

Menggang Li · Qiusheng Zhang
Runtong Zhang · Xianliang Shi
Editors

Proceedings of 2014
1st International
Conference on
Industrial Economics
and Industrial
Security

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on Industrial Economics and Industrial Security

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Preface

This volume contains the proceedings of the 2014 International Conference on Industrial Economics and Industrial Security (IEIS'2014), held in Berkeley, California, USA, and Beijing, China, hosted by the School of Economics and Management, China Center for Industrial Security Research and International Center for Informatics Research of Beijing Jiaotong University (BJTU) in cooperation with University of Reading(UK) and University of California at Berkeley, and supported by FP7 (7th Framework Programme), the National Natural Science Foundation of China (NSFC), and K. C. Wong Education Foundation (Hong Kong).

The conference was held in cooperation with the International Journal of Sustainable Development and Planning (EI Compendex), International Journal of Design and Nature and Ecodynamics (EI Compendex), International Journal of Safety and Security Engineering (EI Compendex), and Pakistan Journal of Statistics (SCI).

With economic globalization, industries in each country have been presenting new phenomena, new situations and new challenges. Thus there is a necessity for academics to conduct in-depth research on industrial organization, industrial structure, industrial development, industrial distribution, industrial policies as well as the theories of industrial security in globalization. The International Conference on Industrial Economics and Industrial Security (IEIS) was initiated under such backgrounds. Focusing on strategic demands of industrial economy and of industrial security in every nation, this conference is to provide a forum for scholars and practitioners in the world to discuss the problems in industrial economics and industrial security theories and practices. It aims to provide insights into solving problems in national economy, social development and economic security.

IEIS 2014 received 168 paper submissions from five countries and regions. Eighty eight papers were accepted and published after strict peer reviews. The total acceptance ratio is 52.3 %. Additionally, a number of invited talks, presented by internationally recognized specialists in different areas, have positively contributed to reinforce the overall quality of the conference and to provide a deep understanding of related areas.

The program for this conference required the dedicated efforts of many people. Firstly, we must thank the authors, whose research and development efforts are recorded here. Secondly, we thank the members of the program committee and the additional reviewers for valuable help with their expert reviewing of all submitted papers. Thirdly, we thank the invited speakers for their invaluable contribution and the time for preparing their talks. Fourthly, we thank the special session chairs whose collaboration with IEIS was much appreciated. Finally many thanks are given to the colleagues from BJTU and Berkeley for their hard work in organizing this event.

Extended and revised versions of the selected papers will be recommended for publication in special issues of the above mentioned four international journals.

We hope you all enjoyed an exciting conference and an unforgettable stay in Berkeley, California, USA, or in Beijing, China. We hope to meet you again next year for the IEIS 2015 at Universitat Politècnica de Catalunya, BarcelonaTech, the details of which will soon be available at <http://icir.bjtu.edu.cn/ieis2015>.

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Part I
Industrial Economics

The Financing of Small and Medium-Sized Enterprises' Strategy

Rongdong Zhang and Bing Huang

Abstract The economy in our country get the steady and rapid development, a large number of small and medium enterprises effectively improve the rate of employment, stimulating the development of local economy. However, since twenty-first century, the development of small and medium-sized enterprises has encountered development bottleneck, generally reflected in the financing problem. On this basis, this paper from the financing and enterprise development strategy point of view to analyze the current problems, and puts forward some views on this problem.

Keywords Small and medium sized enterprises • Financing • Development strategy

1 Introduction

Financing, the financing of small and medium-sized enterprises expensive has become an indisputable fact, but the small and medium-sized enterprise has become the most active one subject in modern market economy China, small and medium-sized enterprises to become bigger and stronger cannot do without financial support, short-term funds or financing channel is not smooth is already one of the small and medium sized the core problem of enterprise growth. At present, the most effective method of enterprise financing through the equity financing or the issuance of corporate bonds, but these two methods because of the small and medium-sized enterprise strength is not enough, corporate credit rating is low, can be said to the small and medium-sized enterprise survival in the line, at any time may disappear, so these two kinds of financing ways are not suitable for small and

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medium enterprises. Small and medium-sized enterprises to obtain funds to support the channel is invisible is limited, indirect financing to bank loans as the main way, and the reality that this is almost the only channel of financing development due to small and medium-sized enterprises or banks, the same is not optimistic [1].

According to the survey, found that the small and medium-sized enterprise development speed is slow, difficult is easy to cause the enterprise capital chain rupture or even bankruptcy reason, small and medium-sized enterprises are in the absence of exogenous financing situation, take the endogenous financing way to enterprises will own savings (including retained earnings, depreciation and fixed liabilities) continuously into investment, which causes the enterprise development speed is slow but also great risks. This mode of financing has become the main mode of financing of small and medium-sized enterprises, which led directly to the small and medium-sized enterprise for R&D funds less or even not the only a little money into R&D and market the new product marketing, in the course of time, the development of small and medium-sized enterprises lack of innovation capability, product only imitated or copied or stay in place, market share will not expand or shrink, more and more low profit margins, the development of this vicious spiral will seriously hinder enterprise even may lead to the enterprise product backlog, capital chain rupture initiation of bankruptcy.

2 The Financing Strategy

2.1 Financing Is Not Smooth in Product R&D Blocked

Small and medium-sized enterprises especially private small and medium-sized enterprises, because of its short history, small scale, poor ability to resist risks and other reasons, led to the development of enterprises and win in the market competition and improve core competitiveness, the only way is to rely on R & D. Start early, the traditional mode of development has now has a certain scale enterprises do not adapt to the present small and medium-sized enterprises. To develop the means to invest, also cannot do without financial support, natural financing problem has come up, and become a key link. In other words, the small and medium-sized enterprise to the smooth development, bigger and stronger, and timely product innovation depends on Financing whether can succeed, otherwise it will seriously hinder the development of small and medium sized enterprises [2].

2.2 Poor Financing Led the Market Development

Now the market is already not the era of the planned economy, but from all walks of life become white hot competition in the market economy, small and medium-sized enterprises as a later how to share a cup of a thick soup in the fierce market, cannot

do without market development. In addition to good products to foreign market development measures need to open up a market, small and medium-sized enterprises by virtue of its own strength is difficult to compete with the giants on the market tide, only difference. Often the difference of behavior is not consistent with the habits of consumers, which requires the cultivation of user habit that is often said that to develop the product market, this also cannot do without strong financial support, if financing is not successful, will directly lead to the lack of funds led to the market development is slow, good product or idea easily by industry giants imitate and beyond, causes the enterprise cannot be developed or acquired, growth and development of small and medium-sized enterprises seriously hinder [3].

2.3 Poor Financing Leads to Lack of Personnel

We know that the enterprise and talents are closely related, if not outstanding talents, the development of enterprises that is simply Arabian Nights, how to obtain the outstanding, outstanding talent with the development of enterprises and the ability to retain talent? Needless to say, this requires favorable treatment and bright occupation development prospects, which requires the enterprise to pay relatively high human cost, this is on one hand. On the other hand, enterprises need to carry on training to the employees of existing enterprises, upgrade the existing employee occupation skill training and occupation accomplishment, to the small and medium-sized enterprise oneself actual strength is very difficult to do or is difficult to do a good job, often by the decision-makers of enterprises to reduce the cost of enterprise name directly to ignore or cope with the past, so that enterprises lack vitality and dynamic intellectual innovation, make the enterprises lack of stamina, hinders the small and medium-sized enterprises bigger and stronger, dream [4].

2.4 Poor Financing Increased Production Costs

As everyone knows, enterprises to reduce production costs in addition to technical innovation, optimization of process flow, is a large-scale, integrated production. Due to the small and medium-sized enterprise technical force is relatively weak, rely on technological innovation to reduce the cost of production in a short period of time is difficult to achieve, but also unrealistic. Can only make use of the existing technical conditions for mass production, which is the most reliable and feasible, it must need a lot of money to equipment and recruitment launched large enough production personnel and corresponding supporting staff and management personnel, if the financing channels blocked poor words, no money, no able to form scale production, only small-scale production lead to the production costs are high, the lack of price and quality advantages in the market, seriously affecting the expanded reproduction of the enterprise profit and [5].

3 In View of the Financing Difficulty

3.1 The Use of Advanced Technology Research Efforts

The small and medium-sized enterprise managers when making business decisions, should be aware of the company, the current development trend and market demand and the actual strength of the enterprise, cannot be instant success, blind optimism, the blind pursuit of enterprises temporarily benefit. Look to put in the long run, making a good development of the company's strategy, the author thinks, the small and medium-sized enterprise first to put the limited resources is preferred to the research and development of products, only the truly innovative, made with different products and industry giants, and then actively seek financing, injection for foreign capital. You know, the small and medium-sized enterprise financing difficult why, one point is the small and medium enterprises make the products lack of scientific and technological content, can't let investors have a strong willingness to invest, natural financing difficulties. Only doing good product is the best means of investment.

3.2 Reduce the Financial Pressure

The small and medium-sized enterprise with money from two aspects, one is the endogenous money, another is foreign capital, foreign capital injection in difficult and channel not unobstructed situation, can make more in line with the actual business of advanced marketing strategy, play safe, open up the market expanding share, as far as possible for the enterprise sell more products and timely recovery of funds, develop steadily, not all aggressive, timely sales timely recovery of funds, to ease the pressure on enterprise funds, reduce the financial cost.

3.3 Establish the Alliance of Enterprises

The small and medium-sized enterprise strength is often poor, anti-risk ability is poor, small and medium-sized enterprises in this case can be considered to find and with the cooperation between the enterprises bundled against risk together, common development, division of labor to reduce operating costs. In the selection of enterprises, to give priority to and the enterprise to the common development of enterprises as partners, to exchange information timely seize market opportunities, to resist market risk, through the integration of enterprise alliance of enterprise resources, cooperation, mutual reciprocity and mutual benefit, and formed a new organization system. Let the enterprise alliance in each member enterprise can by force, the high quality resources inside and outside the enterprise integration,

improve the overall competitive advantage, to create extraordinary competitive advantage, establish common interests body. The strategic alliance is a partnership of strategic thinking, can let the small and medium enterprises in the same industry to avoid killing each other lead to vicious competition in the way of thinking evolved into mutual cooperation, mutual win-win cooperation, the strategic alliance of small and medium enterprises can realize the small and medium-sized enterprise vision and is the most effective and feasible method.

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Differences of Environmental Policy Timing Among Provinces in Chinese Mainland: A Real Options Methodology

Chengli Zheng and Yan Chen

Abstract According to differences among Chinese provinces, especially economic growth and environmental production technology, real options model is used to analyze implementation timing of environmental policies and its main factors under the uncertainty framework. The closed solution and empirical analysis shows that the most important factor of environmental policy timing is technical parameters of environmental production, followed by economic scale and growth, and the disutility parameters caused by environmental pollution, policy implementation cost, the subjective discount factor. As a controllable parameter, the emission reduction ratio required also play an important role. The differences among Chinese provinces require the flexibility of environmental policy, not rigidly uniform.

Keywords Environmental policy • Execution timing • Real options • Emission trade

1 Introduction

To mitigate the environmental problem, the whole world is doing something, including China. The amount of carbon emission per unit of GDP in China is promised to reduce by 40–45 % of that from the year of 2005–2020. However, it is a very difficult task for the country in the key stage of industrialization and urbanization process. How and when to execute the new environmental policy is very important. And, because of differences among the provinces, especially the difference of economic development level, the optimal timing for new policy must be different for them. This is the theme of our paper here. Most of literatures about

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environmental policy apply the cost-benefit analysis, in which only the present value of cost and benefit are considered (see Cropper and Oates [1]). However, this method fails to capture uncertainties and timing option in adopting a new policy. To solve this problem, real options analysis are used in many environmental literatures such as Pindyck [2], Wirl [3]. It is because that environmental decision-making can be viewed as an American option. Based on Pindyck [4] model, Nishide and Ohyama ([5], NO here after) apply the real options to treat the uncertainty of execution timing of policy. They think that the policy maker must consider the economic size when make a decision about GHG emission for the country, because the stock and flow of pollutants depend strongly on the economic size. Empirical research confirms this, see Azomahou et al. [6]. Empirical evidences show that certain types of environmental pressure exhibit an inverted-U relationship with per capita income, which is called environmental Kuznets curve (de Bruyn et al. [7]). However, it is pointed out that every country does not always trace a similar Kuznets curve, and the relationship between GDP and pollutants are different across different countries. So, how does the economic size and growth give impact on the execution timing of environmental policy? Under the framework of NO, we apply real options method to investigate the optimal execution timing of new environmental policy in Chinese Mainland, considering their differences in economic growth and environmental production technology. We extend the NO model with three aspects. The closed solution and empirical analysis for China are presented.

2 The Model and Its Solution

We consider an environmental policy optimization problem with some modifications based on NO model. Firstly, we assume that policy execution cost is random, which is fixed in NO model. Secondly, in contrast to the assumption of NO that once new policy was executed, pollution emissions declined immediately to the required level, we let emissions decreased with the time on the basis of actual policy requirements. Our assumption is consistent with the real situation. And, we consider the consumer price index (CPI) for all the related variables, such as GDP.

Assume one decision-making for new environmental policy is to reduce pollutant emission, which will impact the level of GDP. At time t , GDP is denoted by Y_{ot} , CPI is denoted by C_t , and GDP deflated by CPI: $Y_t = Y_{ot}/C_t$. Suppose that Y_t follows the process: $dY_t = \mu_Y Y_t dt + \sigma_Y Y_t dz_t^Y$, where z_t^Y is the standard Brownian motion, expected growth rate μ_Y and volatility σ_Y are constants. Here, it means that the GDP is independent of the environmental policy. Then, the stock of pollutant is M_t which evolves according to $\dot{M}_t = \beta_t(Y_t)^\xi - \delta M_t$, where $\beta_t(Y_t)^\xi$ is the pollutant emission amount at time t , ξ is a constant; δ is the rate of natural decay of pollutants. The equation means that the increment of pollutants for every year is the difference of pollutant emission amount and the natural decay amount. The pollutant emission amount $\beta_t(Y_t)^\xi$ is related with the GDP. Assume that new environmental policy is executed at time τ , and at time $t < \tau$ (before execution) $\beta_t = \beta_N$. The new policy

requires that the pollutant emission amount for per GDP must decrease by $\alpha\%$ of last year from time τ , namely $E\left[\beta_t(Y_t)^{\xi-1}/\left(\beta_{t-1}(Y_{t-1})^{\xi-1}\right)\middle|t-1, t \geq \tau+1\right] = 1 - \alpha\%$. So, we have $\beta_t = \beta_{t-1}(1 - \alpha\%)\exp(-[\mu_Y(\xi - 1) + \sigma_Y^2(\xi - 1)(\xi - 2)/2])$. With the time elapsing, pollutant emission amount for per GDP will decrease to a stable level but not to zero. We assume it is $\beta_{t \rightarrow \infty} = \beta_G$. Apparently, after executing the new policy, the approximate result is $\beta_t = \beta_G + (\beta_N - \beta_G)e^{-\beta(t-\tau)}$, $t \geq \tau$, where $\beta = -\log(1 - \alpha\%) + \mu_Y(\xi - 1) + \sigma_Y^2(\xi - 1)(\xi - 2)/2$. So we have:

$$\dot{M}_t = \begin{cases} \beta_N(Y_t)^\xi - \delta M_t, & t < \tau \\ [\beta_G + (\beta_N - \beta_G)e^{-\beta(t-\tau)}](Y_t)^\xi - \delta M_t, & t \geq \tau \end{cases} \quad (1)$$

It is very different from NO model. There, once the new policy is implemented, the pollutant emission amount decrease to the level required, namely $\beta_t = \beta_G$, $t \geq \tau$. This is not the real thing. However, our treatment approaches the real situation. The damage by pollutant is called disutility, which translates the damages into monetary cost, and reflects change in preference and technologies. We denote disutility from a unit amount of pollutant at time t by θ_t , and assume that it follows the process $d\theta_t = \mu_\theta\theta_t dt + \sigma_\theta\theta_t dz_t^\theta$, where z_t^θ is the standard Brownian motion. We assume that the decision maker determine the timing to execute the new policy in order to minimize the social costs associated with environmental damage and sunk costs associated with execution of new policy. Specifically, the objective function is as

$$\sup_{\tau \in T} E_0 \left[\int_0^\infty -\theta_t M_t e^{-\phi t} dt - K_\tau e^{-\phi \tau} \right] \quad (2)$$

in which K_τ is the social costs associated with execution of new policy. In NO model, social costs K is fixed. However, K_τ changes with time. In fact, we suppose that $K_\tau = kY_\tau$ with a constant k , which means that it is random. T is the admissible set for implementation times. ϕ is the subjective discount rate reflecting the time preference of policy maker. From Eq. (2), we can see it is just an optimal stopping-time problem. Recently, because of swift growth of emission trade market, its market price p_t can be one alternative for the social costs θ_t associated with environmental damage, see Insley [8] in detail. We apply the same method as NO model: $p_t = E \left[\int_t^\infty e^{-\phi(s-t)} \theta_s \left(e^{-\delta(s-t)} \right) ds \middle| \theta_t \right] = \theta_t / (\phi + \delta - \mu_\theta)$. Assume that the stock of pollutants before and after executing the new policy are M_{Nt}, M_{At} respectively. Then the objective function (2) can be rewritten as

$$V_1 + \sup_{\tau \in T} E_0 \left[\int_\tau^\infty -\theta_t (M_{At} - M_{Nt}) e^{-\phi t} dt - K_\tau e^{-\phi \tau} \right] \quad (3)$$

Where V_1 is constant, and the other part can be viewed as American call option with unlimited term and variable strike price. We denote $\zeta_t = \theta_t(Y_t)^\xi$, which

is a diffuse process with: $\mu_\zeta = \mu_\theta + \xi\mu_Y + \rho_{\theta Y}\xi\sigma_\theta\sigma_Y + \xi(\xi - 1)/2\sigma_Y^2$, $\sigma_\zeta = \sqrt{\sigma_\theta^2 + 2\rho_{\theta Y}\xi\sigma_\theta\sigma_Y + \xi^2\sigma_Y^2}$, $\rho_{\theta Y}$ is the correlation efficient between the growth rate of Y_t and θ_t . The optimal execution of the new policy can be stated as proposition 1.

Proposition 1 Suppose that $\phi > \max(\mu_\theta - \delta, \mu_\zeta)$, then the optimal execution timing (stopping time) takes the form of $\tau = \inf\{t \geq 0, \chi_t \geq \chi_B\}$, and

$$\chi_B = p_B\beta_N Y_B^{\xi-1} = [\gamma(\phi - \mu_\zeta)(\phi - \mu_\zeta + \beta)\beta_N k] / [(\gamma - 1)\beta(\beta_N - \beta_G)] \quad (4)$$

where $\gamma = \left[-\mu_\zeta + \sigma_\zeta^2/2 + \sqrt{(\mu_\zeta - \sigma_\zeta^2/2)^2 + 2\phi\sigma_\zeta^2} \right] / \sigma_\zeta^2$ and χ_B is the trigger value.

In fact, τ is hitting time. When a stochastic variable obtain the threshold value at the first time (hitting time), it trigger the event of implementation for new policy. The proof is omitted. $\chi_t = p_t\beta_N Y_t^{\xi-1}$ is the social cost associated with pollutant per unit of GDP, which means that every unit of GDP must bear χ_t amount of social cost associated with pollutants; namely, the proportion of one unit GDP must be offset by the social cost associated with pollutants. χ_t is a diffuse process with $\mu_\chi = \mu_\zeta - \mu_K - \rho_{\zeta K}\sigma_\zeta\sigma_K + \sigma_K^2$, $\sigma_\chi = \sqrt{\sigma_\zeta^2 - 2\rho_{\zeta K}\sigma_\zeta\sigma_K + \sigma_K^2}$, $\rho_{\zeta Y}$ is the correlation efficient between the growth rate of Y_t and ζ_t . When $\chi_t < \chi_B$, it means that holding on the old policy can produce more value than executing new policy, so the old policy must be held on. When $\chi_t \geq \chi_B$, it means that the social cost associated with pollutant per unit of GDP is too high, holding on the old policy can produce less value than executing new policy, so the new policy must be executed. The decision-maker observes the real situation of economy and environment system, and evaluates χ_t , then makes a decision about the environmental policy according to proposition 1. Figure 1 displays four kinds of possible situation, which correspond to four kinds of possible paths for $\chi_{it}(i = 1, 2, 3, 4)$.

From proposition 1 and the four situations in Fig. 1, we have following the corollary 1 about the optimal timing of new policy. The proof is easy, so we omitted.

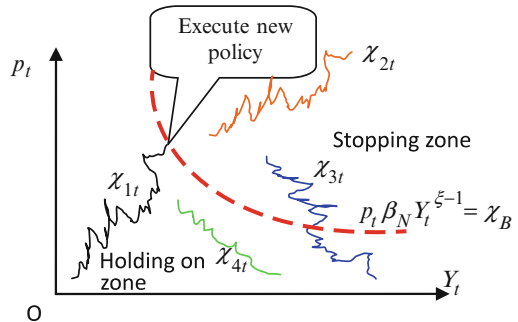


Fig. 1 Threshold value of new policy

Corollary 1 The expected time to the new environmental policy execution is:

$$\begin{aligned}
 E[\tau|\chi_0] &= \log(\chi_B/\chi_0)/(\mu_\chi - \sigma_\chi^2/2) \quad \text{if } \chi_B \geq \chi_0, \mu_\chi - \sigma_\chi^2/2 > 0; \\
 E[\tau|\chi_0] &= 0 \quad \text{if } \chi_B < \chi_0; \text{ else it is } E[\tau|\chi_0] \rightarrow \infty
 \end{aligned}
 \tag{5}$$

From the proposition and corollary above, we can see that the optimal execution timing is related with many factors, such as the economy (GDP size, growth rate and volatility), environmental technology (amount of pollutant emission during the production), social costs to manage the pollutants, disutility (pollutants emission trade market price as a substitute) and time preference for pollutants. Each decision-maker can determine execute the new policy or not and the optimal timing of execution according to the proposition and corollary and their own parameters.

Moreover, from the formula (5), we know that the relationship between the threshold value and expected hitting time is not monotonous. It can explain environmental Kuznets curve to some extent, combining with the proposition 1. Supposed that some a country has a very high $\xi > 1$ at initial stage, this situation is similar to χ_{1t} in Fig. 2. When GDP increases to a size that can trigger the threshold value and the new policy is executed. The new policy will decrease ξ gradually or lead to $\beta_N \rightarrow \beta_G$. With a series of new policies implementation one after another in a long run, the relationship between environmental pressure and per capita income will finally exhibit an inverted-U curve, namely environmental Kuznets curve. Because the factors for different countries are different, it will exhibit different types of environmental Kuznets curve.

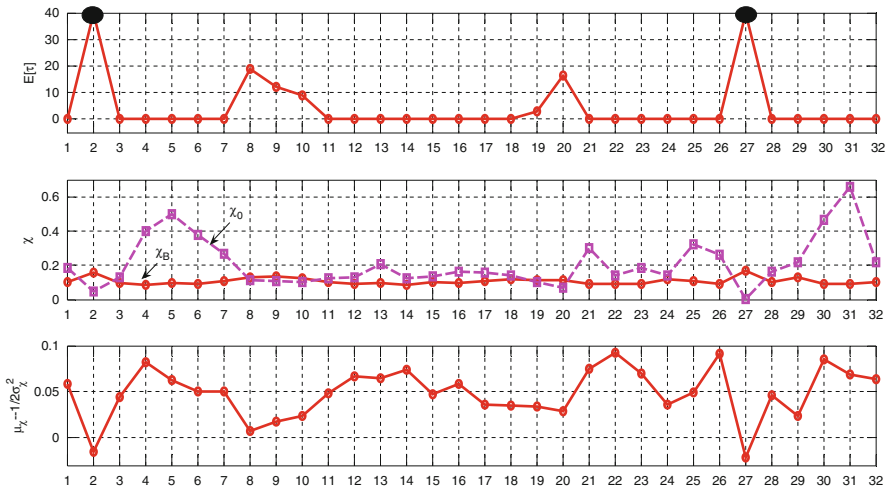


Fig. 2 Threshold value and optimal expected time for provinces in Chinese Mainland. Middle: χ_B -real line with dot marks; χ_0 -dashed line with square marks

3 Empirical Analysis for Provinces in Chinese Mainland

We apply the model and result in above section to analyze the optimal timing of new environmental policy execution for provinces in Chinese Mainland. There are many kinds of pollutants. But we only take carbon emission reduction policy as an example. We have 32 decision-making Units (including 31 provinces and whole China). For convenience, all the units are given a number from 1 to 32, they are: whole China, Beijing, Tianjing, Hebei, Shanxi, Neimeng, Liaoning, Jilin, Heilongjiang, Shanghai, Jiangsu, Zhejiang, Anhui, Fujiang, Jiangxi, Shandong, Henan, Hubei, Hunan, Guangdong, Guangxi, Hainan, Chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang. Data includes annual GDP, CPI, CO₂ emission amount from the year of 1992–2010. The data for disutility is substituted by carbon trade market data (CERs price data from ECX, website of Bluenext). Then, the data is pretreated. GDP is deflated by CPI. We estimate the growth rate μ_Y and volatility σ_Y of GDP for all the provinces. Then β_N and ξ are estimated through the relationship that the CO₂ emission amount equals $\beta_N(Y_t)^\xi$. The rate of natural decay of pollutants $\delta = 0.0041$. It is the same as NO model. NO select $\beta_G = \beta_N/10$ according to Factor 10 in European Union. We take the same method as them. And according to the promise of our central government, we take $\alpha\% = 20\%$ and will change it for different situations. Then β can be computed. According to Factor 10, NO estimated that the social cost associated with the execution of new policy is 25 % of GDP, so we take $k = 0.25$. And $\mu_\theta = \mu_p$, $\sigma_\theta = \sigma_p$, $p_t = e_t CER_t$, where CER_t is the market spot price of CER and e_t is the exchange rate. p_t is deflated by CPI. Then we compute the parameters such as $\rho_{\theta Y}, \mu_\zeta, \sigma_\zeta, \rho_{\zeta K}$ and μ_χ, σ_χ . According to proposition 1, it must satisfy $\phi > \max(\mu_\theta - \delta, \mu_\zeta)$. Yield of treasury bonds is not suitable, because it is too low (about 4 % annually). The growth rate of Chinese GDP is very high, many provinces exceed 10 % annually. At the meantime, the price of carbon trade increase by 10 % averaged annually, even by 46 % in the year of 2005. This leads to the results that μ_ζ of provinces in China are very high, some of them reach to 23 %. So, we select $\phi = 0.25$ for all provinces. Then, γ can be calculated. After completing calculation for all the parameters for the model, we compute χ_B and $E[\tau|\chi_0]$ according to formulas (4 and 5). The current time is the year of 2011. So the current χ_0 is computed from 2011. Some results are showed in Fig. 2, other results are omitted because of limit of space of the paper. Because the expected time $E[\tau|\chi_0]$ mainly depends on three synthesized factors (namely the threshold value χ_B , current χ_0 and expected growth rate of χ_t), the threshold value χ_B and χ_0 (the current social cost associated with pollutant per unit of GDP), $\mu_\chi - \sigma_\chi^2/2$ and $E[\tau|\chi_0]$ for every decision unit are showed in Fig. 2. The unit of $E[\tau|\chi_0]$ is years. For Beijing and Xizang, 40 years just means the need not to execute.

From Fig. 2, it shows that almost all the provinces in Chinese Mainland need to execute the new environmental policy right now, except a few of them. The

situation of the majority is similar to the path χ_{2t} in Fig. 1, where $\chi_0 > \chi_B$, and $\mu_\chi - \sigma_\chi^2/2 > 0$. In the exceptions, Jilin, Heilongjiang, Shanghai, Hunan and Guangdong (no. 8–10, 19–20) can delay some years, which is similar to the path χ_{1t} in Fig. 1, where $\chi_0 < \chi_B$, but $\mu_\chi - \sigma_\chi^2/2 > 0$. However, Beijing and Xizang (no. 2 and 27) need not execute the new policy at all. Beijing as the capital does better than other provinces, and will go on this way. There are few industries in Xizang, so it emits a small amount of pollutants. And their $\mu_\chi - \sigma_\chi^2/2$ is negative which means their χ_t will decrease with the time. This situation is similar to path χ_{4t} in Fig. 1. There are no provinces similar to the path χ_{3t} .

4 Conclusion and Discussion

The paper analyzes the optimal execution timing of new environmental policy under the framework of real options. It shows that there are many factors that have impacts on the optimal timing, including economic growth rate, volatility, disutility caused by pollutants, policy execution costs, time preference, environmental technology parameter. The last one is most important, it affect the optimal timing directly. The decision-maker observes the real situation of economy and environment system, and evaluates his own social cost associated with pollutant per unit of GDP compared with the trigger value, then makes a decision about the environmental policy. Under the requirements of the new policy, the local government and the micro units (companies) must adjust the environmental technical parameter through adjusting the industrial structure, improving the production techniques to produce less pollutants, and dispose the pollutants before emission.

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A New Production and Inventory Control System Seeking for Inventory Recovery and Operational Cost Trade-off

Bowei Xu, Yongsheng Yang, Guolong Lin, and Bin Yang

Abstract This paper focuses on the triple feed-forward automatic pipeline, inventory and order-based production control system (TFF-APIOBPCS), by introducing a first order differential feedforward to APIOBPCS. The feedforward mechanism help to mitigate the impact of demand fluctuations and enhance supply chain resilience. In this research, analysis of the relationship between parameters of first order differential feedforward and inventory recovery metric (*ITAE*) is conducted. Operational cost model is constructed. Simulations with a unit step signal as the customer demand evaluate the effect of the feedforward mechanism, and reveal the validity of TFF-APIOBPCS.

Keywords Production control system • Inventory recovery • Operational cost

1 Introduction

Supply chain resilience [1, 2] is affected by production strategies. APIOBPCS [3, 4] can reduce the uncertainty of demand, help to reduce production peaks and troughs, and allow the production and inventory with a little cushion. Virginia et al. [5] used the *ITAE* to evaluate an often used benchmark model of make-to-stock supply chain, and found that optimum solutions for resilience do not yield a system that is robust to uncertainties in lead-time.

In this work, to trade off between the optimal inventory recovery and minimal operational cost, we first propose triple feedforward (TFF) APIOBPCS model by introducing a first order differential feedforward to APIOBPCS. We use *ITAE* (integral of time-weighted absolute value of the error) measure to assess inventory recovery in the case of distinct poles under zero steady-state error. When considering

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the supply chain's goal, operational cost involves inventory cost and production regulation cost. Parameter k_2 variations and impact on inventory recovery and operational cost are verified with simulations.

2 Triple Feedforward APIOBPCS

This paper introduces a feedforward control $G_c(s)$ to APIOBPCS (as shown in Fig. 1), in consideration of feedforward control can compensate or counteract the disturbance effect on the general control system. We call it triple feedforward APIOBPCS (TFF-APIOBPCS) because of three feedforward controls in this system. The actual values of signals in Fig. 1 are expressed by the lowercases. And Laplace transform of each signal is named by the uppercases. T_a, T_i, T_q, T_w and T_p are positive.

Let supply chain system response to a unit step input and $G_c(s) = k_1 + k_2s$, it is easy to deduce that if $1/T_p + 1/T_w > 0$, $1/(T_i T_p) > 0$ and $1/T_a > 0$, TFF-APIOBPCS would reach steady state.

3 Inventory Recovery Under Zero Steady-State Error

Inventory recovery is one key performance index to assess supply chain resilience. Therefore, we use $ITAE$ to evaluate inventory recovery when $cons(t) = 1(t)$, $k_1 = T_i(T_p - T_q)$ (under zero steady-state error).

One of the poles, p_0 is easily identified ($-1/T_a$) and the other two poles (p_1 and p_2) are equal to the roots of the quadratic equation in the denominator. We use the unit step response to evaluate the impact of system dynamics.

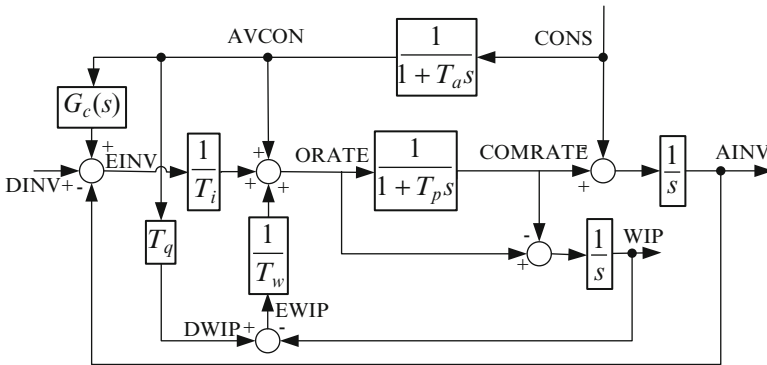


Fig. 1 Block diagram representation of TFF-APIOBPCS

ITAE values are calculated in different pole distributions [5]. In the case of distinct poles: real and/or complex.

$$ITAE = \left| A \cdot T_a^2 + B \frac{\sigma_{p_1}^2 - \omega_{p_1}^2}{(\sigma_{p_1}^2 + \omega_{p_1}^2)^2} + C \frac{\sigma_{p_2}^2 - \omega_{p_2}^2}{(\sigma_{p_2}^2 + \omega_{p_2}^2)^2} \right| \tag{1}$$

Where, $A = -[T_i T_a (T_w + T_p) - k_2 T_w] / [T_i T_p T_a T_w (p_1 + 1/T_a)(p_2 + 1/T_a)]$,

$B = -[T_p T_a T_i T_w (p_1 + 1/T_a) + T_i T_a (T_w + T_p) - k_2 T_w] / [T_i T_p T_a T_w (p_1 - p_2)(p_1 + 1/T_a)]$,

$C = -[k_2 T_w - T_i T_a (T_w + T_p) - (p_2 + 1/T_a) T_p T_a T_i T_w] / [T_i T_p T_a T_w (p_2 + 1/T_a)(p_1 - p_2)]$.

For the convenience of analysis, the internal number of the absolute value symbol in Eq. (1) is indicated by $ITAE'$. That is $ITAE = |ITAE'|$.

$A, B, C, ITAE$ and $ITAE'$ are $A_0, B_0, C_0, ITAE_0$ and $ITAE_0'$ when the system is APIOBPCS [3] ($k_2 = 0$). We establish the relation among $A, B, C, ITAE, ITAE'$ and $A_0, B_0, C_0, ITAE_0$ in distinct poles. $A = A_0 + k_2 / [T_i T_p T_a (p_1 + 1/T_a)(p_2 + 1/T_a)]$, $B = B_0 + k_2 / [T_i T_p T_a (p_1 - p_2)(p_1 + 1/T_a)]$, $C = C_0 - k_2 / [T_i T_p T_a (p_2 + 1/T_a)(p_1 - p_2)]$, and $ITAE' = ITAE_0' + k_2 \Theta / T_i T_p T_a$. Where $\Theta = \frac{T_a^2}{(p_1 + 1/T_a)(p_2 + 1/T_a)} + \frac{1}{(p_1 - p_2)(p_1 + 1/T_a)(\sigma_{p_1}^2 + \omega_{p_1}^2)} - \frac{1}{(p_1 - p_2)(p_2 + 1/T_a)(\sigma_{p_2}^2 + \omega_{p_2}^2)}$ if $\Theta > 0$, $ITAE'$ value increases linearly with increasing k_2 . Conversely, $ITAE'$ value decreases linearly with increasing k_2 .

Let coefficient of k_2 in Equation $ITAE' = ITAE_0' + k_2 \Theta / T_i T_p T_a$ be λ . T_a, T_i, T_p, T_w, T_p are all sampled in (0,100) using Monte Carlo method according to a Low Discrepancy sequence—Korobov Lattice [6]. Sampling results indicate that $ITAE'$ value changes linearly with k_2 . Therefore, $ITAE$ value changes linearly or piecewise linearly with k_2 .

4 Supply Chain Operational Cost

Suppose that C_h denotes unit stockholding cost, C_p denotes unit stock-out cost, and $IC(n)$ denotes average inventory cost in n cycles

$$IC(n) = \frac{1}{n} \sum_{t=1}^n \{C_h[ainv(t)]^+ + C_p[ainv(t)]^-\} \tag{2}$$

Where, $x^+ = \begin{cases} x, & x \geq 0 \\ 0, & x \leq 0 \end{cases}$, $x^- = \begin{cases} 0, & x \geq 0 \\ -x, & x \leq 0 \end{cases}$, $C_h[ainv(t)]^+$ denotes stockholding cost in the t^{th} cycle, $C_p[ainv(t)]^-$ denotes stock-out cost in the t^{th} cycle.

We use production regulation cost to describe order rate drifts. $dorate(t)/dt$ denotes the size of the order rate fluctuations per cycle. CO_h denotes unit production regulation cost of a rise in order rate. CO_p denotes unit production regulation cost of a drop in order rate. $DC(n)$ denotes average production regulation cost in n cycles. T_m is the sampling period. For the convenience of implementation, $DC(n)$ is described by difference equation.

$$DC(n) = \frac{1}{n} \sum_{t=1}^n \{CO_h[orate(t+1) - orate(t)]^+ / T_m + CO_p[orate(t+1) - orate(t)]^- / T_m\} \quad (3)$$

Operational cost includes production regulation cost and inventory cost. $C(n)$ denotes average operational cost in n cycles. $C(n) = IC(n) + DC(n)$.

5 Simulation

This section starts comparing the performance of APIOBPCS [3] and the TFF-APIOBPCS proposed in the current work with respect to inventory tracking and operational cost decrease. The comparisons are performed by simulating one echelon supply chain with MATLAB under a unit step in the case of distinct poles.

The simulation time is 100 cycles. $dinv(t) = 1$, $cons(t) = 1(t)$, and $ITAE$ values are calculated. Let $C_h = 2$, $C_p = 10$, $CO_h = 20$ and $CO_p = 10$. Their units are million yuan. Our calculations assume that if the actual order rate response is equal to demand, the production regulation cost would not be affected.

To simulate the dynamics for the case of distinct poles in Sect. 3, let $T_p = 6$, $T_i = 5$, $T_a = 12$, $T_w = 18$, $T_q = T_p$ and $k_I = T_i(T_p - T_q) = 0$. In this case, TFF-APIOBPCS is stable, steady state error is 0. Figure 2a discloses $ITAE$, $IC(n)$, $DC(n)$ and $C(n)$ changes with parameter k_2 under a unit step input. In order to plot $ITAE$, $IC(n)$, $DC(n)$ and $C(n)$ on a figure for compare and analysis their trends of changes with k_2 , $ITAE$ values are divided by 250 in Fig. 2a. We see that $ITAE$ value first decreases linearly, and then increases linearly. $DC(n)$ first decreases slightly, and then increases slowly. $IC(n)$ and $C(n)$ first decreases rapidly, and then increases slowly.

Figure 2b discloses $dinv(t)$ and $ainv(t)$ changes with parameter k_2 under a unit step input. Actual inventory fluctuates dramatically and shortage cost is high in APIOBPCS (when k_2 is 0). With the increase of k_2 , system response is improved, and the deviation from the target inventory is minimized firstly. And then the actual inventory fluctuations strengthen, shortage cost decreases and stockholding cost increases gradually. When k_2 is 100, the actual inventory exhibits the least volatility.

Figure 2c discloses $cons(t)$ and $orate(t)$ changes with parameter k_2 under a unit step input. Order rate fluctuates dramatically, which leads production to be more volatile with some compromise in increased production regulation cost

Fig. 2 Dynamic response performance of supply chain system under a unit step input

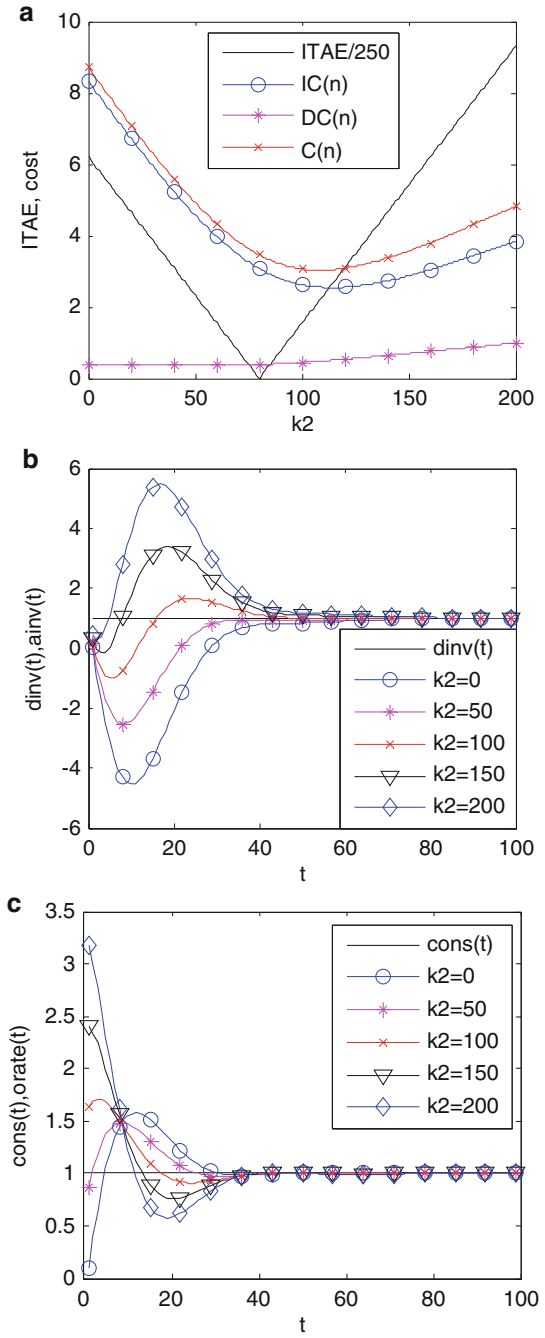


Table 1 Variations of $ITAE$, $IC(n)$, $DC(n)$ and $C(n)$ under a unit step input

k_2	$ITAE$	$IC(n)$	$DC(n)$	$C(n)$
0	1,550.07	8.33	0.38	8.71
50	581.28(-62.50 %)	4.57(-45.14 %)	0.37(-5.26 %)	4.93(-43.40 %)
100	387.52(-75.00 %)	2.62(-68.55 %)	0.44(15.79 %)	3.06(-64.87 %)
150	1,356.31(-12.50 %)	2.87(-65.55 %)	0.70(84.21 %)	3.57(-59.01 %)
200	2,325.11(50.00 %)	3.83(-54.02 %)	0.99(160.53 %)	4.82(-44.66 %)

when $k_2 = 0$ (APIOBPCS). With the increase of k_2 , the order rate drift first weakens, and then strengthens, which verifies production regulation cost first decrease, and then increase in Fig. 2a.

Table 1 discloses values of $ITAE$, $IC(n)$, $DC(n)$ and $C(n)$ under a unit step input when $k_2 = 0, 50, 100, 150, 200$. The percentages of Table 1 in line 3–6 row 2–4 indicate change rates of $ITAE$, $IC(n)$, $DC(n)$ and $C(n)$ values of TFF-APIOBPCS relative to $ITAE$, $IC(n)$, $DC(n)$ and $C(n)$ values of APIOBPCS ($k_2 = 0$). Positive/Negative numbers denote increase/decrease. Table 1 highlights a rather worrying situation that APIOBPCS (when k_2 is 0) has poor inventory recovery ($ITAE$ value is 1,550.07) and high cost ($IC(n)$ is 8.33, $C(n)$ is 8.71). When we take TFF-APIOBPCS and let $k_2 = 100$, the inventory recovery performance improves significantly ($ITAE$ value drops by 75 %) and average operational cost decline dramatically by 64.87 %. Therefore, in the process of the actual operation and management, parameter k_2 is suitable for relatively large number (such as 50–100), so as to trade-off between the optimal inventory recovery and minimal operational cost.

6 Conclusions

To sum up, supply chain is a complex system where the customer demand changes with time. In this research, steady state error of TFF-APIOBPCS is analyzed, and inventory recovery under zero steady-state error is assessed. Supply chain operational cost model is constructed. Supply chain system simulations show that TFF-APIOBPCS is more successful than APIOBPCS.

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The Data Envelopment Analysis of Eco-efficiency in Western China from 2000 to 2010

Xuemei Zhang, Xiuping Yang, and Qianhong Li

Abstract In the view of sustainable development, there are some resources and environmental problems increasingly prominent in the economic development of western China due to its fragile ecosystem. This paper evaluates the eco-efficiency and analyzes the changes based on DEA model with the data of Provinces in western China from 2000 to 2010. The results show as follows: the average value of eco-efficiency is less than 1 and fluctuated since the west development, not reaching the most effective production frontier; there are some striking differences among provinces from two respects of efficiency and redundancy rate; such pollutants as waste gas, industrial waste water and solid wastes and such natural resources as energy are major factors influencing the western eco-efficiency.

Keywords Western China • Eco-efficiency • DEA model

1 Introduction

How to reach a win-win situation for economic development and environment resources protection has always been concerned by environment experts and economists. Scholars (Schaltegger, Sturm) propose the concept of eco-efficiency, and constantly enrich, improve and develop it [1]. According to World Business Council of Sustainable Development [2–3], the concept of eco-efficiency combines two dimensions of economics and ecology to establish a relationship between the product or service value and its environmental impact, seeking to achieve a greater aggregate value to the product or service with reduced environmental impacts [2]. The Organization of World Economic Cooperation and Development (OECD) expands the concept into government, industries, enterprises and other organizations and thinks that eco-efficiency is “the efficiency of ecological resources to meet human needs”, as a ratio of the output and input [4]. Although there are different expressions, a

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common point is that the economic value is maximized while resource consumption and environmental load is minimized.

Eco-efficiency has become a significant tool of assessing sustainable development at different levels. It mainly develops in the products, companies, industries and is measured in different ways. But two typical methods are popular in the calculation: one is the ratio of the value to impact, and another is data envelopment analysis (DEA) based on the relative efficient concept. In recent years, Chinese scholars not only introduce foreign advanced ideas and theoretical methods, but also focus on quantitative study of regional eco-efficiency in China more and more. As a whole, most studies concentrate on the nationwide evaluation of eco-efficiency by utilizing the data envelopment analysis [5–8]. However, there are almost few researches about the eco-efficiency of specific area, such as western China, where the contradiction is obvious and serious between the economic development, resources and environment.

In view of this, the article attempts to take western region as the research object, measures the eco-efficiency of West region since the west development, with modifying the CCR of DEA model and regarding the resources and environment indicators, and explicates the improving directions of western economy to realize eco-efficient in the future.

2 Methodology and Data

2.1 The DEA Model for Assessing

DEA is a non-parametric assessment method that was created in 1978 by Charles, Cooper etc. mainly using mathematical programming model to estimate the relative effectiveness and the production frontier about multi-input, multi-output sectors or decision-making units (DMU) [9]. The regional eco-efficiency measurement is a process of the relative efficiency assessment according to inputs and outputs in a complex system. So the approach of DEA is consistent with the relative and procedural characteristics of regional eco-efficiency. The research is based on the hypothesis that there are n areas, of which one is called as a decision making unit (DMU) during the same period, and each DMU has m kinds of input X , r kinds of output Y . If x_{ij} represents the total volume of i input in j area ($i = 1, 2, \dots, m$) and y_{lj} represents the total volume of l output in j area ($l = 1, 2, \dots, r$), the input and output in j area can be expressed as $X_j = (x_{1j}, x_{2j}, \dots, x_{mj})^T$ and $Y_j = (y_{1j}, y_{2j}, \dots, y_{rj})^T$ respectively. Then (X_j, Y_j) reflects the entire production activities of DMU $_j$. Taken the eco-efficiency of DMU $_{j_0}$ as the objective function and the efficiency indexes of all decision making units as constraint conditions, the linear programming model of optimal CCR is shown as follows:

$$\begin{aligned}
 & \min \theta \\
 \text{s.t.} \quad & \sum_{j=1}^n \lambda_j X_j + s^- = \theta X_j \\
 & \sum_{j=1}^n \lambda_j Y_j - s^+ = Y_j \\
 & \lambda, s^-, s^+ \geq 0, j = 1, 2, \dots, n
 \end{aligned} \tag{1}$$

In Eq. (1), s^- , s^+ remark the slack variables of input/output respectively. The ratio of slack variables s^-_{ij} to corresponding index x_{ij} can be defined as the input redundancy rate that indicates the proportion of input component reduced. If the optimal value $\theta^* = 1$, $s^{-*} = 0$, and $s^{+*} = 0$, the eco-efficiency of DMU_{j_0} is effective. It means that the output relying on the original input has reached the optimum. If the optimal solution $\theta^* = 1$, $s^{-*} \neq 0$, or $s^{+*} \neq 0$, the eco-efficiency of DMU_{j_0} is weakly efficient. That is to maintain the output by decreasing s^{-*} of input or increase s^{+*} of output by remaining the input. If $\theta^* < 1$, the eco-efficiency of DMU_{j_0} is inefficient.

However, besides the desired inputs/ outputs, the undesirable inputs/outputs are often accompanied just like environmental pollutants. It is generally known that the smaller pollutants produced are the better. Therefore, from a standpoint of outputs (fix the output and minimize the inputs), environmental impacts are treated as inputs and added into the DEA model to form Eq. (2).

$$\begin{aligned}
 & \min [\theta - \varepsilon E^T (s^u + s^+ + s^-)] \\
 \text{s.t.} \quad & \sum_{j=1}^N \lambda_j X_j + s^- = \theta X_j \\
 & \sum_{j=1}^N \lambda_j Y_j - s^+ = Y_j \\
 & \sum_{j=1}^N \lambda_j U_j + s^u = \theta U_j \\
 & \lambda, s^u, s^+, s^- \geq 0, \varepsilon > 0, j = 1, 2, \dots, n
 \end{aligned} \tag{2}$$

Where u_{pj} represents the undesirable output p in j area ($p = 1, 2, \dots, k$), the total volume of undesirable outputs can be expressed as $U_j = (u_{1j}, u_{2j}, \dots, u_{kj})^T$. The slack variable of desired output is denoted by s^u . So the redundancy rate of undesirable output refers to the proportion of the slack variable s^u_{pj} to the corresponding index u_{pj} , which means how many pollutants should be cut down. Thus, under the condition of the output is constant, when the optimal value $\theta^* = 1$, $s^{-*} = 0$, $s^{+*} = 0$, and $s^{u*} = 0$, the eco-efficiency of DMU_{j_0} is effective. When $\theta^* = 1$, $s^{-*} \neq 0$, $s^{+*} \neq 0$, or $s^{u*} \neq 0$, the eco-efficiency of DMU_{j_0} is weakly efficient. If $\theta^* < 1$, the eco-efficiency of DMU_{j_0} is non-effective.

Table 1 Index system for measuring of ecological efficiency

	Aspects	Attributes	Indicators
Input index	Resource consumption	Energy	Total energy consumption
		Water	Total water use
		Land	Construction land area
Undesired output index	Environmental pollution	Waste water	Volume of industrial waste water discharge; chemical oxygen demand (COD) discharge
		Waste gas	Volume of SO ₂ emission by industry; volume of industrial soot emission; volume of industrial dust emission
		Solid wastes	Volume of industrial solid wastes discharge
Expected output index	Economic value	Total economic development	Regional GDP

2.2 Index System and Data Source

Considering the above DEA model, we establish the index system of inputs, undesired outputs and desired outputs that covers three aspects of resources consumption, environmental pollution and economic value. As seen in Table 1, each aspect is a set of attributes, which in turn is composed of indicators that can be used to construct regional eco-efficiency measures.

Under the index system, in order to evaluate the western eco-efficiency objectively and correctly, the sample data are mainly available in “*Statistical Yearbook of China*”, “*Chinese environmental Statistical Yearbook*”, “*Chinese energy statistics yearbook*”, “*Chinese land resources Yearbook*”, “*Chinese water resources bulletin*”. Due to the lack of Tibet’s data in several years, Tibet cannot be selected in this study. Through dealing with some data, we get the final panel data of 11 western provinces, autonomous regions and municipalities from 2000 to 2010 since the west development.

2.3 Measure Results

Eco-efficiency Analysis The results calculated by the DEAP2.1 software supply values in the interval (0, 1], closer the 1 more efficient will be the DMU. The average value of western eco-efficiency changes not greatly between 0.935 and 0.974. But the eco-efficiency of each province exist obvious difference. For Guangxi, Chongqing, Sichuan, Yunnan and Shaanxi, their eco-efficiencies are higher than other provinces, and equal 1 annually during the whole evaluation period. That means they comprise the efficiency frontiers and they do not need improvement in relation to their indicators. The eco-efficiencies of Guizhou and Inner Mongolia progressively grow from about 0.8 to 1, so that the annual values

reach 0.968 and 0.975 separately. Otherwise, the eco-efficiencies of Qinghai and Xinjiang show a downward trend, falling to 0.690 and 0.956 in 2010 respectively from 1 in 2000. The eco-efficiency of Gansu is fluctuating at the range [0.811, 1]. Ningxia has always been in a non-efficiency frontier where its eco-efficiency is lowest and undulating between 0.591 and 0.760.

Redundancy Rate Analysis For the areas on non-efficiency or weakly-efficiency frontier, whose inputs or outputs fail to achieve the optimizations, we can adjust their inputs or outputs to improve their eco-efficiencies in the light of the redundancy rates. As illustrated in Table 2, there are four areas not eco-efficient including Inner Mongolia, Guizhou, Gansu and Ningxia in 2000. Ningxia has the highest redundancy rate of input and undesirable output which is up to more than 39 %, whereas Gansu has the lowest one that is less than 5 %. From the aspect of average redundancy rate, the inputs and undesired outputs with higher redundancy rate are COD, industrial soot, SO₂, industrial waste water, industrial solid wastes and energy in proper order, which are all above 18 %. In 2010, there are only three areas of Qinghai, Xinjiang and Ningxia as demonstrated in Table 3. All of inputs and undesired outputs redundancy rates are over 23 % and higher than those of 2000. Thus it indicates that the discharge of industrial waste gas, industrial wastewater, industrial solid waste and energy consumption are the key factors impacting on the eco-efficiencies of non-efficiency production frontier areas, as well as it is necessary to progress their the eco-efficiencies by means of energy conservation and emission reduction in these factors.

3 Conclusions

From adopting the approach of DEA to assess western eco-efficiency, we can draw the following fundamental conclusions:

On the whole, the west has not yet realized the production eco-efficient and its economy has grown rapidly still at the cost of the abundant resources consumption and the heavy environment pollution since the west development.

The differences among provinces are remarkable at two respects of eco-efficiency value and redundancy rate within western region. On the one hand, some provinces are relatively eco-efficient, such as Guangxi, Chongqing, Sichuan, Yunnan and Shaanxi, but other provinces eco-efficiencies are fluctuating during the evaluation period. On the other hand, the non-efficiency frontiers and redundancy rates also present the changes in different years. It indicates there are the huge potential improvements for inefficient provinces to become eco-efficient.

In addition, energy consumption and industrial “three wastes” pollution are the main factors influencing the western eco-efficiency. Hence it is emphasized to control and reduce these inputs and undesired outputs for the improvement of western eco-efficiency.

Table 2 Redundancy rate of nonproduction frontier area in 2000

Area	Efficiency	Input redundancy rate/%			Redundancy rate of undesired output/%						
		Energy	Water	Land	Wastewater	COD	SO ₂	Soot	Dust	Solid wastes	
Inner Mongolia	0.868	13.18	13.23	13.19	13.18	13.38	13.10	13.03	13.50	13.18	
Gui zhou	0.858	14.24	14.26	14.24	14.24	14.37	14.24	14.14	14.37	14.24	
Gan su	0.952	4.77	4.75	4.78	4.77	4.83	4.78	4.58	4.89	4.77	
Ning xia	0.602	39.83	39.09	39.45	39.83	40.97	40.60	41.25	39.00	39.83	
Average	0.82	18.01	17.83	17.92	18.01	18.39	18.18	18.25	17.94	18.01	

Table 3 Redundancy rate of nonproduction frontier area in 2010

Area	Efficiency	Input redundancy rate/%			Redundancy rate of undesired output/%						
		Energy	Water	Land	Wastewater	COD	SO ₂	Soot	Dust	Solid wastes	
Qing hai	0.69	30.97	31.17	31.26	30.97	29.84	30.31	29.77	31.6	30.97	
Ning xia	0.64	36.03	35.83	35.31	36.03	35.44	35.92	37.1	35.44	36.03	
Xin jiang	0.956	4.4	4.4	4.4	4.4	4.46	4.41	4.44	4.52	4.4	
Average	0.57	23.8	23.8	23.66	23.8	23.25	23.55	23.77	23.85	23.8	

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Comprehensive Evaluation of Environmental TFP Index in China: Based on the DEA Model of Directional Distance Function

Juan Gao, Dawei Zhang, Hui Liu, Ning Xu, and Wenji Sun

Abstract In the process of Chinese industrialization, industrialization has significantly effects on economic growth, but also poses a serious environmental problem. Under the DEA way of Directional Distance Function to make up for the deficiency of the traditional DEA model, using the directional distance function of VRS linear programming model, China's Environmental TFP Index is evaluated. The results showed that: for the time trend, China's industrial environmental TFP presents a dynamic process, which affected by a number of major events or policy changes; for different regions, there are some differences in unbalanced regional development, and industry TFP changes. Overall, levels of Environmental TFP Index in china are on the decline, technological advance is a key factor to improve industrial environmental TFP, technical efficiency is secondary cause.

Keywords Industrialization • Environmental total factor productivity • Directional distance function • DEA

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1 Introduction

As we all know, industrial has a significant contribution to the economic growth. It is an important symbol of human society and progress of technology. However, the path of China's economic growth (Especially before 1999, China's industrialization is taking the road of extensive development, which is a high investment and high pollution output.) has brought serious environmental problems. It is necessary to study the China's industrial TFP, especially under the background of the domestic environmental problems have become increasingly prominent and the people become more and more anxious about the environmental problem.

2 Empirical Methodology

In the study of measuring the environmental TFP index method, the most popular approach is Stochastic Frontier Analysis method (SFA) which proposed by Aigner et al. [1], Meeusen et al. [2], and Data Envelopment Analysis method (DEA) proposed by Fare [3], which gives great enlightenment to the scholars. SFA method has the advantages of taking into account the environmental changes and the influence of random factors on the productive behavior, but the overdependence on the production function and the stochastic error term which are set in advance is prone to having problems. So, this paper makes use of DEA model without incurring into model or estimation errors.

2.1 *The Data Envelopment Analysis (DEA) Method*

DEA method and Malmquist index method are widely applied to measure TFP problem by scholars. The basic idea is to define the distance function firstly, using DEA method from the perspective of inputs or outputs; then construct Malmquist index; finally, to measure the TFP.

The Directional Distance Function (DDF) is used to measure the environmental TFP, in order to make up for the deficiency of traditional DEA model. We use DEA method of the DDF to measure the process of industrialization in China Environmental TFP Index, and combined with the data of China's province level. There are several advantages: first is the method can be used to more clearly observed that the effect of the difference of industrialization on the environment, because of the great differences are exist in the provincial cross section data; second, the pollution emission price data are unnecessary to the DDF model, when it is used to measure

the environment TFP; finally, in the given input conditions, the method encourage “good” output increased to the production frontier directions at the same time, reward “bad” output (e.g. pollution) to reduce pollution minimization direction [4]. This article attempts to measure the TFP index based on the industrial environment by using DDF model with the provinces’ industrial data.

2.2 Model

This model assumes that each decision making unit (DMU) using n inputs, m outputs in each period, the provincial industrial input-output is an closed convex set, combined with weak disposability and input-output free processing conditions, the production technology can be expressed as:

$$p^t(x^t) = \left\{ y_{j,m}^t \leq \sum_{j=1}^J z_j y_{j,m}^t, x_{j,n}^t \geq \sum_{j=1}^J z_j x_{j,n}^t, \sum_{j=1}^J z_j = 1 \right\}. \tag{1}$$

For $m = 1, 2, \dots, M$ $n = 1, 2, \dots, N$ $j = 1, 2, \dots, J$ z_j represents the weight of each industry observations provincial heavy, and $\sum_{j=1}^J z_j = 1$ means variable returns to scale production, Two inequality constraints represent inputs and outputs can be freely treatability. Directional distance function can be configured to:

$$\vec{D}(x, y; -g_x, g_y) = \sup \{ \beta : (x - \beta g_x, y + \beta g_y) \in p(x) \}. \tag{2}$$

The style can follow $g = (-g_x, g_y)$ to achieve the maximum reduction in the maximum expansion of output and input, $g = (-g_x, g_y)$ represents a direction vector, β is scalar quantity, the larger the value, the lower the efficiency, conversely, the smaller the value, the higher the efficiency, Particularly, when $\beta = 0$, observations show that the sample surface is already in the production frontier. Therefore, based on China’s industrial environment directional distance function can be expressed as total factor productivity:

$$ETE = (x_j^t, y_j^t; g) = 1 - \vec{D}(x, y; -g_x, g_y). \tag{3}$$

Based on the relaxation model outputs and inputs increase or decrease in proportion to the hypothesis, this paper makes $\lambda_j = z_j + u_j$, we use the linear programming model *VRS* (Variable returns to scale) under the directional distance function to solve TFDI of Industrial environment of China. The following *VRS* linear programming model is then specified as:

$$\vec{D}(x, y; -g_x, g_y) = \max \beta \quad (4)$$

$$st. \left\{ \begin{array}{l} (1 + \beta)y_j^t \leq \sum_{j=1}^J z_j^t y_j^t \\ (1 - \beta)x_j^t \geq \sum_{j=1}^J (z_j^t + u_j^t)x_j^t \\ \sum_{j=1}^J z_j^t + \sum_{j=1}^J u_j^t = 1 \end{array} \right.$$

Therefore, China's TFPI of industrial environment under the directional distance function is expressed as:

$$M_0(x_{t+1}, y_{t+1}, x_t, y_t) = \vec{D}_0^{\rightarrow t+1}(x_{t+1}, y_{t+1}; -g_x, g_y) / \vec{D}_0^{\rightarrow t}(x_t, y_t; -g_x, g_y). \quad (5)$$

Among that, (x_{t+1}, y_{t+1}) , (x_t, y_t) represent the input and output vectors of period $t + 1$ and period t , $\vec{D}_0^{\rightarrow t+1}$, $\vec{D}_0^{\rightarrow t}$ represent the directional distance function of period $t + 1$ and period t .

3 Empirical Analysis

3.1 Data and Index

The selected data sample is extracted from 30 provinces, autonomous regions, and municipalities directly under the central government ranging from 1999 to 2012, in which Tibet is not included because of data unavailability.

For the output indicators, we use the added value of the secondary industry of GDP (production method) in each province, as the "good" output, to measure the output of each province. As for unexpected "bad" output indicators, we select the provincial industrial SO2 emissions as the unexpected industrial "bad" output.

For input indicators, we select the classic capital and labor as inputs, of which we use the average annual balance of fixed assets net values of each province as the capital indicators; we use average annual labor input of all employees in industry department as labor indicators. In this paper, the data used are all from the Statistical Yearbook.

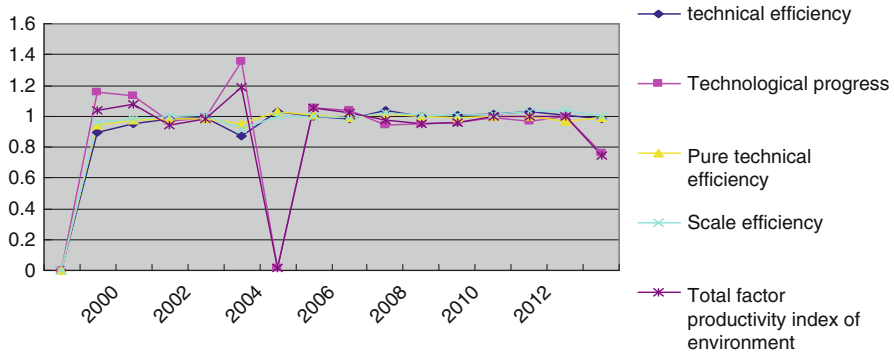


Fig. 1 1999–2012 TFDI of industrial environment and its resolution: time trend (Notes: The average is the geometric average of each year)

3.2 Results and Discussion

Here we also consider the variable returns to scale and calculate the industrial total factor productivity, technical efficiency, technological change, pure technical efficiency and scale efficiency of our 30 provinces and cities from 1999 to 2012 based on DEA model of directional distance function (Fig. 1).

Along with the acceleration of China’s industrialization and the adjustment of the policy, in 1999–2000 years, China’s industrial total factor productivity is increased, reaching 1.076 in 2000 and the main reason for the rise is the increase of technical efficiency index, rising to 5.2 %. In 2003, China’s industrial total factor productivity index reaches the maximum value, 1.185, the average growth rate is 18.5 %, and technical progress is the main driving force of its growth, of which the reason lies in GDP growth of 9.1 % and the growth rate of investment 26.7 % in 2003, which greatly promotes the technological progress. But the advantage of backwardness is insufficient, technology progress regresses, investment is overheated in China in 2004, so the path goes into low quality with high growth, which reduces industrial environmental total factor productivity index, in 2004 the total factor productivity index is 0.014, the lowest level over the years. Along with our country adopts a series of measures to reduce the overheating investment in some sectors, in 2005–2006 year industry total factor productivity index rises, 2 years’ the average growth rate is 3.5 %, and the key is the progress of technology has been greatly improved. Because of the financial crisis in 2007–2008 globally, the international environment has changed, leading to China’s deterioration of industrial environment total factor productivity in 2008, total factor productivity index drops to 0.953. After 2008, China adopts some policies and measures and as a result the total factor productivity has a slight rise. Our country brings in overseas advanced technology and relies on technical progress mainly based on innovation to improve technical efficiency and scale efficiency and then increase the total factor productivity. In 2012, the total factor productivity index reaches 0.998, but it still needs increasing.

Table 1 1999–2012 TFDI of industrial environment and its resolution: area differentiation

	Technical efficiency index	Technological progress index	Pure technical efficiency index	Scale efficiency index	Total factor productivity index of environment
Northeast	0.976	0.781	0.978	0.998	0.762
East	0.982	0.892	0.993	0.989	0.876
Central section	0.976	0.779	0.98	0.996	0.760
West	0.960	0.633	0.973	0.987	0.608

From Table 1, we can see industrial total factor productivity size sequence is northeast east > middle > West, showing Eastern labor and capital using efficiency is high, and also the eastern area takes the leading position in environment treatment technically. While the western industrial environmental total factor productivity index is the lowest with serious decline, the average falling range up to 30.6 %, because the production technology is backward, technological progress, technical efficiency and pure technical efficiency are low, and growth is still “extensive” form, and the economic growth is at the cost of resources and energy, suggesting that the labor and capital using efficiency is not high, and also the technology for controlling and treating the pollution emissions is backward.

4 Conclusion

In the long run, the index to China’s industrial environmental TFP may appear a certain amplitude fluctuations, especially in the process of reform. A larger fluctuations will occur when some important events or policy adjustment have been made. From the regional differences of view, industrial environment TFP in various regions of China is in decline, showed that the area of the production technology in China is still very backward, and embodied in labor productivity, capital productivity and the productivity of pollution control. In contrast, the eastern region often play the “advanced” role, industrial environmental TFP is highest, the northeast region, the west central again, the lowest, they play a “catch-up” role. Industrial environmental TFP mainly comes from technological progress, followed by the technical efficiency.

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Development on Smart Agriculture by Wireless Sensor Networks

Jiange Li and E. Xu

Abstract The paper proposed a platform for collection and analysis by using an agriculture information for the real-time remote crops environments. The platform consists of infrastructure layer, network transmission layer and application service layer, which can collect and store temperature, light, humidity and so on. And it also can maintain the basic information, analyze the data. The result shows that the method is useful and effect.

Keywords Smart agriculture • Wireless sensor • Monitoring

1 Introduction

Greenhouse modernization mainly reflected greenhouse internal environmental administrator, environmental monitoring is an important symbol of the modernization of agriculture. Greenhouse environment monitoring system is a hardware and software platform achieving a greenhouse environment monitoring, it is a sensor technology, control technology, communications technology, computer technology, and expert system technology is one of the high-tech products that can effectively improve crop yields and shorten the growth cycle, reduce labor blindness operation [1].

In 2008, France established a relatively comprehensive monitoring network for greenhouse crop production aspects of all the various aspects of the growth of crops, a variety of information on the life of the crop, crop growth is directly related to access to environmental information, and sends the relevant data to agricultural processing integrated decision network to guide fertilization, spraying, harvesting and other agricultural production process. Louisiana State University established a

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rice plant monitoring network system, in the greenhouse laid by sensor networks for greenhouse environment, real-time access to information on plant morphology, while the acquired information to the wireless communication sent to the computer room devices [2]. Although there are many features have been implemented and applied, in crop production and management methods and habits, foreign farmers in these systems are quite different, so it is necessary to research and development of autonomous greenhouse monitoring system. Wang Fulu designed a temperature wireless sensor network system which based on Zigbee greenhouse environment monitoring system, in local greenhouse environment it is to achieve a real-time monitoring function [3]. Zhao Mengwen designed temperature wireless sensor network system which based on Bluetooth technology, to achieve the temperature data acquisition, processing, wireless transmission and other functions [4]. In summary, the current national monitoring and management system for wireless sensor networks are mostly limited to local monitoring data [5–9], which is not conducive to agricultural producers and agricultural experts to obtain information on crop growth no matter where and when it is.

This study intends to develop a smart agricultural information platform based on wireless sensor networks, achieving network browsing, the user can view the information anytime, anywhere crop growth monitoring and analysis environment to facilitate decision-making.

2 Overall System Design

In this paper, the greenhouse environment monitoring system consists of the infrastructure layer, data service layer, infrastructure-application service layer, service bus layer, business process layer and user access layer. Infrastructure layer includes information storage and basis of transmission including hardware and software infrastructure; data services layer mainly achieves different types, originally in the dispersion system of integrated data; basis application service layer provides the function to perform a single application service, such as rights management, membership management services; service bus layer will be relatively independent of the underlying service object in the ESB unified registration service bus, and to manage the life cycle and service through the ESB service interface calls the rule; business process layer according to system users role to establish a set of related functions business services; user access layer SO a single application services provided by the underlying architecture, composite business services and integration of data services through a unified access portal to the end user.

2.1 System Design

Data collection and transmission subsystem consists of a remote sensor nodes, gateway nodes, relay routing node. Sensor nodes are connected temperature, humidity, carbon dioxide content, light sensor, which is deployed between the

center of each greenhouse, multi-hop nodes way through Zigbee wireless communication data to the gateway node of the sensor [10], by the gateway node serial cable is connected with the local PC, run the stand-alone version of the monitoring software on this PC, by scanning the serial port to receive data storage monitoring, and process analysis, monitoring greenhouse administrator can view live.

APC connected to the server, as the case may be: there is a network of regional through Internet connected to the server, otherwise the server connected through GPRS. Stand-alone monitoring software using TCP/IP protocol to transmit information platform for greenhouse environment monitoring data in real time; server receives the data stored procedures, MS SQL Server agricultural information and intelligence database platform components. Data storage is responsible for receiving the specified port listens to determine and identify the TCP S stand-alone monitoring software terminal connection requests sent socket receiving content data will be stored as a legitimate MS SQL Server database; MS SQL Server database responsible for basic information and intelligence received data needed agricultural information platform for the wisdom to call a stored access agricultural information platform; wisdom agricultural information platform for processing data in a SQL database and graphically charts and other forms of display. Web-based agricultural information platform is a smart network application, the platform uses ASP.NET dynamic web technology, under Visual Studio. Net 2008 environment was developed using C# language.

Video camera through the Internet network and server platforms and PC connected to greenhouse crops growing and pest monitoring. Wisdom agricultural information platform uses B/S mode design, the user can access the platform as long as the browser, query monitoring data and other management operations, authorized users can view real-time video surveillance images of each greenhouse.

2.2 Platform Functional Design

Wisdom agricultural information platform includes five main modules: data acquisition, data storage, basic information maintenance, data analysis, and data output. Wherein the data acquisition module is TCP Socket technology standalone monitor and receive monitor software uploaded data, and determine whether the data is acceptable, it is "NO" discarded, it is "YES" then stored; data storage module may store the received sensor data historical data of the greenhouse, the spatial distribution of map data base information and user information, as a platform for a detailed image of the display and provide the basis for management and maintenance; basic information maintenance module, in order to ensure that users see the latest information, the administrator should be updated to maintain basic information, such as changing with the seasons and crops set the standard value, assign user rights, updated information and other greenhouse; data analysis module can upload data for statistical analysis and logic to determine whether it exceeds the upper limit of condition monitoring and data query etc.; data output module for real-time display of data uploaded and judged according to the logic output alarm recording.

3 Platform and Database Design Process

Platform for process design including business process and data flow design, database design is mainly a database table design.

3.1 Business Process Design

After the authorized user login, you can see the different permissions based on published information, monitoring information, data query, reporting, and so on. Various different greenhouse administrator privileges, after administrators authorized to view the monitoring data under the jurisdiction of the greenhouse, police records and other information, such as the greenhouse with a video monitor, you can also watch the video information; general users only have permission to view the sharing of information; administrator responsible assign user rights, publish information and updates to the data.

3.2 Data Flow Design

In order to clarify the division of data features of the platform and the functional link among, the design of the first layer data flow can be designed as follow. Platform administrator can assign roles to users, such as greenhouse managers, ordinary users. Greenhouse on the basis of the information can be uploaded data collection and management, such as changing greenhouse monitoring standard value, the output of statistical reports to users.

Layer 2 data flow function of each module of the data thinning process. Take the news management for example, the platform news and information in the database manager table to add, delete, change and other operations, such as adding multimedia library and text information table, and then released, the user can browse the news.

3.3 Database Design

With the extension of the acquisition consideration to improve the frequency and time, the data becomes very large and data stored in the selected data security, concurrency control, data mining, online operation has the advantage of medium-sized database SQL.

Wisdom agricultural information platform capabilities are numerous, and database relation tables are complex, including rights management, greenhouse

management, real-time monitoring of three relational tables. Real-time monitoring, for example, its data table relationships can be designed as a database. Such a database table design eliminates data redundancy, update anomalies, abnormal insertion and deletion anomalies.

Wisdom agricultural information platform using ADO.NET technology to achieve the user access to the database query to the database, or delete operation, ADO.NET interact with data sources NET technology, which allows the exchange of different data sources-depends on agreement or the database used. Sql Connection source, object management and data connections; Sql Command allows communication with a data source object and send commands to it. Sql DataReader objects can be fast forward only read data; DataSt and Sql Data Adapter objects to realize the data can be read off from or write data source.

4 Platform

Server operating system using Microsoft Windows Server 2003, PC operating system for the Microsoft Windows XP Professional, databases are SQL2008. Power Designer choice for database design, build scripts, generating entities in SQL2008. Specific implementations:

1. Interface design. For the convenience of users to learn and use, smart agricultural information platform using friendly graphical interface design.
2. Data storage and management. Using TCP Socket technology to receive stand-alone monitoring software via Ethernet or GPRS uploaded data and stores SQL 2008 database, in addition to the database also stores the greenhouse environment, monitoring standards, alarm information, greenhouse basic information, user registration information, news and information. Platform will upload greenhouse environmental monitoring data compared with the value of the latest monitoring standards, beyond the upper limit alarm is generated to fill alarm table, including the monitoring of greenhouse standard value by the user based on the best growth environment requirements for different crops in different seasons input.
3. Data display and query. Adoption curve chart and table displays real-time monitoring data for each node in the greenhouse; pie chart and bar graph displays the calendar greenhouse cultivation information and greenhouse production data; table shows greenhouse files, the standard values of the different periods of the greenhouse, greenhouse cultivation and soil information recorded.

5 System Test and Data Analysis

Information platform for the stability test function 2012-08 in the second Jungar Banner, Inner Mongolia Erdos even five urban and rural Yao village 22 greenhouse test applications. Test deployed as follows: 22 greenhouse green house group

divided into six groups of each greenhouse placing a central node respectively connected to node 16 which temperature, humidity sensors, connected to the node 6 temperature, humidity and carbon dioxide content, light sensor; six groups were equipped with a greenhouse cluster gateway node and a PC, the receiving node upload greenhouse environmental monitoring data. Gateway node interconnect terminal node and PC. Upload to PC, six groups of greenhouse group, five groups using Ethernet to upload data to the server in real time after each sensor with multi-hop fashion spread gateway node, a gateway node to its simple handling, the use of a group GPRS uploaded to the server real-time data. Commissioning process every 5 s upload a set of data, the practical application of the frequency of data collection can be modified according to application needs.

Because the object is 8 months late autumn planting delays tomatoes, Contingencies 2012-08-27 tomato seedlings in the rejuvenation period after planting, for the benefit of Huanmiao cultivation techniques according to the experts set temperature limit is 32 and 26, the lower the humidity is 65 %, and 15 %, CO₂ upper limit of the volume fraction of 0.05 % and 0.02 %, the lower limit is 85 and the light 50 k lx. Setting environmental standards see the value in Table 1. Of which 2012-06-20 for each monitor set lower results for the period of puberty tomato monitoring standards.

As can be seen that 13:00:00 near the greenhouse temperature exceeds the upper limit 32 and over 40. Because greenhouse environment close to full closed form, so the higher the temperature inside the greenhouse outdoor temperature. It also can be seen: leaf transpiration due to high temperature, humidity has been low greenhouse 1, close to the lower limit. Greenhouse temperature exceeds a limit, so the information platform alarm recording. Internet authorized users via a web browser (eg IE, Firefox, etc.) to access the server platform, browse analyze data, view alarm information to clarify the status of the greenhouse environment, make the appropriate improvement measures, such as ventilation, watering and so on.

The information platform has been running for nearly 5 months in five Yao Village, timely and accurate access to the greenhouse temperature, humidity, carbon dioxide levels, light intensity, for a variety of sensor data can be stored in the prescribed format, statistical analysis, criteria query, in the form of graphic charts display a variety of real-time data and historical data.

Table 1 Standard values of monitoring of greenhouse

Project	Caps	Limit	Standard values	Set the data
Temperature/ $^{\circ}$ C	32	26	28	2012-08-20
Humidity/%	32	24	28	2012-06-20
	60	15	45	2012-08-20
Illumination/k lx	55	10	30	2012-06-20
	85	50	60	2012-08-20
$\varphi(\text{CO}_2)/\%$	80	45	55	2012-06-20
	0.05	0.02	0.045	2012-08-20
	0.05	0.015	0.04	2012-06-20

6 Conclusion

The research and development of agricultural information platform to achieve the wisdom of the 22 remote monitoring greenhouse environmental information, it can output alarm information if necessary, and reduces the blindness of manual operations, and enables the user to view the greenhouse environment monitoring information anywhere, anytime, for the crop environment continues to maintain a good state to provide convenient and possible. The test results showed that: the platform has good stability, improve the function of convenient and friendly man-machine interface. But away from the practice of agricultural production facility requirements are still some gaps: In the process of platform applications, it needs to build support systems for different crops, and to provide regulatory strategy for the realization of facility agriculture environmental monitoring internal intelligence.

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Industrial Undertaking Efficiency of Wuhan City Group

Jianjun Miao and Hanwen Zhang

Abstract The accelerating effects of industrial undertaking are obvious. But there's little quantitative research. This thesis will use DEA method to measure the industrial undertaking efficiency of Wuhan City Group which takes the leadership of the development of central China strategy. The calculation shows that the efficiencies of nine cities differ a lot. Cities, such as Wuhan, with large economic scale, good industrial foundation and reasonable industrial structure can get higher industrial undertaking efficiency.

Keywords Industrial undertaking efficiency • Wuhan city group • DEA model

1 Introduction

Industrial transfer and receiving is the product of the deepening of international division. As the leader of the rise of central China strategy, it plays the model role in industrial practice, industrial policy adjustment, undertaking a demonstration resources integration etc. The thesis is based on the theory of industrial transfer, combining quantitative and qualitative methods to calculate the regional industrial efficiency of Wuhan City Group.

2 DEA Methods

DEA methods (Data Envelopment Analysis) are created by A. Charnes and W. W. Cooper which have been one of the most important methods of measuring efficiency [1]. This thesis will choose CCR model of DEA methods to measure the industrial undertaking efficiency of Wuhan City Group. The final Dual form expression of CCR model is as follows [2]:

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$$\min[\theta - \varepsilon(\hat{e}^T S^- + e^T S^+)]$$

$$\begin{cases} \sum_{j=1}^n X_j \lambda_j + S^- = \theta X_0 \\ \sum_{j=1}^n Y_j \lambda_j - S^+ = Y_0 \\ \lambda_j \geq 0, j = 1, 2, \dots, n \\ S^+ \geq 0, S^- \geq 0 \end{cases} \quad (1)$$

And

$$\begin{aligned} \hat{e} &= (1, 1, \dots, 1)^T \in E^m, \\ e &= (1, 1, \dots, 1)^T \in E^s \end{aligned} \quad (2)$$

We define DMU as strongly effective when $\theta = 1$ and $S^+ = S^- = 0$. It means that the production activities have reached the Pareto optimality.

3 Index Selection and Related Instructions

According to the essential productive factors and considering calculation and considering data availability, this paper will choose the capital and labor as inputs, which consists of provincial investment and foreign direct investment (FDI) [3]. Through the analysis the ability of industrial undertaking, the industrial undertaking of Wuhan City Group is mainly from the Pearl River Delta and Yangtze River Delta and other domestic transfer of industry. So this thesis will define capital as the sum of provincial capital and FDI. And we'll define labor as the sum of the employment of the second industry and the third industry. By calculating, the efficiency of Wuhan City Circle is as following.

Industrial production is the production of industrial activities in the value of all final goods and services, to become the best measure of industrial production area. Therefore this paper will choose the second and third industrial GDP to calculate.

DEA method consists of output-oriented and input-oriented models. The former refers to adjust the output while the input unchanged to improve the production efficiency. The latter refers to reduce the input while the output unchanged to improve the production efficiency. By consulting literature, input-oriented model is more easily controlled and regulated. So this thesis will choose.

4 Industrial Undertaking Efficiency of Wuhan City Group

Wuhan City Circle became a national "two-oriented reform experimental zone" in 2007. Considering the data availability, this thesis will select related data estimates of Wuhan City Circle from year 2007 to 2011. At the same time, considering the

industrial transfer efficiency has a lag, we'll choose related data estimates from year 2006 to 2011. All the data is from "Statistical Yearbook of Hubei Province" from year 2006 to 2011. Using the CCR model with constant returns to scale to measure the industrial efficiency of Wuhan City Circle, the results are as Table 1 showing.

Table 1 shows that the average efficiency from 2006 to 2011 of industrial undertaking efficiency is 0.739. That is to achieve Pareto optimality efficiency of 73.9 %, which means that output at present levels didn't reach the optimal input level. To reach DEA efficiency, production can reduce related input while keep the present output. Meanwhile, the standard deviation increased from 18.2 % in 2006 to 23.9 % in 2011 with undulating. It means that the regional difference of industrial undertaking efficiency is in the trend of expansion of Wuhan City Circle.

From the point of view vertical comparison, in this thesis, when $\theta \geq 0.8$, the industrial undertaking efficiency of this area is at a high level. When $0.6 \leq \theta \leq 0.8$, the industrial undertaking efficiency is the in the medium level. When $\theta \leq 0.6$, the efficiency is too low, needing to be improved. The Table 2 shows that Wuhan, Xiantao, Qianjiang, Huangshi are in high level. Among them, Wuhan and Xiantao have achieved DEA achieve efficiency; Ezhou, Tianmen are in medium level. The efficiency of both of the two cities were over 0.6; Xiaogan, Xianning, Huanggang are in low level. Their average efficiencies were below 0.6. Among them, the average efficiency of Huanggang are the lowest six recent years of the city circle.

Particularly worth mentioning is that the efficiency of Wuhan, which is the leading city of the city circle, has achieved 1 every year since 2006–2011 meaning achieving DEA efficiency. And it has achieved Pareto optimal. Unexpectedly the efficiency of Xiantao, with the Weak industrial base, is 1, reaching DEA efficiency, which is in the production frontier.

From the point of view horizontal comparison, the industrial undertaking efficiencies of Wuhan and Xiantao were 1 every year since year 2006–2011 meaning achieving DEA efficiency. Their inputs and outputs are in the production frontier surface, and are very stable.

Wuhan is the capital of Hubei province and the leader city of this city circle, whose economic scale and development is better than any other cities. Therefore, Wuhan is more susceptible to government policies favoring in economic development. It formed the industrial scale and enjoy the benefits of the resulting economies of scale. Meanwhile it is equipped with first – class talents and the production technology is more developed than the surrounding. Therefore, Wuhan takes the biggest share and highest efficiency in the process of industrial undertaking. As a provincial deputy county-level city, Xiantao is of small economic scale. Since year 2009, the Utilization of provincial capital and FDI of Xiantao surges. It stimulated local economic development. Rapid growth in investment stimulated the increase of output, which makes industrial efficiency at a high level.

Qianjiang and Huangshi's industrial undertaking efficiencies are high during the 6 years, whose average are above 0.84. But the two cities had different degrees of fluctuation during the 6 years. Among them, Qianjiang's efficiency fluctuated a lot, but overall the tendency is rising. Its efficiency achieved 1 at 2011 which means

Table 1 The calculation of industrial undertaking efficiency of Wuhan City Circle

	2006	2007	2008	2009	2010	2011	Average efficiency	Sort
Wuhan	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1
Xiantao	1.000	1.000	1.000	1.000	1.000	1.000	1.000	2
Qianjiang	0.808	0.679	0.856	0.963	0.897	1.000	0.867	3
Huangshi	0.883	0.841	0.930	0.831	0.814	0.749	0.841	4
Ezhou	0.856	0.712	0.688	0.683	0.663	0.696	0.716	5
Tianmen	0.640	0.596	0.656	0.623	0.620	0.639	0.629	6
Xiaogan	0.712	0.550	0.606	0.640	0.609	0.465	0.597	7
Xianning	0.684	0.555	0.577	0.575	0.555	0.468	0.569	8
Huanggang	0.435	0.368	0.410	0.457	0.471	0.429	0.428	9
Average	0.780	0.700	0.747	0.752	0.737	0.716	0.739	
Standard deviation	18.20 %	21.40 %	20.80 %	20.20 %	19.70 %	23.90 %	20.00 %	

Table 2 The classification of industrial undertaking level of Wuhan City Circle

Classification	Cities
Cities in high level	Wuhan, Xiantao, Qianjiang, Huangshi
Cities in medium level	Ezhou, Tianmen
Cities in low level	Xiaogan, Xianning, Huanggang

DEA efficiency. This is because the economic scale of Qianjiang is small. With the city is included in the city circle and the establishment of “two-oriented reform experimental zone”, the supporting industries of Qianjiang becomes more and more comprehensive. Meanwhile, Qianjiang is rich in oil, natural gas and other resources and possesses of lithium, cesium and other trace elements resources. Those resources are very conducive to the development of high-tech electronic industry, metallurgy, and aerospace. Those resources stimulate the investment of input and output a lot. So the industrial undertaking efficiency grows rapidly.

Huangshi’s industrial undertaking efficiency is more stable than Qianjiang’s and is decreasing. Because Huangshi, deputy center city, has comprehensive infrastructure construction and industry basis. The industry in this district has featured combination. But Huangshi is famous of iron and steel industry based on its abundant resources of metal. But as the resource intensive industry, iron and steel industry gradually becomes declining industries. And it has become the bottleneck that limits the development of Huangshi. Meanwhile, with other cities of this city circle adjusting their developing policies, Huangshi didn’t perfume well on absorbing the provincial capital and FDI. So its industrial efficiency is slightly declining.

The efficiencies of Ezhou and Tianmen are very stable and both of them stay the medium level. This is because these two cities’ industry supporting resources don’t fit well. And their industrial structure is not reasonable. They’re inadequate to converse the input into effective output which need to be strengthened urgently.

Xiaogan, Xianning and Huanggang stay at the lowest level. Among them, the efficiencies of Xiaogan and Xianning are basically the same. The industrial basis of the three cities are week and are also week to converse the input into effective output.

5 Conclusions

Calculation of industrial efficiency is to adjust the industrial undertaking direction. Table 3 shows the input redundancy of each city of year 2011. In 2011, the efficiencies of Wuhan, Qianjiang and Xiantao are all 1, and $S^+ = S^- = 0$. It means all of the three cities’ efficiency reached strongly DEA effective which meant the production had reached Pareto optimality using the least input to product the most output [4].

The so-called “input redundancy” refers to the extra amount of input index when reaching the strongly DEA efficiency [5]. That is the number of input we can reduce

Table 3 Input redundancy of each city

		Original value of input	Input redundancy(S-)	Investment target value
Wuhan	Capital input	2,796.660	0.000	2,796.660
	Labor input	436.900	0.000	436.900
Huangshi	Capital input	445.210	-111.761	333.449
	Labor input	105.800	-26.559	79.241
Ezhou	Capital input	261.280	-72.402	181.878
	Labor input	42.600	-12.946	29.654
Huanggang	Capital input	608.850	-347.453	261.397
	Labor input	228.000	-130.113	97.887
Xiaogan	Capital input	572.230	-306.355	265.875
	Labor input	208.400	-111.571	96.829
Xianning	Capital input	446.080	-237.385	208.695
	Labor input	103.500	-55.078	48.422
Xiantao	Capital input	95.170	0.000	95.170
	Labor input	56.700	0.000	56.700
Tianmen	Capital input	105.020	-37.954	67.066
	Labor input	54.000	-19.515	34.485
Qianjiang	Capital input	116.570	0.000	116.570
	Labor input	36.100	0.000	36.100

under the premise of the current output. The input redundancies of the other 6 cities which didn't reach the strongly DEA efficiency are as Table 3 showing. Take the example of Huangshi. It needs to reduce 11,176,100,000 yuan RMB capital input and reduce 265,590 labor input to achieve strongly DEA efficiency. Other cities are of the same analogy.

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Calculation of the Fiscal Transfer Payments After Value-Added Tax Expansion Reform in China

Shuguang Wang, Wei Wang, Jia Song, and Jirong Zhao

Abstract The VAT expansion reform is one of the crucial issues in the reform of fiscal and tax system during the twelfth five-year-plan in China business tax, which is the leading type in local tax system, would be turned into value-added tax (VAT) after the reform and this is bound to affect local financial interests. Through the formula of the local revenue of VAT and business tax before or after the reform, the paper concludes that local revenue can not be restored to the original level only by increasing the local proportion. In practice, we can improve the fiscal transfer payment system. Only through this way, we can reduce the impact of the VAT expansion to local finance, which will ensure the vested financial resources of local government and smooth the reform process.

Keywords VAT expansion reform • Fiscal interests • Transfer payment

1 The Sharing Proportion of Local Tax Revenue After the Expansion Reform

China tried out value-added tax (VAT) in 1979, and made two significant reforms in 1984 and 1994, then transferred production VAT to consumption VAT in Jan. 1, 2009. The government replaced turnover tax with VAT, that is known for VAT reform expansion in Shanghai since Jan. 1, 2012, extend the pilot program to eight other provincial level regions, Beijing, Jiangsu, Xiamen and so on in July, 2012. The tax is levied on selected sectors, such as the transport sector and some modern service sectors. This reform aims at eliminating duplicate taxation and improving VAT credit chain in a bid to promote the development of service sectors, optimize

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and upgrade the industrial structure. It also has theoretical and practical sense in regard to reinforcing tax neutrality, making a neutral effect of VAT and so on.

To avoid duplicate taxation between two types of taxpayers, China replaced its turnover tax which is the leading local tax with VAT in the VAT expansion reform [1]. However, local tax revenue would suffer heavy losses without sharing proportion adjustment between the central government and local ones. Therefore, the key is how to distribute the VAT revenue between the two layers of governments and make up the loss for the local governments so that they can be motivated to promote the reform [2, 3].

1.1 The Formula Design of Fiscal Transfer Payment

Suppose the corporate tax burden remains the same before and after the expansion reform regardless of the influence of other taxes, such as enterprise income tax, urban maintenance and construction tax and so on. Let x be the local sharing proportion of VAT after the expansion reform. In order to maintain the same local fiscal revenue, we have the following equation:

$$x * \left(\frac{b}{25\%} + a \right) = b + a \quad (1)$$

The left side of the equation is the VAT revenue of local governments after the reform, while the right represents the summation of turnover tax and VAT before the reform.

Solving the equation, we get

$$x = \frac{a + b}{a + 4b} \quad (2)$$

And we have equation

$$k = \frac{a}{a + b} \quad (3)$$

Solving the equations, we get

$$x = \frac{1}{4 - 3k}, 0 < k < 1 \quad (4)$$

Now we take the derivative of k , and we get

$$\frac{dx}{dk} = \frac{3}{4 - 3k}, 4 - 3k > 0 \quad (5)$$

From the above computation, we know that x is an increasing function of k . As k varies among each provincial-level region, we can not have a unified sharing proportion of VAT- x , to ensure all regions can maintain the same number of these two tax revenue before and after the expansion reform. The more proportion turnover tax took before the expansion, the bigger x is so that the local fiscal revenue will not be affected. Therefore, a unified x can not ensure the fiscal revenue of all regions unaffected while making different x for each region is not feasible and violate tax neutrality principle. Hence, we can make a unified x and implement fiscal transfer payment at the same time, so that we can maintain the same fiscal level for each area before and after the reform.

1.2 The Calculation of Sharing Proportion

We can see from the scatter diagram that k is mainly spread between 60 % and 70 %. According to the mean value theorem, we can make $k = 65 %$ and evaluate Eq. (4) with $k = 65 %$, so we have $x = 1/(4-3k) = 1/(4-3 \times 65 %) = 48.8 %$.

After sharing VAT in the ratio of 48.8 %, the differential section between VAT revenue made by local governments and the taxes gained before the expansion will be adjusted in the way of improving the fiscal transfer payment system by central government. As for the regions with $k > 65 %$, they should make sure this condition— $x > 48.8 %$, so that they can maintain almost the same fiscal level before and after the expansion reform.

2 The Calculation of Fiscal Transfer Payments

The Fundamental Formula After setting the unified sharing proportion of VAT by the mean value theorem, as the k of some regions are more than 65 %, they can not return to the fiscal level before the reform, so we need fiscal transfer payments provided by central governments to make up the fiscal gap. We have the following formula:

The number of equalization transfer payment in a certain region = (the summation of the two taxes before the expansion reform – the sharing VAT revenue in the region after the reform) * coefficient of transfer payment.

When the summation of the two taxes before the expansion reform < the sharing VAT revenue in the region after the reform, the region can not enjoy the fiscal fund from the transfer payment. Only when the summation of the two taxes before the expansion reform \geq the sharing VAT revenue in the region after the reform, the region can secure corresponding subsidy from transfer payment.

Using the above letters, we have the following formula:

$$T = \left[b + a - x * \left(\frac{b}{25\%} + a \right) \right] * t \quad (6)$$

In this formula, T represents the number of equalization transfer payment one region deserves. (b + a) shows the summation of the two taxes before the expansion reform while $x*(b/25\% + a)$ stands for the sharing VAT revenue in the region after the reform and t is the coefficient of transfer payment.

The fiscal fund of the equalization transfer payment one region enjoys only makes up for the fiscal gap caused by the expansion reform, and it does not involve the other parts in the local fiscal gap.

The Calculation of Transfer Payments Some regions do not need the transfer payment from central governments after the adjustment of the sharing proportion of VAT because their fiscal revenue of the two taxes increases after the expansion, but most regions ($k \geq 65\%$) need transfer payments from central government to cover the fiscal loss. As the former do not deliver the extra tax revenue they benefit from the expansion reform and the latter need fiscal subsidy from central government, the gap between the summation of the two taxes before the expansion reform and the sharing VAT revenue in the region after the reform must not outnumber the extra VAT revenue central government benefits from the reform. Therefore, we need a coefficient—t for the fiscal fund of transfer payment one region need to determine the equalization transfer payment for each region so that we can make sure the total demand of transfer payments equals to the supply of transfer payments from the central government. The coefficient can be defined as:

$t = \frac{\text{the extra VAT revenue the central government benefits from the expansion reform}}{\text{(the summation of the two taxes in all the regions which need fiscal subsidy before the expansion reform - the summation of the sharing VAT revenue in all the regions which need fiscal subsidy after the reform)}}$

Using the above letters, the summation of the two taxes of the central government before the expansion reform can be defined as: $m = c + \sum 3b$. In this formula, c represents the VAT the railway sectors and financial sectors delivers to the central governments.

After the expansion reform, the VAT revenue of the central government is:

$$n = c + \sum (1 - x) * \left(\frac{b}{25\%} + a \right) \quad (7)$$

Then

$$t = \frac{n - m}{\sum (a_0 + b_0) - \sum \left[x * \left(\frac{b_0}{25\%} + a_0 \right) \right]} \quad (8)$$

Table 1 Transfer payments in each region after the expansion reform (unit: a hundred million)

Regions	Turnover tax a	Domestic VAT b	Summation of the two taxes before expansion a + b	Sharing VAT revenue $x \times (b/25\% + a)$	Transfer payments after expansion
Hainan	112.35	18.53	130.88	91.24	28.62
Beijing	855.4	210.01	1,065.41	827.37	171.86
Guangxi	207.44	77.48	284.92	252.47	23.43
Jiangxi	204.38	84.79	289.17	265.25	17.27
Shanghai	933.91	388.62	1,322.53	1,214.33	78.12
Liaoning	453.75	188.84	642.59	590.05	37.93
Tianjin	283.87	119.2	403.07	371.21	23
Hunan	256.8	112.57	369.37	345.06	17.55
Fujian	319.7	141.1	460.8	431.44	21.2
Anhui	291.93	129.48	421.41	395.21	18.92
Henan	319.34	155.79	475.13	459.94	10.97
Zhejiang	816.68	398.82	1,215.5	1,177.04	27.77
Hubei	249.49	125.57	375.06	366.86	5.92
Guangdong	1,244.26	657.82	1,902.08	1,891.26	7.81
Jilin	145.97	78.15	224.12	223.78	0.25
Jiangsu	1,023.92	562.6	1,586.52	1,597.87	0
Hebei	362.65	203.84	566.49	574.87	0
Neimenggu	234.57	135.95	370.52	379.84	0
Shandong	631.51	378.23	1,009.74	1,046.48	0
Heilongjiang	165.8	123.52	289.32	322.02	0
Shanxi	191.91	198.26	390.17	480.66	0

In this formula, a_0 is the turnover tax in the regions which need fiscal subsidy before the expansion reform. b_0 represents the VAT revenue in the regions which need fiscal subsidy before the expansion reform.

Hence we can get the number of Transfer payments by $t = 0.722$ in each region after the expansion reform (see Table 1).

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Research on Risk Warning Model of Private Equity Investment Based on Extenics

Jingfen Wei

Abstract It is established risk warning evaluation indicators system of private equity investment from the aspects of management risk warning, technology risk warning, market risk warning, accounting risk warning, and policy environment risk warning, as well as established the risk warning model of private equity investment according to extenics. Combined with the practical situation of company M, it is carried out the risk warning empirical research of private equity investment in order to provide beneficial reference for the development of China private equity investment.

Keywords Private equity • Investment risk warning • Extenics

1 Introduction

Under the financial environment and economic circumstance of excess liquidity, as the industry with high risk and high return, risk warning management and investment evaluation of private equity investment is particularly important. First, right risk warning evaluation method, on one hand can accurately evaluate the various risks during investment decision; on the other hand can be useful for reasonably avoiding the potential risk existing in the investment process in order to make right decision. Second, risk warning evaluation can be applied to the projects which have been invested so as to choose the reasonable withdrawal channel and way from the risky investment project as quickly as possible [1–3].

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2 Extenics Theory of Private Equity Investment Risk Warning

Based on extenics theory, the method evaluates the target from the angle of feasibility and optimization, which not only reflects the grade of the target's state from the angle of quantity, but also reflects the whole dynamic process of the target from quantitative change to qualitative change.

According to the definition of extensional matter element, in the risk warning of private equity investment, the basic matter element is risk warning system of private equity investment. It is divided into four risk warning grades: Grade One, Grade Two, Grade Three and Grade Four., $N = \{N1, N2, N3, N4\}$ stands for the four risk warning grades, risk warning grade's correlation degree of private equity investment risk warning index will be:

$$K_j(N) = \sum_{i=1}^n W_i K_j(V_i) = [w_1, w_2, \dots, w_n] \begin{bmatrix} k_1(v_1) & k_2(v_1) & \dots & k_m(v_1) \\ k_1(v_2) & k_2(v_2) & \dots & k_m(v_2) \\ \vdots & \vdots & \dots & \vdots \\ k_1(v_n) & k_2(v_n) & \dots & k_m(v_n) \end{bmatrix}$$

W_i is the weight coefficient of private equity investment risk warning index C_i ; $K_j(N)$ reflects whether the target conforms to the degree of risk warning grade j , $K_j(N) < 0$ shows that the target doesn't conform to the risk warning grade j .

The expression of private equity investment risk warning grade is

$$\overline{K_j(N)} = \frac{K_j(i) - \min K_j(i)}{\max_j K_j(i) - \min_j K_j(i)}$$

j^* stands for the variable characteristic value of private equity investment risk warning grade, which means the risk warning grade of private equity investment.

3 Empirical Analysis on Risk Warning of Private Equity Investment

3.1 The Construction of Private Equity Investment Risk Warning Index System

In this paper it is constructed private equity investment risk warning index system in view of extenics on the five aspects: management risk warning, accounting risk warning, market risk warning, technology risk warning and policy environment risk warning. It is calculated the weight of each index by Analytic Hierarchy Process, Standard Deviation Method, G1 Method and Entropy Method. The comprehensive weight of each index is calculated by combination weight formula, described in Table 1 below.

Table 1 Private equity investment risk warning index system in view of extenics

Index of Grade One	Comprehensive weight of index of Grade One	Index of Grade Two	AHP weight	Standard deviation weight	G1 weight	Entropy weight	Entropy weight	Comprehensive weight
Private equity investment risk warning index system	Management risk warning U1	0.2382	Risk of organizational structure minor adjustment U11	0.0413	0.0499	0.0763	0.0484	0.2572
			Risk of management strategy error U12	0.0495	0.0526	0.0643	0.0492	0.2413
			Risk of scarce capacity of management team U13	0.0291	0.0565	0.0712	0.0508	0.2406
			Risk of scarce executive force of development strategy U14	0.0418	0.0500	0.0142	0.0487	0.1252
			Risk of management level falling behind the development speed U15	0.0251	0.0414	0.0296	0.0458	0.1357
	Technology risk warning U2	0.1860	Risk of unable to keep continuous innovation U21	0.0792	0.0505	0.0304	0.0480	0.2489
			Risk of faultiness matching technique U22	0.0528	0.0359	0.0771	0.0444	0.3310
			Risk of scarce protection of intellectual property U23	0.0476	0.0389	0.0532	0.045	0.2623
			Risk of technology maturity degree U24	0.0453	0.0547	0.0103	0.0488	0.1578
	Market risk warning U3	0.2347	Risk of market capability change U31	0.0758	0.0502	0.0612	0.0481	0.2607
			Risk of same occupation's virulent competition U32	0.0531	0.0575	0.0321	0.0523	0.1833
			Risk of competitive product appearance U33	0.0676	0.0485	0.0635	0.0482	0.2570
			Risk of scarce marketing and service U34	0.0575	0.0484	0.0873	0.0481	0.2990

(continued)

Table 1 (continued)

Index of Grade One	Comprehensive weight of index of Grade One	Index of Grade Two	AHP weight	Standard deviation weight	G1 weight	Entropy weight	Entropy weight	Entropy weight	Comprehensive weight
Accounting risk warning U4	0.1725		Risk of change of capital usage plan U41	0.0536	0.0452	0.0372	0.0461	0.2497	
			Risk of decrease of growth and sustained profitability U42	0.0381	0.0455	0.0463	0.0473	0.2579	
			Risk of scarce financial liquidity U43	0.0425	0.0481	0.0632	0.048	0.3161	
			Risk of unreasonable financial management system U44	0.0377	0.0393	0.0212	0.0452	0.1763	
Policy environment risk warning U5	0.1687		Risk of change of national industrial policy U51	0.0394	0.051	0.0326	0.0488	0.2302	
			Risk of economic environment change U52	0.0465	0.0426	0.0532	0.0457	0.2917	
			Risk of nature U53	0.0423	0.0473	0.0321	0.047	0.2278	
			Risk of social stability U54	0.0345	0.0462	0.0435	0.0461	0.2504	

3.2 *Determination of Classical Domain and Joint Domain of Private Equity Investment Risk Warning*

Each evaluation index of private equity investment risk is divided into four risk warning grades: Grade One is no risk (0–0.25); Grade Two is normal (0.25–0.5); Grade Three is high (0.5–0.75); Grade Four is higher (0.75–1.0). It is calculated the classical domain and joint domain of private equity investment risk warning according to the formula.

3.3 *Correlation Degree Calculation of Company M’s Private Equity Investment Risk Warning*

1. *The correlation degree of each index of private equity investment risk warning on risk warning grade*

Based on the correlation degree analysis of warning index Grade Two, it is obtained the correlation degree result of each Grade One risk warning index of private equity investment on each risk warning grade which is shown in Table 2 below.

2. *Risk warning grade evaluation of Company M’s private equity investment*

It is calculated the correlation degree of Company M’s private equity investment risk warning grade. The detail result is shown in Table 3 below.

It is calculated the characteristic value of Company M’s private equity investment risk warning grade, which is shown as follow:

$$j^* = \frac{\sum_{j=1}^m j * \bar{k}_j(N)}{\sum_{j=1}^m \bar{k}_j(N)} = \frac{1 * 1 + 2 * 0.0143 + 3 * 0.0033 + 4 * 0}{1 + 0.0143 + 0.0033 + 0} = 1.02$$

Table 2 Risk warning degree calculation result of Company M’s private equity investment warning index Grade One

Warning index Grade One	$K_1(V_i)$	$K_2(V_i)$	$K_3(V_i)$	$K_4(V_i)$
Management risk warning U1	9.48012	-0.03206	-0.13513	-0.16949
Technology risk warning U2	0.02717	0.00165	-0.00078	0.00050
Market risk warning U3	0.01072	0.00030	-0.00015	0.00010
Accounting risk warning U4	0.01114	0.00044	-0.00021	0.00014
Policy environment risk warning U5	0.00158	0.00002	-0.00001	0.00001

Table 3 Grade correlation degree value

	$K_1(V_i)$	$K_2(V_i)$	$K_3(V_i)$	$K_4(V_i)$
Grade correlation degree value	2.2679	-0.0071	-0.03240	-0.0402

3.4 Analysis on Risk Warning State and Result of Company M's Private Equity Investment

1. Analysis on risk warning of single index

According to the correlation degree of Company M's private equity investment risk warning index value on each risk warning grade, it can be reflected the risk warning grade of each warning index. Based on the criterion $K_j = \max\{K_j(N)\}$, taking the market risk warning index as the example, Table 1 shows that U_{31} is risk warning Grade Two which is normal; U_{32} is risk warning Grade One which is no risk. In the same way, it's obtained the other risk warning index's state and grade of Company M's private equity investment

2. Integrated risk warning analysis

The extenic evaluation of Company M's private equity investment which has multivariate data quantification decision is to transform the optimal result into the maximum value of integrated correlation degree. Table 3 shows that $K_j = \max\{2.2679 \quad -0.0071 \quad -0.3240 \quad -0.0402\} = 2.2679$, according to the criterion $K_j = \max\{K_j(N)\}$, and private equity investment risk of Company M is warning Grade One which means there is no risk. However, $j^* = 1.02$ shows that the private equity investment risk warning of Company M is partial to normal risk warning, Company M must make efforts to maintain good development state.

4 Conclusion and Suggestion

Multi-aspect integrated factors affected private equity investment by the empirical research and result analysis of private equity investment risk warning above. It not only need to do integrated warning evaluation before private equity investment, but also to do potential risk warning evaluation the in the process of investment. In this paper, it's constructed private equity investment risk warning evaluation index system. Meanwhile extenic evaluation model is used to do empirical research on private equity investment risk warning, which can provide related reference for the deep decision of investment institution.

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Exploring the Coupling Relationship Between R&D and Performance: Evidence from China Industrial Enterprises Above Designated Size

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Abstract Using the data of China industrial enterprises above designated size, this article examines the coupling relationship between R&D and performance. R&D and performance are regarded as two independent sub-systems. CRITIC method is used to objectively calculate the weight coefficients. The coupling coordination degree model is used to measure the relationship between R&D and performance. The results illustrate that the coupling relationship level of the 38 sectors of the industrial enterprises above designated size is relatively weak and 71.05 % sectors are on the condition of barely balance. 68.42 % sectors belong to the R&D lagging-type. And most of the moderate balance sectors belong to the performance lagging-type, while the moderate imbalance ones all belong to the R&D lagging-type.

Keywords R&D • Performance • Coupling relationship

1 Introduction

R&D is one of the most important driving forces for core competence, and the coordinated development of R&D and performance has become the key to improve enterprises' competitive advantage. Under the coordinated development of R&D and performance, they are able to cooperate with each other to achieve sustainable development. In the specialized literature there is a considerable amount of research on the relationship between R&D and performance. They mainly focus on two parts: (1) the direct relation which contains the effects of R&D on business performance, innovation performance, etc. (2) the indirect relation which explores the regulated or mediated variable affecting the relationships, etc. And there are few

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researches analyze the relation from the coordination development perspective. Different from [1] this paper focuses on the differences of coupling relationship in different sectors. The organization of the rest of the paper is as follows. In Sect. 2, the research design is described including the construction of index system, weight determination and model building. In Sects. 3 and 4, we empirically analyze the coupling relationship of industrial enterprises above designated size in different sectors. The final section concludes the research results and the future work.

2 Research Design

2.1 The Construction of Evaluation Index System

The evaluation index system of R&D and performance is shown in Table 1.

2.2 Index Weight Determining Based on Grey Incidence Analysis

The CRITIC method is applied to calculate the weight coefficient [2, 3]. The index weight can be determined as follows:

Table 1 The evaluation index system of R&D and performance

Object layer	Criterion layer	Index layer	Units
The coupling relationship between R&D and performance	R&D (X)	Full-time equivalent of R&D personnel (x_1)	Man-year
		Expenditure on R&D (x_2)	10,000 Yuan
		R&D projects (x_3)	Unit
		Number of patent applications (x_4)	Piece
		Number of invention in force (x_5)	Piece
		The proportion of invention patent (x_6)	%
	Performance (Y)	Ratio of profits, taxes and interests to average assets (y_1)	%
		Ratio of debts to assets (y_2)	%
		Turnover of current assets (y_3)	Times/year
		Ratio of profits to total industrial costs (y_4)	%
		Sales ratio of products (y_5)	%
		Profit ratio of production (y_6)	%

A. Quantitative the conflict (κ_i) of indicator i

$$\kappa_i = \sum_{i=1}^m (1 - \rho_{ij}), \quad i = 1, 2, \dots, m \quad (1)$$

with ρ_{ij} is the correlation coefficient between indicator i and j , m , is the number of indicators.

B. Calculate the information (I_i) of indicator i

$$I_i = \sigma_i \cdot \kappa_i = \sigma_i \cdot \sum_{j=1}^m (1 - \rho_{ij}), \quad i = 1, 2, \dots, m \quad (2)$$

with σ_i is the standard deviation of indicator i .

C. Determine the weight (w_i) of indicator i

$$w_i = \frac{I_i}{\sum_{i=1}^m I_i}, \quad i = 1, 2, \dots, m \quad (3)$$

with $\sum_{i=1}^m w_i = 1$ and $w_i \geq 0$, w_i is the weight coefficient.

2.3 The Construction of Coupling Coordination Degree Model

The process of the construction of the coupling coordination degree model of R&D and performance is as follows:

A. The construction of coordination degree model. x_1, x_2, \dots, x_p are p indicators reflecting the R&D information of companies, and y_1, y_2, \dots, y_q are q indicators reflecting enterprise's performance. And the scores are

$$u(x) = \sum_{i=1}^p w_i x_{ik}^*, \quad v(y) = \sum_{j=1}^q w_j y_{jk}^* \quad (4)$$

with $i = 1, 2, \dots, p, j = 1, 2, \dots, q$; x_{ik}^* and y_{jk}^* are the standard value of object k ; and w_i and w_j are weight coefficients. Referring to [4] we get the coordination degree model of R&D and performance.

$$C = 2 \left\{ \frac{u(x) \cdot v(y)}{[u(x) + v(y)]^2} \right\}^{\frac{1}{2}} \tag{5}$$

with C is the coordination degree.

- B. The construction of coupling coordination degree model. Due to the coordination degree cannot reflect the level of coordinated development [5]. So we introduce the coupling coordination degree model

$$D = \sqrt{C \times T}, \quad T = \lambda \cdot u(x) + \mu \cdot v(y) \tag{6}$$

with D is the coupling coordination degree, and T is the comprehensive index. We define $\lambda = 0.5, \mu = 0.5$.

- C. The determination of coupling coordination degree type. The coupling coordination degree $D \in [0, 1]$, and its value is closer to 1, the coordinated development of R&D and performance is better. The criterion is shown in Table 2.

3 Results

The data of 38 different sectors of industrial enterprises above designated size are collected from China Statistical Yearbook (2013) and China Statistical Yearbook on Science and Technology (2013). The empirical results of the index weight and coupling coordination degrees are shown in Tables 3 and 4 (The 38 sectors use their name abbreviations).

Table 2 The hierarchy of coupling coordination degree

Interval	Type	Interval	Type	Interval	Type
[0.0–0.2)	Serious imbalance	[0.4–0.6)	Barely balance	[0.8–1.0]	Well balance
[0.2–0.4)	Moderate imbalance	[0.6–0.8)	Moderate balance		

The relationship type of R&D and performance: Type I: $u > v$ is performance lagging-type; Type II: $u < v$ is R&D lagging-type; Type III: $u = v$ is R&D and performance synchronous-type

Table 3 The weight coefficients of indicators

R&D	Weight	Performance	Weight	Performance	Weight
x_1	0.1008	x_5	0.1271	y_3	0.1586
x_2	0.1184	x_6	0.3990	y_4	0.1354
x_3	0.1266	y_1	0.1468	y_5	0.1699
x_4	0.1281	y_2	0.2425	y_6	0.1469

Table 4 The results of coupling coordination degree

Sector	D	Coordination type	Lag type	Sector	D	Coordination type	Lag type
MWC	0.5133	Barely balance	II	MM	0.6325	Moderate balance	I
EPNG	0.5855	Barely balance	II	MCF	0.5111	Barely balance	II
MPFMO	0.5712	Barely balance	II	MRPP	0.5095	Barely balance	II
MPNMO	0.5555	Barely balance	II	MNMP	0.5386	Barely balance	II
MPNO	0.5938	Barely balance	II	SPFM	0.5935	Barely balance	I
PFAP	0.5834	Barely balance	II	SPNM	0.5701	Barely balance	I
MF	0.5539	Barely balance	II	MMP	0.5224	Barely balance	II
MLBRT	0.4830	Barely balance	II	MGPM	0.5899	Barely balance	I
Mto	0.6053	Moderate balance	II	MSPM	0.5758	Barely balance	I
Mte	0.4543	Barely balance	II	MA	0.5896	Barely balance	I
MTWAA	0.3384	Moderate imbalance	II	MRSAOTE	0.5453	Barely balance	I
MLFFRPF	0.3538	Moderate imbalance	II	MEMA	0.6443	Moderate balance	I
PTMWBRPSP	0.4670	Barely balance	II	MCCOEE	0.7240	Moderate balance	I
MF	0.2564	Moderate imbalance	II	IM	0.5125	Barely balance	I
MPPP	0.4673	Barely balance	II	OM	0.4555	Barely balance	II
PRRM	0.4798	Barely balance	II	RSPMPE	0.4647	Barely balance	II
MACEACSEA	0.3382	Moderate imbalance	II	PSEPHP	0.5440	Barely balance	II
PPCPNF	0.6160	Moderate balance	I	PSG	0.4879	Barely balance	II
MRCMCP	0.6473	Moderate balance	I	PSW	0.3870	Moderate imbalance	II

4 Discussion

According to the results of coupling coordination analysis, the coordination relationship between R&D and performance has the following features:

- A. The coordination development level of R&D and performance is weak. In the 38 sectors, there are only 6 sectors belong to the moderate imbalance type. And 27 sectors are on the condition of barely balance, the percentage of which comes to 71.05 %. In addition, there are also 5 sectors, are under the moderate imbalance type. Moreover, there is no sector in well balance type or serious imbalance type.
- B. Most of the industrial enterprises above designated size belong to the R&D lagging-type. 26 sectors belong to R&D lagging-type, the percentage of which is 68.42 %. Manufacture of computers, communication and other electronic equipment sector has the highest degree -0.7240 . The other ones are pertaining to performance lagging-type. Manufacture of furniture has the lowest degree of coupling coordination -0.2564 . There is no sector can reach the balance type.
- C. The moderate balance sectors belong to the lag type I, and the moderate imbalance sectors belong to the lag type II. The six sectors of moderate balance type have the same characteristic that most of them belong to performance lagging-type. Only manufacture of tobacco is the performance lagging-type.

5 Conclusion and Future Work

In this paper, we empirically analyze the coupling coordination relationship between R&D and performance by using the data of 38 sectors in China industrial enterprises above designated size. The results illustrate that the coordination development level of R&D and performance is weak; most of the sectors of industrial enterprises above designated size belong to the R&D lagging-type; and the moderate balance sectors belong to performance lagging-type, and the moderate imbalance sectors belong to the R&D lagging-type. And raise the level of enterprise's R&D can better improve the coordinated relationship between R&D and performance.

However, there are still some limitations in this research. Possible future research topics can be stating on the analyzing the dynamic relationship between R&D and performance to comparing the results with different years.

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Research on Safety of China's Film Industry

Junhui Zhang

Abstract The twenty-first century is the era of knowledge economy, under the background of the Chinese film industry after more than 100 years of development, film industry has become the hot spot in the field of the combination of economy and culture. Based on the 100 years of development, the film industry usher in a new higher level of challenge at the same time, due to the economic development of the improvement of people's living standard and the demand for spiritual culture rose to their highest level in history, so the film industry challenges with greater opportunities at the same time. Challenge is often and opportunities coexist, the film industry in the information age to the new industry pattern, just like any other industry all has bred the industrial safety this problem, for the healthy and sustainable development of the industry and the film industry bigger and stronger, we must face it and treat it correctly.

Keywords Film industry • Industrial security • Brand building

1 Introduction

Global film industry was born at the end of the last century, in soon after the birth has been introduced into China, such as China's first domestically produced movie Ding Junshan is appeared in 1905. To see movies in China started from the time or earlier, although the film industry for 35 years of reform and opening-up as well as all walks of life also ushered in the period of rapid development, through the tireless efforts of several generations of artists, has achieved high performance, but with the film industry is relatively weak compared with developed abroad, especially in post-production, computer special effects, the audience reaction is immature [1]. After the reform and opening up, the film industry continuously, step by step with the west, the introduction of new ideas, new technology constantly. Have been in the industry believe that the development history of Chinese film art films, independent films, transnational production three times. The author thinks that,

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the three times compare foreign mature film industry such as Hollywood, or the primary stage, although it is also the Chinese movie industry, try to go abroad, towards the world, but mostly is a poor box office even cannot recover the cost of ending. By contrast, American is accustomed to watching foreign movies, even compared to the domestic film more like watching Hollywood movies, we also have a kind experience into the cinema, such as the amount of Wanda cinema, arranged in one of the most famous Hollywood blockbusters, few domestic film *Deus ex*, but happily in recent 2 or 3 years, this from the trap in the breakthrough of foreign films and film stand out more and more, it shows that the development of China's film industry is gradually obtained the recognition, the author from the perspective of an ordinary audience to think of domestic some excellent films, no matter from the late actor's deduction, the photography technology, production, marketing campaign before the premiere, the box office and into China in such aspects as foreign films are close. We are looking forward to the rise of China's film industry, the author believe that the Chinese film industry is the ability to learn experiences and lessons of the development of foreign films, seize the opportunity to meet challenges, will movie industry bigger and stronger.

2 A New Thought as to Develop Chinese Film Industry

The Chinese film industry to invest in new train of thought, is to improve the investment environment of the film industry, raise investment efficiency, makes the Chinese film industry industrial chain formation, lead to more original works, promote the research of movie content and the internationalization of the industry [2].

The Chinese film industry to create a good investment environment and investment atmosphere, here mainly refers to the soft environment and good environment. Soft environment usually refers to: film talents, policy, culture and social environment, etc. Good environment refers to: establish or transform the cinema, the movie theme park, etc. Open up a new idea of investment mainly from two aspects of the soft environment for investment and good environment. Foreign film industry developed countries or regions, the film industry has become one of the local pillar industries, the government often give some policies to attract investors to contribute to the ascension of hard and soft environment, build and perfect the whole chain of film industry, industrialization operation, improve competitiveness and to form the research and development of new content or the power of the new technology, the hearts of the audience as brand image, this kind of environment is to stimulate more and better new works are created, so as to build a complete with strong innovation ability and international industrial chain. The film industry and other traditional industries, the health of the complete industry chain can be a very good guarantee industry, efficient and sustainable development. Industrial chain to maintain the talents cultivation, filming, production, screening, and other links, for China's film industry to build a complete industrial chain is particularly urgent and important. The Chinese film industry to build a complete industry chain should be

from upstream and downstream industry combination, the influence of related elements and resources integration, brand promote three aspects, the key to build and perfect.

3 Copyright Protection

The film industry and other cultural industries, in this information age, knowledge of copyright protection is one of the important link to maintain the healthy development of the industry. Today film piracy rampant, industrial property rights (ipr) protection embarrassed, in order to maintain the healthy development of the film industry must crack down on piracy to protect the legitimate interests of the genuine manufacturers in order to maintain the concept of sustainable development. So we Chinese film industry to achieve great development must rely on state policies, laws and regulations to crack down on piracy and infringement of intellectual property rights behavior to maintain and support the development of film industry, the real let the film industry in a free loose environment for creation, only solved the trouble back at home of legitimate manufacturers make them all the main focus on the creation, new technology research and development, marketing, rather than on how to protect the interests of their own to prevent piracy.

4 Shape Brand Image and Expand the Market

The development of the film industry is based on excellent films and further expand the market share, in the modern age of digital television technology and highly developed network video how to let consumers willing to pay into the cinema to watch movies, it's need to shape the brand image, in the real theater we see there is no lack of such a phenomenon, when there are foreign movies in China, our customers have to watch, movie arrange events closely, houses [3]. The Chinese film is thin many, explain this phenomenon? At least not the Chinese do not like the movies but I don't like watching Chinese movies, Chinese films is not attractive, in a sense you can say that, but I think the lack of Chinese film is not the most lack talent or novel elements such as movie content enough, but to consider the lack of Chinese domestic film from the whole industry chain brand, on the premise of no brand effect of the Chinese film industry with natural developed mature like Hollywood movie industry, consumer before going to the cinema to watch movies and no special guidance to see a film, but listened to the salesman said, this is a film from the American movies in Hollywood, darling we will pay for it, this is the brand effect in the film industry, in fact, we often see of is not one of these films, look more like a "Hollywood" and "American movies".

China's film industry to get higher in the domestic market share, it is necessary to pay attention to shaping the brand image, get rid of the embarrassing situation of

Chinese movie is “chicken ribs”, happily Chinese filmmakers seemed to understand this, some famous director guidance work is slowly to do some adjustments, make some domestic movie scene in the film market, obtain good box office, shows that the film industry to the brand development has become the inevitable road [4]. But throughout the development of the industry, the movie market still exist many problems to solve. Such as marketing promotion activity in front of the new film is not scientific and unreasonable, to marketing and marketing, promotion is arbitrary cannot be targeted on the movie, the effect not beautiful, not only caused huge waste of resources and will make the audience of film products produced a feeling of distrust. So it is necessary to make film brand, good brand can make the movie marketing cost greatly reduce, also can realize the effective interaction with the audience. At the end of the day, although the film product has its own particularity, it is also a kind of commodity, it endowed with the essential attribute of goods, we should abide by its commodity attribute orientation and mass consumer groups, make distinctive products brand, promote the improvement of the film industry continuously and prosperity.

5 Pay Attention to Industry Personnel Training

Any industry development cannot leave the professional talents, especially as the film industry of cultural industry, here refers to the talents include: the actor, director, producer, dubbing, makeup, camera associated with film industry chain, marketing planning, etc. The twenty-first century is the age of talent competition that is there is no denying the fact that very few young creative talent, in the film market of today are facing the situation of dating, facing the fierce competition in the market situation of this view is by no means alarmist, the film industry in China urgently needs to develop and launch youth talent and talent pool for industry, savings industry talent. Attaches great importance to the talent cultivation and industrial development speed imbalance phenomenon and take the corresponding measures.

With the deepening of the reform and opening up and the WTO, China and the world high standard in all walks of life, movies and more attention paid to the cultural industry, movie industry ushered in the history of the development of the important opportunities, the current domestic film industry a good situation, under the background of this we need to continually expand the scale of movie talented person's raise to apply to industry requirements. In talent cultivation under the premise of expanding scale and pay attention to the quality of film professional personnel training, presenting a number of high-level talents with artistic innovation ability and the phenomena of “low-end” personnel number. Even at the same time pay attention to cultivating talents especially related to the film industry to cultivate a group of outstanding director and management talents.

6 Conclusion

The Chinese film industry is ushered in the unprecedented opportunity and the development of China's film industry is in an optimistic mood, but we cannot ignore the problems existing in the development of industry, opportunities are often accompanied by challenges, strive to contribute to China by the historic transformation of film producers to power.

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Study on Chinese Retail Format Development Based on Consumer Demand Theory

Huichun Che and Xiao Song

Abstract From the process of retail format evolution, we found, along with the change of consumer demand, the change of retailing is around the “consumers focus” business philosophy under the adjustment and innovation, changes in consumer demand can be said to be the fundamental power of its retail format transformation. Therefore, for the healthy development of China’s retail industry, it is necessary to analyze the interactive relationship between the consumption demand and retail format, and provides suggestions for retailing formats optimization.

Keywords Retail format • Consumer demand • Countermeasure

1 Introduction

With the improvement of residents’ consumption level in recent years, the change of China’s retail industry is more and more profound. The formation and evolution of the retail format depends on the interaction of market participants. Most previous studies are based on the perspective of the seller, rather than on the role of consumers. Therefore, this article focuses on the role of consumers in the change of retailing forms, as to provide the theoretical basis and decision-making reference for optimization of retailing forms in China.

2 Further Understanding of Retail Formats and Consumer Demand Concept

2.1 Retail Formats

Retail format is refers to the management which is formed in the retailers’ systematically conduct procurement and marketing activities. "Relative to traditional store valuing “what to sell”, it emphasizes “how to sell”, which means the core activity is

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Table 1 The different of marketing mix strategy in retail formats

Type of the formats	Goods				Service	Price	Place
	Breadth	Length	Depth	Correlation			
Department store	High	High	Middle	Low	More	High	Far
Supermarket	Middle	High	Middle	Middle	Less	Low	Middle
Discount store	Middle	High	Low	Low	Less	Low	Far
Warehouse store	Middle	Middle	Low	Middle	Less	Low	Far
Convenience store	Low	Low	Low	High	Middle	Middle	Far
Specialty store	Low	High	High	High	More	High	Middle

purchasing and marketing around the consumer demand, including marketing strategy, product strategy, sales promotion strategy and price strategy [1]. From the perspective of marketing strategy, retailers based on the division of similar consumer groups on the market, design marketing combination for each segment. From product strategy point of view, the key is to analyze the relationship between consumers and products, that is to say, when retailers launch new products, consumer perception, cognition, behavior and the environment related to the product require are serious consideration, and are monitored in the product life cycle. From sales promotion strategy point of view, retailers transfer product information to consumers through advertising, sales promotion, personal selling, and public relations promotional activities to persuade consumers to buy the product. From the perspective of price strategy, the key lies in the four types of consumer cost, namely the currency, time, cognitive activities and behavior, these costs together with the product value or utility represent the prices for consumers.

The essence of the difference between retail formats is the different weights and use of these variables combination [2]. Marketing mix strategy of different business types exist substantial difference (Table 1).

2.2 Consumer Demand

The necessary premise of exchange is getting extra benefit. The total utility from goods and services which consumers get can be divided into two parts. One part is equivalent exchange, namely the price paid, and the rest part is the total value minus the price paid, which is expressed as “balance utility” in this article [3]. If the balance utility to 0, whether exchange for consumers are the same, so consumers don’t step in the trade. The greater balance utility is, the stronger the consumer transactions wishes are.

As a result, the actual (or expected) balance utility is expressed as: consumers’ actual (or expected) total utility from the goods and services minus the actual price paid (or psychological price). Psychological price is the highest price which makes consumer to break through the resistance of purchase. We express the balance utility as $S = E - P$ and the expected balance utility as $ES = N - G$. Among them,

S represents balance utility, E represents consumption total utility, P represents actual price paid, ES represents expected balance utility, N represents market price, G represents psychological price.

If the commodity exchange is divided into two groups, before and after, the evaluation of demand and utility can be respectively for $N = G_0 + Gr + ES$ and $E = P_0 + Pr + S$.

Needs assessment content includes the following three aspects: first, under the given resources, goods should have the functionality and quality reflecting the social knowledge and technology (G_0); Second, the matching demand and commodity search cost (Gr), namely the cost of the supply and demand both sides waiting for, looking for, transporting goods and other activities; Third, the expected balance utility (ES) namely expect consumer satisfaction. The basis of evaluating utility includes goods factory price (P_0), retail raise price (Pr), consumer satisfaction S .

At constant when confronted with asymmetric information in the competitive environment, the P_0 reflects the market pricing of G_0 , Pr reflects the market pricing of Gr , in addition, $(S - ES)$ is the gap between expectation and reality of consumer, it does not change the facts of the transaction, so without considering the differences, $P_0 = G_0$, $Pr = Gr$, $N = E = P_0 + Pr + S$. Which means the market is in a state of equilibrium of supply and demand, utility “E” is consumer’s evaluation of the market price (N represents), currency ($P_0 + Pr$) was “votes” which used to evaluate. When N is used to reflect all market requirements in a certain period of time, the $(P_0 + Pr)$ represents the total market consumption during the period.

3 Analysis on Retail Market Main Body Behavior

3.1 Retail Market Main Body

The retail market main body includes consumers, retailers and producers. The decision variables of every main body is different, when the market supply and demand balance, the parties expressed the relationship between decision variables as,

$$(E - N) = (P_0 - G_0) + (Pr - Gr) + (S - ES) = 0. \quad (1)$$

If the supply and demand of market balances, formula (1) is described below,

$(E - N)$ to 0: consumption utility just meet the demand in the market,

$(P_0 - G_0)$ to 0: products are good value for money and producers get average profit margin

$(Pr - Gr)$ to 0: retailers get average profit margin by linking the supply and demand;

$(S - ES)$ to 0: there is no gap between the consumer expectations before trade and satisfaction consumers actually received after trade.

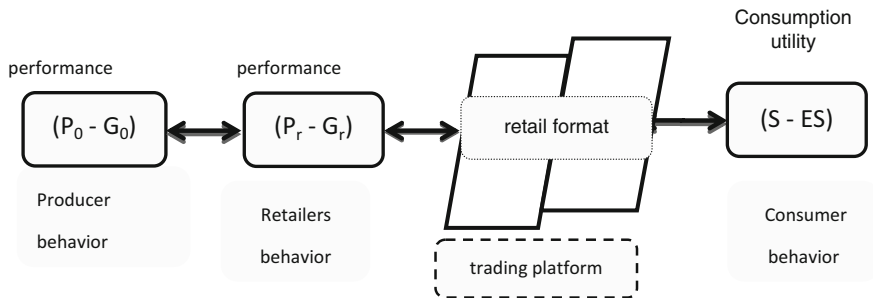


Fig. 1 Relationship between decision variables of market subjects

Of course, in actual market operation, all kinds of disturbance factors make the supply and demand balance in continuous wave, so the existence of the balance above is very short.

Figure 1 reflects the relationship between decision variables of market subjects.

3.2 Dynamic Game Between Main Bodies

In actual market operation, supply and demand balance can only be achieved by continuous changes. And this is another set of activities in the deal, the correction of needs assessment and effectiveness evaluation. Among them, the modified consumer needs assessment can be expressed as:

$$(E_{t-1} - N_t) = (P_{0(t-1)} - G_{0(t-1)}) + (P_{r(t)} - G_{r(t)}) + (S_{(t)} - ES_t). \tag{2}$$

The modified producers' utility evaluation can be expressed as:

$$(E_t - N_{t-1}) = (P_{0(t)} - G_{0(t)}) + (P_{r(t)} - G_{r(t)}) + (S_{(t-1)} - ES_{(t-1)}). \tag{3}$$

After the correction of needs assessment and effectiveness evaluation, supply and demand achieve equilibrium again: $E_t - N_t = 0$.

Among them, t refers to this period; $(t-1)$ refers to the previous period. In the previous period under the condition of equilibrium of supply and demand, we have:

$$P_0(t-1) - G_0(t-1) = S(t-1) - ES(t-1) = 0. \tag{4}$$

There are two circumstances discussed below:

The first case, in the case of demand change, such as consumers leave the market for dissatisfaction ($(S-ES) < 0$) which lead to the decrease of N , rising disposable

income increase N , market rumors cause panic buying, etc. Similar to the above, the retailers must adjust the market to balance:

$$\Delta(P_0 - G_0) + \Delta(\text{Pr} - \text{Gr}) = \Delta(S - \text{ES}). \quad (5)$$

$$(E - N) = 0. \quad (6)$$

The second case, in the case of the supplier change, such as input costs of the products changes (G_0), as technical innovation, shortage of raw material and so on. In order to maintain profit, manufacturers change $\Delta(P_0 - G_0)$, such as maintain G_0 but increase the price. So retailers' profits and (or) the balance utility must adjust to make market rebalancing:

$$\Delta(P_0 - G_0) = \Delta(\text{Pr} - \text{Gr}) + \Delta(S - \text{ES}). \quad (7)$$

$$(E - N) = 0. \quad (8)$$

Thus, retailers' comparative advantage in the market transaction is: retailers are closer to consumers and better understanding consumers than producers, while closer and better understanding producers than consumers. For market changes, whether from supply to demand or demand to supply, retailers are timelier feel than the downstream one, and adjust faster and more flexibly. According to the formula (2) and formula (3), we analysis some examples of retailers reaction in market volatility, as shown in Table 2.

From these simple reaction models of market volatility, we can find, continuous fluctuations in market convey power to retailers who have the comparative advantage. The change and evolution of the retail format was also the result around enhancing the comparative advantage. The optimization of retail formats is dependent on the common role of subject and object in the market.

Retailers directly lead to reforms of the retail format; their decision-making behavior can be referred as the "vote by hand". Retailers choose target market, formulate marketing strategy, choose the appropriate structure to establish supply channels, and implement the marketing mix strategy, this comprehensive management form make up the retail formats.

Whether consumers recognized the existing retail format changes, their attitudes and behaviors can be referred as the "vote by feet". Basing on the balance utility maximization, consumers take the initiative to collect information, rely on the experience and knowledge of themselves or others, select "trust old retailer" or "look for more high quality source of goods", quickly make a "buy", "delayed" or "cancel" decision under the comprehensive thinking [4].

According the advantage of know more about commodity, producers choose the most favorable distributors, if they cannot find that retailers in time on the market, the producer can choose to build their own terminal sales, enriching the retail formats.

Table 2 Retailers' reaction in market volatility (examples)

The direction of the changes	Customer		Retailer		Producer	
	Example	Variable	Variable	Example	Variable	Example
From the demand side to suppliers	Disposable income increases	$N_t > N_{t-1}$; $(S_t - ES_t) < 0$; $ES_t > S_{t-1}$	$(P_{r(t)} - G_{r(t)}) > 0$; $G_{r(t)} < G_{r(t-1)}$; $P_{r(t)} > P_{r(t-1)}$	Clearance, raise prices, finally increase procurement	$(P_{0(t-1)} - G_{0(t-1)}) = 0$; then $G_{0(t-1)}$ decline, raise $P_{0(t-1)}$	Purchase raw materials, but lags behind the retailers
From the suppliers to demand side	Rigid demand, cut other spending, the price rise but still to buy	$ES_t = ES_{0(t-1)}$; $S_t < S_{t-1}$	$P_{r(t)} > P_{r(t-1)}$	Raise price, sell out stock, then restock by the high prices	$P_{0(t)} > P_{0(t-1)}$	Raw material supply nervous, produce only if the profits don't reduce

4 China's Retail Industry Development Strategy

4.1 Grasp the Consumption Trend

Consumer oriented market means to respect the change of customer demand. Retailers should constantly adjust development strategy on basis of the keen market insight. Retail enterprises collect sales information in various market segments, so they can get keen perception to the volatility of the market. The mass market coverage enhances their insight on the subtle changes, so as to improve the ability to deal with market crisis. Beijing New Yansha Mall, for example, constantly adjusts the layout according to a lot of market investigation since opened. They arrange function combination and structure of the whole mall in accordance with the new plan. This makes shopping mall closer to the habits of Chinese consumer, which has won the acceptance of many consumers.

4.2 Diversified Development

Retail enterprises use diversified organic industry cluster or a large number of sites scattered to attract customer flow, achieving economies of scale. Similarly, retailers can achieve the ways of differentiation by diversified sourcing strategy, pricing strategy, and unique value-added services.

4.3 Enhance the Core Competitiveness

Retail core competitiveness concentrated embodied in execution and service ability. The key is to cultivate a group of well trained employees. They can guide the consumer thought by communicating, expand the scale of enterprises, manage the market risk, and guarantee the execution. Retail giant Wal-Mart pays attention to staff training and quality of service, for example. Sam Walton said many times that customer service distinguishes Wal-Mart from all others. In many Wal-Mart stores hang the slogan: rule 1, the customer is always right; rule 2, if the customer happens to be wrong, refer to rule 1. This is a vivid portrayal of the Wal-Mart customer first principle.

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Study on Evaluation Methods as to Mineral Property

Zhengdong Sun

Abstract The methods of mineral property evaluation directly affect the entire process of mining rights market as to grant, assign, transfer, mortgage, pledge, finance and list, also affect capacity and levels of market allocation as to mineral resource. Currently, scholars and researchers assess the mineral property as to the value of sources, methodology, evaluation standards, property financing and financing methods from the multi-dimensional perspective. It improves our methodology for assessing the value of mining, also helps to construct a unified, open national mining rights market.

Keywords Mineral property • Assessment methods • Review

1 Introduction

The assessment of mineral resources rights is currently very active. It covers all kinds of methods. It assesses mining rights mainly in terms of revenue, cost market and etc. The methods mostly come from abroad or by reference to asset valuation principles. However, the legal system in China's mining right property market is different from foreign countries significantly such as the only ownership of country, requiring transfer of mining rights, the transfer of the full protection of national interests, And also the "mining rights assessment guidelines" as to determine Specific assessment methods which are from abroad do not fully consider the loss of mineral rights, the discount rate, grade of ore and other indicators which lack dynamic adjustment mechanism. In accordance with the national "Twelve Five-Year" Plan spirit, the future economic development of mining industry is to further deepen the mining rights of property rights, establish linkage mechanism of fees and taxes, also establish a "green mining" [1], which are assessed on mining method. All these propose higher standards, require systematic analysis of mining rights wherever at home or abroad to construct adaptation mineral property evaluation methodology which is very useful for the development of mining economy.

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2 The Concept of Mining

Mining rights means a natural person, legal persons and other organizations who are legally entitled to have the right of exploration or exploitation as to mineral resources and a series of economic activities [2]. It has the characteristics of qualification-specific, circulation of paid fees, the gradual loss of power. According to its connotation of view, the right is a bundle of rights, It is composed of a series of related rights.

3 Summary of Three Valuation Methods as to Mining Rights Abroad

Since “Roman Law” was firstly put forward the “mineral rights concept”. Research on assessment methods of mining has continued ever, especially the United States, Canada, Australia and other Western country, by way of reference to evaluate the project, form a line with mining right’s evaluation. The main are covered from cost of exploration and exploitation to market, income and other methods prototype which the most popular and most mature approach comes from Hoskold method, it is based on discounted cash flow calculated in accordance with the dual rate, before 1950s, foreign mining rights assessment circles’ mainstream Assessment Act. Actually carrying out systematic research and exploration from a theoretical point of view and disciplines consciously began in the 1960s, both the degree of development according to the economy and markets, but also with the introduction of sophisticated and property rights, institutional economics and other related theories, after mining Valuation commences organized to carry up [3].

There are professionals who assess the mineral resources on the core parameters of mineral property evaluation, conduct reserve value system evaluation. For the different characteristics of prospecting and mining rights, researchers and evaluators from three dimensions as to the market, revenues and costs makes specific exploration. Mining rights assessment, Grant based on the fair market value of other scholars presented comparable sales method. Some scholars option theory, game theory and other theories introduced in the field of mining evaluate proposed options valuation method, game pricing and other evaluation methods. Some scholars use computer technology, the use of computer models of mineral resources, the discount rate coefficients of sensitivity analyzes to assess and enhance the scientific and rational assessment methods. Prospecting and evaluation, Kilborn Engineering Geology proposed law, later scholars have put forward on the basis of geo-sorting method, the joint venture exploration agreement method of evaluation [4, 5].

4 Summary of Domestic Mining Rights' Assessment Methods

Mineral property evaluation carried out on the true meaning of our country, began in the mid-1980s, "Mineral Resources Law" and its follow-supporting policies promulgated, has undergone three stages. The first stage, from the mid 1980s to the early 1990s, mainly by direct introduction of absorption, both at the theoretical level, or at a practical level, mainly become law, marketing law, comparative law, such as the introduction of foreign mining mainstream assessment the right to assess areas where Li Wanhen and other scholars also from the large mining economics starting system, contact the development process of the development of the law of the foreign and internal assessments of mining methods, proposed the construction of a preliminary assessment of mining methodology envisaged [6]. The second stage, from the early 1990s to the late 1990s. Theoretical and practical results of this phase focused on the digestion and absorption and innovation. Due to large differences in terms of mineral resources in property management, storage standards, such as taxes levied on foreign direct references is not conducive to the sustainable development of mineral resources, mining rights on the existing evaluation methods to improve innovation, has become the stage. The main features of the main findings of both theoretical exploration, but also improve specific evaluation methods, at the theoretical level, primarily based on the value side, from a focus on scarcity value based on the value of labor based on a variety of value, scarcity value basis, etc. In the specific method level, from pure market approach, cost approach, the income approach to systematic assessment; basis. The third phase focused on the early part of this century, with cross-disciplinary integration of different development, knowledge of statistics, information science, environmental science, economics and other disciplines of the field began to assess the penetration of mining rights, both to expand the mineral rights evaluate ideas, but also increases the mining rights assessment method in which information science and rational securities options market to absorb knowledge, not only to maintain a dynamic and consistent foreign mining rights assessment methods, but also reinforces the qualities of the new mining rights assessment methods. The results of this phase of the study focused on the mathematical model of respect, while at the national level, "mining rights assessment guidelines" formally promulgated and implemented, so that China formally entered the mining rights assessment standards and procedures orbit.

On specific research, the Li instrument [7] and other experts based mining economics perspective introduction and absorption of foreign mining rights assessment methods, based on the exploitation of mineral resources exploration stage, low accuracy prospecting proposed assessment methodology, assessment methods and precision prospecting mining rights assessment methods. Liu [8] and other researchers from the mining rights to assess the internal consistency of the theory, methods and parameters of the market approach, cost approach, the income approach specific assessment conducted systematic research, the initial formation

of mining rights assessment methodology. Liao [9] and other experts to assess the value of the option theory into the field of mining proposed binomial tree model, BS pricing model, option pricing models and other complex mineral rights option pricing methods. Geng [10] and other scholars to assess the value of game theory in the field of mining, proposed pricing game. In addition, the theory of fuzzy mathematics and uncertainty has also been introduced mineral property evaluation, and further enrich the value assessment methodology value connotation of mining and mineral rights in China.

5 Conclusion Domestic and Foreign Mineral Property Evaluation Method Research Trend's Analysis

As a practical, highly specialized technical and economic assessment, research and analysis of domestic and foreign counterparts in this field, it can be seen, mineral property evaluation method from the subjective judgment of law, special technical analysis and financial modeling analysis shifted to Multivariate, dependency theory and dynamic measurement analysis of computer information science-based mining capital market trends. Research on Evaluation Method of mining is currently abroad, mainly showed the following trend characteristics. Study presents the characteristics of integration. More emphasis on mineral resources assessment, mining right market, correlation studies and exploration of mineral resources in the capital market, which not only affect the mineral resources and mineral property evaluation accuracy, to accurately determine the discount factor, but also with the current Mineral Resources and constantly improve the market system has a great relationship. Future research priorities will focus on the mineral property evaluation parameters and assess market reserves, mining rights market, the intrinsic correlation analysis and related capital markets regression analysis and probability and statistics research. Presents crossover study characteristics. New theoretical mathematics, statistics, economics, ecology, computer science and other disciplines, the field continues to introduce mineral property evaluation, spawned a new research perspective and research methods.

6 Conclusion

Comprehensive analysis of domestic and international mineral property evaluation method, the purpose is to construct the evaluation system suited to China's actual mining, the above analysis, we can see, we must continue to enhance our scientific and accurate assessment of the value as to mining rights, the need to constantly study new situation, new trends, constantly revised to improve assessment methods. Meanwhile, the need to further improve the basic theory of the value as to mining

rights, mining exploration and exploitation reasonable quantification process to protect national resources security, promote economic development, to solve the mining workers in employment benefits and positive externalities, such as resource depletion and environmental pollution Vice external costs, and to accelerate the establishment of a unified national mining rights market, the formation of an open and transparent national information system of mining, in order to truly realize the assessment methods and assessment practices interact resonance integration.

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Relationship Between Logistics Industry and Industrial Structure in Chongqing

Jieru Quan, Weiguo Zhang, and Sihuan Li

Abstract This paper takes the method of system dynamics, uses “Vensim PLE” software to make an empirical analysis on the relationship between logistics industry and industrial structure in Chongqing. According to compare the simulation of Chongqing’s GDP and three industries’ output value, we found that the logistics industry has significant impact on economic growth of Chongqing. It influenced the primary and the tertiary industry most and then the secondary industry, which indicates that the development of logistic industry could push the primary industry to evolved to a higher level, and optimize the industrial structure of Chongqing.

Keywords Logistics industry • Industrial structure • System dynamics

1 Introduction

In recent years, many Chinese scholars, who use various kinds of methods, have made researches into the relationship between logistics industry and industrial structure from different perspectives. Li Hong [1] establishes a series of indication to analyze the influence of logistics industry development on regional economic. Liu Shuang [2] who makes the northeast of China as their research object analyzes the relationship between logistics industry and the optimization of industrial structure. Zhao Jia [3] makes an analysis about the principle of three industries optimizations influenced by modern logistics industry by using relevant theories. Shen Jiang etc. [4] analyze how the development of logistics industry influences its optimization of industrial structure by using meterage method. It is discovered that

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the development of logistics industry and the third industry driven by logistics can efficiently increase the proportion of the third industry in domestic economy. Meanwhile, the developments can also put impetus into the optimization of interior structures of the first and the second industries, thus promoting the optimization of the whole industry. Based on previous researches, this paper makes a system dynamic model concerning the relationship between logistics industry and industrial structure. By emulating and proving the model, this thesis makes analysis of how logistics industry affects the optimization of industrial structure, with the intention to provide a reference for promoting the development of logistics industry in Chongqing, pushing forward the optimization of industrial structure and economic development.

2 Research Method and Empirical Data

This paper takes the method of system dynamics and makes an empirical analysis on the optimization effect of logistics industry development to Chongqing's industrial structure. The relationship between logistics industry and the industrial structure of Chongqing is complex. As a part of the tertiary industry, the logistics industry is limited by other industries; meanwhile, the logistics industry can promote economic development and industrial structure optimization. The development and coordination degree of logistics infrastructure resources is an important indicator to evaluate the sustainable and coordinated development of logistics industry [5], and logistics infrastructure investment has positive correlation relationship with logistics industry output value, therefore, we choose the logistics infrastructure investment on behalf of the development of logistics industry. The system dynamics model of the system of logistics industry and industrial structure is shown in Fig. 1.

There are 21 variables in this model. Among these variables, six are state variables (GDP: Chongqing's GDP; PGDP: the primary industry's output value; SGDP: the secondary industry's output value; TGDP: the tertiary industry's output value; LD: logistics demand; LS: logistics supply), six are rate variable (GGDP: Chongqing's GDP growth; GPGDP: growth of primary industry's output value; GSGDP: growth of the secondary industry's output value; GTGDP: growth of the tertiary industry's output value; GLD: logistics demand growth; GLS: logistics supply growth), five are secondary variables (PI: the primary industry investment; SI: the secondary industry investment; TI: the tertiary industry investment; RLDS: the ratio of logistics supply and demand; LI: logistics infrastructure investment) and four are constant variables (DCP: logistics demand coefficient of the primary industry; DCS: logistics demand coefficient of the secondary industry; DCT: logistics demand coefficient of the tertiary industry; RIC: investment conversion rate).

The original data which are obtained from statistical yearbook of Chongqing include the output value and investment of three industries in Chongqing. Based on the original data and the system dynamics model, we use "Eviews" software to

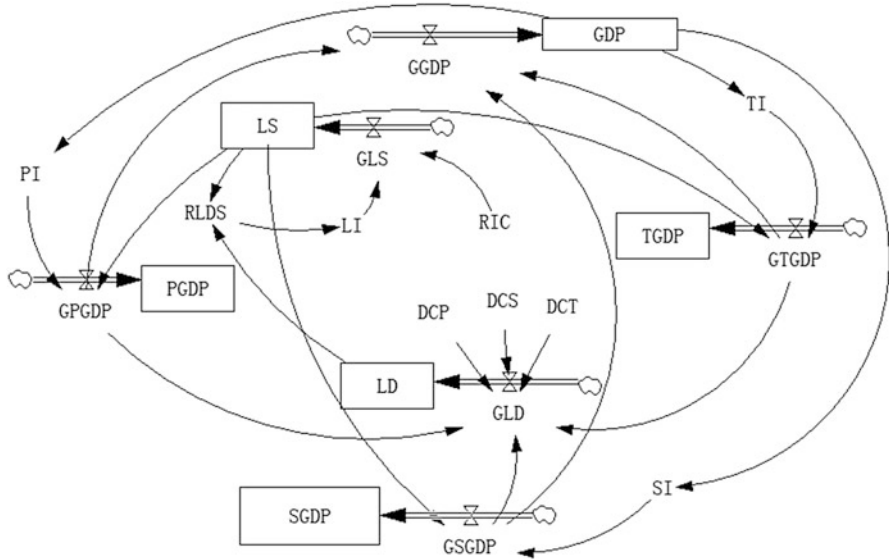


Fig. 1 System dynamics model

conduct a regression analysis, then we can list all the mathematical equation between variables, as shown below:

$$PI = (GDP - 2422.0)/24.4. \tag{1}$$

$$SI = (GDP - 1591.2)/2.9. \tag{2}$$

$$TI = (GDP - 962.8)/1.8. \tag{3}$$

$$GPGDP = 7.74 + 0.11 * PI + 0.03 * LS. \tag{4}$$

$$GSGDP = 105.54 + 0.37 * SI + 0.1 * LS. \tag{5}$$

$$GTGDP = -26.46 + 0.11 * TI + 0.09 * LS. \tag{6}$$

$$GLD = GPGDP * DCP + GSGDP * DCS + GTGDP * DCT. \tag{7}$$

$$RLDS = LS/LD. \tag{8}$$

$$LI = \begin{cases} 350, RLDS > 1 \\ 500, 0.8 < RLDS < 1 \\ 700, 0.6 < RLDS < 0.8 \\ 1000, 0.4 < RLDS < 0.6 \end{cases} \tag{9}$$

$$GLS = LI * RIC. \tag{10}$$

$$GGDP = GPGDP + GSGDP + GTGDP. \tag{11}$$

$$GDP = INTEG (GGDP, 2232.86). \tag{12}$$

$$PGDP = INTEG (GPGDP, 317.87). \tag{13}$$

$$SGDP = INTEG (GSGDP, 958.87). \tag{14}$$

$$TGDP = INTEG (GTGDP, 956.12). \tag{15}$$

$$LD = INTEG (GLD, 337.63). \tag{16}$$

$$LS = INTEG (GLS, 357.15). \tag{17}$$

3 Model Simulation and Analysis

Don't changed any parameters, we simulate the value of Chongqing's GDP, the output value of three industries by using "Vensim PLE" software, and the result of the simulation are shown in Fig. 2's R1. In order to testify this model's accuracy, we make a comparison between simulation value and the original data from 2003 to 2012, and the test results are shown in Table 1.

Obviously, the error between the simulative value and the actual value is very small, it is about 3 %. This result shows that the precision of the model is in a high level. We defined logistics infrastructure investment as zero, and other parameters are unchanged. We simulated the values again. It is concluded that the result is shown in Fig. 2's R2.

We can see from the figures that the contribution to the Chongqing's GDP and the output value of the three industries of logistics infrastructure investment intuitively. Table 2 shows that the contribution in concrete value, in view of the space, we choose the data from 2006 to 2012 to analyze.

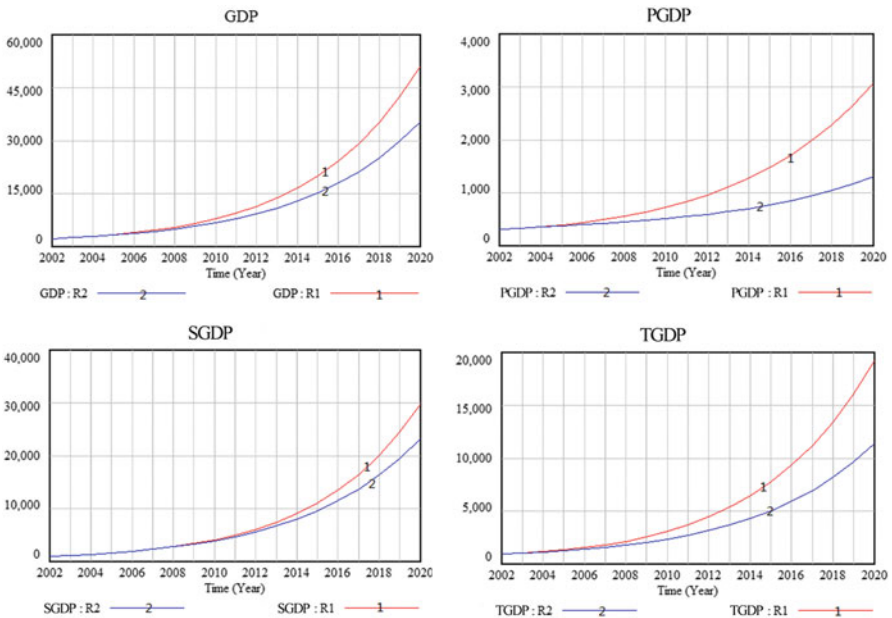


Fig. 2 Model simulation result

Table 1 Test data (unit: one hundred million Yuan)

Year	Field data				Simulation data			
	GDP	PGDP	SGDP	TGDP	GDP	PGDP	SGDP	TGDP
2003	2,555.72	339.06	1,135.31	1,081.35	2,517.6	335.472	1,142.71	1,039.42
2004	3,034.58	428.05	1,376.91	1,229.62	2,879.62	360.432	1,360.84	1,158.34
2005	3,467.72	463.40	1,564.00	1,440.32	3,336.44	393.802	1,622.91	1,319.72
2006	3,907.23	386.38	1,871.65	1,649.20	3,908.07	436.474	1,940.85	1,530.75
2007	4,676.13	482.39	2,368.53	1,825.21	4,618.5	489.456	2,329.14	1,799.9
2008	5,793.66	575.40	3,057.78	2,160.48	5,496.59	553.932	2,805.32	2,137.35
2009	6,530.01	606.80	3,448.77	2,474.44	6,577.1	631.302	3,390.54	2,555.26
2010	7,925.58	685.38	4,359.12	2,881.08	7,901.84	723.217	4,110.4	3,068.23
2011	10,011.37	844.52	5,543.04	3,623.81	9,521.09	831.623	4,995.77	3,693.7
2012	11,409.60	940.01	5,975.18	4,494.41	11,495.3	958.803	6,083.91	4,452.56

Table 2 Contribution of logistics infrastructure investment (unit: one hundred million Yuan)

	Year	2006	2007	2008	2009	2010	2011	2012
No parameters changed	GDP	3,908.07	4,618.5	5,496.59	6,577.1	7,901.84	9,521.09	11,495.3
	PGDP	436.474	489,456	553,932	631,302	723,217	831,623	958,803
	SGDP	1,940.85	2,329.14	2,805.32	3,390.54	4,110.4	4,995.77	6,083.91
	TGDP	1,530.75	1,799.9	2,137.35	2,555.26	3,068.23	3,693.7	4,452.56
	GDP	3,757.15	4,345.58	5,052.11	5,900.46	6,918.89	8,141.15	9,607.49
LI = 0	PGDP	399,682	426,661	457.5	492.97	533.951	581,446	636.62
	SGDP	1,941.42	2,318.89	2,771.05	3,312.86	3,962.35	4,741.14	5,675.14
	TGDP	1,416.06	1,600.02	1,823.57	2,094.63	2,422.59	2,818.56	3,295.73
	GDP	150.92	272.92	444.48	676.64	982.95	1,379.94	1,887.81
	PGDP	36,792	62,795	96,432	138,332	189,266	250,177	322,183
Contribution	SGDP	-0.57	10.25	34.27	77.68	148.05	254.63	408.77
	TGDP	114.69	199.88	313.78	460.63	645.64	875.14	1,156.83
	GDP	3.86 %	5.91 %	8.09 %	10.29 %	12.44 %	14.49 %	16.42 %
	PGDP	8.43 %	12.83 %	17.41 %	21.91 %	26.17 %	30.08 %	33.60 %
	SGDP	-0.03 %	0.44 %	1.22 %	2.29 %	3.60 %	5.10 %	6.72 %
Percentage	TGDP	7.49 %	11.11 %	14.68 %	18.03 %	21.04 %	23.69 %	25.98 %

Table 2 shows that the contribution of logistics infrastructure investment to GDP and three industries' output value of Chongqing increasing from 2006 to 2012. The average contribution to GDP is 10.21%, and 21.49 %, 2.76 %, 17.43 % to three industries in turn. Among them, the contribution to the primary industry is the biggest and then the tertiary industry. With logistics infrastructure investment increasing, the logistics supply is growing, and satisfy the growing logistics demand due to the rapid economic development, and directly or indirectly promote economic growth in Chongqing.

4 Conclusions

This paper only chose the variables which cause the quantitative change of industry structure, without further argument about qualitative variables, it is the limitations of this paper, but this is the direction of further research. In view of this, the following conclusion is based on the view of quantitative change of industrial structure.

While maintaining the values of all parameters and keep the definition of zero value of infrastructure, "Vensim PLE" software simulated GDP and output value of different industries in Chongqing, we get the influence of investment in logistics' infrastructure to local GDP in Chongqing and different industries. These analyses show that, the logistics industry has huge influence when pushing the economic growth in Chongqing. It influenced the primary and the tertiary industry most and then the secondary industry, which indicates that the development of logistic industry could push the primary industry to evolved to the higher level.

Also, in order to optimize the industrial structure of Chongqing, we have the following suggestions. Firstly, based on the influence of the investment in logistic industry, adjusting the logistics' networks could help the economic development in Chongqing circle and the suburbs, and help the balance of industrial structures. Therefore, government should invest more in the logistics' infrastructures. Secondly, the effect of tariff-free zone could not be neglected, which could help the evolution of the industry and make it more international. Chongqing now has two these kinds of zones, one is in XIYONG and one is in CUNTAN, which stretched 17 km along the Yangtze River and they are the models of tariff-free zones in China. Thus, government should take more serious concerns about these areas in order to give more chances to the whole industry. Finally, building the industry communication platform between manufacturing companies and logistics companies are also critical since Chongqing is a large city with comprehensive manufacturing industry. These two industries need and should have a deeper communication so that the whole economy could be boosted.

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The Coupling of Regional Economic Development and Element Flows: Take Chongqing for Example

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Abstract Based on Grey System Theory, the dissertation built an evaluation index system of flow economy which is a new economic category. By positive analysis of Grey Relation, it conducted an empirical study on the coupling mechanism between regional economy and resource elements in Chongqing, and revealed the effect of resource elements on regional economy growth as well as the promotion of regional economy on the mobility of elements. It is shown that the increasing level of flow economy in Chongqing was relatively high from 1999 to 2012, and there is a U-shaped trend in the coupling mechanism. Finally, as to the downward coupling trend, several countermeasures and suggestions have been presented on industrial structure optimization and regional economy development in the future.

Keywords Regional economy • Element flows • Gray correlation degree • Coupling • Chongqing

1 Introduction

As a new economic development mode, flow economy realizes greater regional value and bigger flow scale by building a corresponding carrier and consciously organizing different kinds of elements. There are many academic definitions, yet current domestic scholars basically agree with [1]. Ren Shenggang [2] put forward the economy growth mode for international city development composed of liquidity, cluster and diffusion, industry structure three engines [2], Niejian [3] evaluated the flow economy level of 31 Provinces with panel data from 1999 to

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2006 by Spatial Regression Model [3], took Zhangjiagang as an example to construct the evaluation index system of flow economy [4]. These researches mainly focused on theoretical system and operation mechanism, rarely involved quantitative analysis on the effect evaluation, let alone the systematic analysis on the coupling of multidimensional economic factors and regional economic development.

Chongqing, one of the most important regions in China, is the western economic center leading the whole economic development. This paper is designed to construct evaluation system for flow economy and discuss the mutual effect between economic growth and element factors in Chongqing, and further forecast the coupling trend to take action on the rapid development of related industries and form a regional “growth pole”.

2 Data and Method

In combination with historical literature statistics and the practical situation of Chongqing area, the evaluation index system of flow economy development includes 6 economic indicators (Table 1) and 15 element indicators (Table 2). The data involved in the dissertation contain the index values from 1999 to 2012 in Chongqing, which are mainly from China Economic and Social Development Database, China Statistical Yearbook, China Industrial Statistics Yearbook, Chongqing Statistical Yearbook, and some data need to be organized.

Due to the complex relevance of regional economy and element flows, this paper build the effect evaluation system to measure their close degree via grey correlation, then further evaluated the mutual coupling coordination degree from time series and finally forecasted the coupling trend to put forward relevant suggestions.

The two sequences used in this article is economic development indicators Y_i for behavior sequence and element indicators X_j for related factors. First of all, Gray Comprehensive Correlation Degree (GCCD) is applied to characterize the similarity degree and changing rate between Y_i and X_j [5].

$$GCCD = \theta\varepsilon_{ij} + (1 - \theta)\gamma_{ij} \tag{1}$$

Table 1 Index system for regional economic development

System	Destination layer	Index and unit	Sequence	Weight
Regional economy	Economic scale	GIOV (100 million yuan)	Y_1	0.204
	(0.30)	TIs (%)	Y_2	0.096
	Economic level	PC (yuan)	Y_3	0.208
	(0.40)	AIE (yuan)	Y_4	0.192
	Economic trade	TEI (10 thousand dollars)	Y_5	0.153
	(0.30)	TRSG (100 million yuan)	Y_6	0.147

Table 2 Index system for economic elements

System	Destination layer	Index and its unit	Sequence	Weight
Economic elements	Logistics	RFTK (100 million tons km)	X ₁	0.118
	(0.25)	HTV (10 thousand tons)	X ₂	0.089
	Capital	TWPs (%)	X ₃	0.043
	(0.25)	FOD (100 million yuan)	X ₄	0.105
		FDI (10 thousand dollars)	X ₅	0.051
		PI (10 thousand yuan)	X ₆	0.094
	Talent	TETI (10 thousand people)	X ₇	0.043
	(0.2)	NGU (people)	X ₈	0.076
	Information	NGS (people)	X ₉	0.081
	(0.1)	PIS (10 thousand people)	X ₁₀	0.052
	Technology	SFT (10 thousand households)	X ₁₁	0.036
		TC (%)	X ₁₂	0.012
		CNTM (item)	X ₁₃	0.037
	(0.2)	TMT (100 million yuan)	X ₁₄	0.075
		PG (item)	X ₁₅	0.088

In the Eq. 1, ε_{ij} is Gray Absolute Correlation Degree, γ_{ij} is Gray Relative Correlation Degree, and θ values 0.5 in general.

Then quantitatively evaluate the Coupling Coordination Degree (CCD) in time series via Deng’s relational degree in order to explain the coupling mechanism. Through interval standardization, it can be figured by the formula as follows:

$$CCD(t) = \frac{1}{mn} \sum_{i=1}^m \sum_{j=1}^n \frac{\min_j \min_t \Delta_{ij}(t) + \xi \max_j \max_t \Delta_{ij}(t)}{\Delta_{ij}(t) + \xi \max_j \max_t \Delta_{ij}(t)} \tag{2}$$

In the above equation, $\Delta_{ij}(t) = |x_i'(t) - y_j'(t)|$, and ξ usually values 0.5.

Finally, the coupling trend is predicted through grey GM (1, 1) model whose time response is the following formula [5]:

$$\hat{x}^{(1)}(k) = \left(x^{(0)}(1) - \frac{b}{a} \right) e^{-a(k-1)} + \frac{b}{a} \tag{3}$$

3 The Index for Regional Economy and Element Flows

To emphasize the different importance, this article divides the five economy elements into three levels: supporting factors, driving factors and auxiliary factors. By optimal sequence comparison method, each layer has been given different

weights. After averaging the scores of three experts, integrate their opinions to determine the weight of different indicators.

3.1 *Economic Indicators*

First, use CNKI database to find out the most economy indicators in recent years and combine the specific conditions with the data availability. Then three aspects together with six secondary indicators are designated to represent regional economy development (Table 1). Economic scale is the different levels of economic output including the total capital, labor, technology, etc. Gross industrial output value (GIOV) and share of tertiary industry to GDP (TIs) can be adopted to reveal the scale of flow economy. Economic level is known as the scale and speed of economy development, per capita GDP (PC) and average income of employers (AIE) are taken to describe regional economic level. Economic trade includes intra-regional and foreign trade, thus here use total export-import volume (TEI) to show the external trade and total retail sales of consumer goods (TRSG) to describe the frequency of intra-regional trade.

3.2 *Element Indicators*

Five economic elements have been selected as comparative sequence (Table 2). Logistics is the physical flow that covers the goods trading and exchanging process, Rotation volume of freight transport (RFTK), highway transportation volume (HTV), the share of transportation, warehousing and postal industry in GDP (TWPs) can totally reflects the basic logistics situation and measure the momentum of regional development. Capital is the funds business during production activities and support for the other elements which can be depicted by the final outstanding of deposits in financial institutions (FOD), foreign investment in actual use (FDI) and premium income (PI). The flow of talent refers to the migration and circulating between regions when existing different living standard, and total employment in tertiary industry (TETI), number of graduates in universities (NGU) together with number of graduate students (NGS) are chosen as the talent indicators. Information transfers from source to receiver via network, letters and telecommunications, so it can be described by population of internet surfing (PIS), subscribers on fixed telephone (SFT), television coverage (TC). Technology implies the right and ownership, which can be measured by contract number in technology market (CNTM), total market transactions (TMT), patent grant (PG).

4 Empirical Analysis

4.1 Correlation Degree and Analysis

According to the original data and gray relative analysis method, we can figure out the weighted GCCD and the correlation matrix of Chongqing.

On one hand, the result shows the weighted GCCD in Chongqing is 0.65 which belongs to high correlation, and the biggest three factors of elements on regional economy is capital, talent, logistics. Among these indicators, FOD has the closest relation with regional economy (0.72), indicating their highest synchronous change trend. In other words, finance industry in Chongqing is the main engine for economic growth. The correlation of RFTK (0.68) reveals the inland port should be fully utilized to promote other transportation industries and improve the economy efficiency as a whole. Besides, high-quality talent plays an excellent role in the fierce competition and the correlation of NGS (0.70) implies more attention should be paid to strengthen talent construction and training.

On the other hand, it is can be seen from Table 3 that economic level has the strongest influence to accelerate element circulating, in other words, the higher economic level, the faster circulation. Through the market mechanism, flow economy realizes the constant integration and diffusion of different elements to deeply promote regional economy development.

4.2 Coupling Degree and Prediction

Take reciprocal of the contrarian index: TIs and TWPs, and the coupling degree in time series can be realized via formula (2). Because of the computation complexity, all have been done with Matlab7.0 and the result is shown in Fig. 1.

The high coupling between regional economy and element flows shows not only the complexity and certain volatility, but also the periodic development law which is a similar U shape in coincidence. The fluctuation trend implies the discrepancy in coupling strength, focus and coordination degree in different periods. As to the fluctuation characteristics, the curve can be broadly divided into two phases: first stage is 1999–2008 during which there was an overall downward trend since the elements circulating cannot meet the demand of rapid economic growth despite of the policy measures to stimulate western economy. Owing to the flexible measures against financial crisis and Wenchuan earthquake, the second phase is 2008–2012 when the two systems gradually broke into coordination. Chongqing is faced with strong policies and new opportunities to expand investment and undertake the eastern industrial transfer, directly leading to the coordination.

As is known, there are so many prediction methods that each has their advantages such as regression analysis, expert prediction, grey theory prediction. As a result of the irregular distribution and small sample, it is better to forecast the

Table 3 The correlation matrix of regional economy development and elements in Chongqing

Index	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄	X ₁₅	Weighted GCCD
Y1	0.72	0.60	0.50	0.87	0.65	0.74	0.52	0.67	0.79	0.77	0.60	0.51	0.55	0.54	0.93	0.70
Y2	0.50	0.51	0.70	0.50	0.50	0.50	0.56	0.50	0.50	0.50	0.51	0.62	0.54	0.52	0.50	0.52
Y3	0.68	0.76	0.51	0.76	0.57	0.60	0.53	0.72	0.73	0.62	0.70	0.51	0.55	0.59	0.72	0.66
Y4	0.69	0.79	0.51	0.74	0.59	0.61	0.53	0.75	0.79	0.63	0.68	0.51	0.54	0.59	0.70	0.67
Y5	0.59	0.54	0.50	0.62	0.79	0.85	0.51	0.60	0.64	0.63	0.54	0.50	0.51	0.56	0.64	0.62
Y6	0.83	0.67	0.51	0.66	0.56	0.59	0.55	0.66	0.61	0.68	0.79	0.52	0.65	0.59	0.65	0.65
Weighted GCCD	0.68	0.66	0.53	0.72	0.62	0.66	0.53	0.67	0.70	0.65	0.65	0.52	0.56	0.57	0.71	
	0.65			0.67			0.65			0.64			0.64			0.65

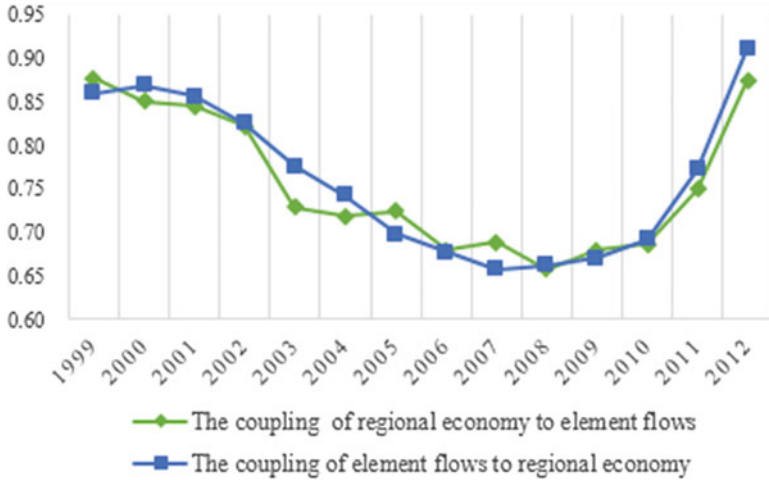


Fig. 1 The coupling of element flows and economic growth in Chongqing

coupling trend by grey prediction model GM (1, 1). Through formula (3), the predicted value in 2013 are 0.6985 and 0.7047, and the average relative error are both less than 0.1 which belongs to accuracy level 3, that is, the results are available. The falling trend, however, reminds us to strengthen competitive industries and invigorate the stock of resource elements to achieve self-development.

5 Conclusion and Suggestion

From the perspective of GCCD, the level of flow economy in Chongqing is so high that it promotes the development of related industries, especially the tertiary industry. Although the effective extents of different elements are not the same, the capital flow ranks first, which means the financial industry is the main engine for economic growth. So it is supposed that regional economy development should be promoted through the financial industry. On the contrary, raising incomes and promoting living standards can also bring faster circulation of resource elements. Factually, logistics is a new key point of economic growth for Chongqing to develop higher flow economy. And likewise, information industry will be the next breakthrough in the future.

As for coupling mechanism, the selected index system reveals the coupling mechanism between economic development and element system integrally. The similar U-shaped trend of the two systems is an integrated reflection of policy, economic level, infrastructure construction and market environment. To prevent the coupling degree from declining, it is necessary to take advantage of the opportunity of financial industry, and increase the scale of flow economy, and promote

circulating efficiency. Via regional trade and logistic distribution, the government should adjust existing social resources and optimize industry structure and the distribution of resources. In addition, high-end talents and advanced technology play an important role in the development of flow economy, which should not be neglected. Therefore some measures should be taken such as attracting all kinds of talents, gathering academic institutions, accelerating the transformation of technological achievements. Overall, the positive development of flow economy is significant to sustainable economic growth.

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Determination of the General Value of the Claim in the Conditions of the Slovak Republic (Central Europe)

Marián Židó and Anna Židová

Abstract The book value of claims, reported in the financial statements, has to correspond to the reality. Until 1989, the prices of the individual components of assets in the centrally directed economy were firmly fixed according to the given rules. Nowadays, the general value of the enterprise and its individual components (claims not excluding) is determined by the expert opinion. The procedure exactly follows the instruction of the decree. In the presented paper, we realize a determination of the general value of claims of the selected enterprise using breeding method. The general value of claims fixed by breeding method takes into account not only the time value of claims, but also evaluates selected qualitative and quantitative criteria, which have different weight of significance and at the same time, we respect the laws, regulations and procedures of the Slovak Republic.

Keywords Claim • Valuation • Breeding method

1 Introduction

Valuation of enterprise assets and their individual components is a fundamental assessment task. Valuation is the opinion of assessment expert. Assessment experts' opinions to the same value may differ; therefore, it is important to justify the determination of the general value of the claim. Valuation is performed to a certain date. The value of the claim can rise or fall at the time. The value is not determined only with respect to the presence, but also to its future potential.

At present, the valuation of enterprises and their components is very actual topic in the Slovak Republic. Valuation practice sets the value of the enterprise assets, especially when they are in a bankruptcy. Valuation of claims is one of the

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most challenging tasks of appraiser. The experts from the field of economics and management determine not only claims but also the value of securities (shares, bonds, debentures, options, etc.), parts of the stocks (not technical), financial assets and components of liabilities (debt) [1].

2 Determination of the General Value of the Claim

Claims are an important part of current assets. They bind a significant part of operating capital. Ideally, borrowers pay their debts in full before maturity. Creditors, however, are often forced to satisfy with a partial collection, late payment or they do not receive consideration at all.

From enterprise financing point of view, claims are considered to be relatively liquid component of assets [2] and they represent financial potential especially for the repayment of commitments. Claims are also an indicator of business efficiency. Therefore, valuation of claims is an important economic measure that is gaining more and more on its importance and extent of application. In the Slovak Republic, the process of assessing claims is legislatively regulated at appendix no. 9 of Decree no. 492/2004 collection of laws of the Ministry of Justice of the Slovak Republic about establishing the general value of assets. The basis of this process is the division of claims into different groups with margin coefficients of enforcement.

Claims as part of the enterprise assets at the same time represent a temporary stage in the cycle of cash. Under this component of the asset, it is understood the creditor's claim to certain cash or in kind by the debtor [3]. Once the seller provides the commercial implementation without immediate consideration to the buyer, the claim arises. The seller is becoming the creditor and the borrower debtor, until the settlement of the debt. Claims are recognized only if they are the result of past events, if it is almost certain in the future to increase economic benefits of the creditor and can be evaluated reliably.

In the presented paper, we are evaluating claims according to the Annex no. 9, Decree no. 492/2004 collection of laws of the Ministry of Justice and the general value of the claim is identified according to the following formula [4]:

$$\text{GVoC} = \text{SVoC} * c \quad (1)$$

GVoC – General value of the claim;

SVoC – Starting value of the claim;

c – Coefficient of enforcement of the claim.

When determining the coefficients of enforcement is very important to consider the time factor. Time aspect represents a fact that in the accounting, claims are recorded at nominal value. Each customer pays claims with a certain time lag. In addition to time perspective, the value of claims is influenced by many other

factors. Therefore, when evaluating claims, it is important to take into account for example economic development of industry, changes in exchange rates, inflation rate, interest rate, the possibility of trading with claims etc.

The general value of the claim is its final objectified value, which is an expert estimate of the price of this claim to the date of the evaluation in the ordinary business transaction, in a given place and time, including value added tax. According to current legislative standards, determination of the general value of the claim is based on the starting value of the claim and the coefficient of enforcement of the claim. Starting value of the claim means its book value. Valuation of claims represents an expression of positive and negative factors affecting their market price. When assessing claims, the following methods can be used: the method of the nominal value of the claim, the cost method of risk assessment, the rating methods, the breeding method, the liquidation method, a combination of these methods [5].

For the purpose of the presented paper, at the example of a particular enterprise, we apply the breeding method that takes into account not only the time value of claims, but also evaluates relationships with customers, the duration of cooperation, personal reasons for accepting a prolonged period of debt repayments etc.. By this method, we abstract from simplified models for the valuation of claims, which abstract from many important parameters.

3 Breeding Method of the Valuation of Claims

Breeding method of the valuation of claims is based on the principle of scoring evaluation. Evaluation based on scoring uses different scoring scales. This method often use coefficients calculated by scales that reflects the level of significance of each criterion. Evaluator can attribute the same weight to several criteria. When using the method, various breeding criteria can be used. Within the presented paper, we evaluate not only the financial situation of enterprises, but also their overall characteristics, history, research and development, production program and relations. Breeding method assumes the quantitative assessment of the importance of criteria. In general, it is a relatively differentiated expression of subjective information. The more important criterion is the higher score it reaches.

In our case when using Breeding method, we evaluated each claim on six criteria, which we assigned weights of significance from 0 to 5, while 5 is the highest rating. To each breeding criterion, we also assigned points from 0 to 5, while 5 is the highest rating. The resulting score of the claim is determined as the sum of weighted points. Coefficient of enforcement is then determined as the proportion of the weighted points of the claim and maximum numbers of points that given claim could achieve.

When selecting evaluation criteria of claims, we obtained the most important data directly during personal meetings with top officials of the enterprise. Additional data were obtained from the financial statements of the enterprise and other

documents. Assessment criteria, their corresponding weights of significance, scores of individual alternatives of assessment criteria are shown in the following table.

Time after maturity refers to the number of days after the deadline for maturity. The second criterion is the length and quality respectively debtor's willingness to cooperate with the enterprise. Payment discipline means how the partner pays his/her debts that is what is the *average duration of debt collection* (ADD) and whether is higher than the *given number of days for payment* (GND). Criterion of economic and financial situation of the debtor reports to the partner's situation that is, whether he/she has any subjective reasons for non-payment. Assumption of debt repayment is primarily a personal subjective opinion of the CFO of the enterprise to what extent the partner will repay his/her debt. Legal status means the documentation, the stage of enforcement and security of the claim. We set the weights of significance of individual assessment criteria according to past empirical experiences, scholarly literature and an interview with the CFO of the enterprise. In this paper, we focused on the valuation of claims from the trade relation while we selected the appropriate package of claims that represents the different groups of claims of the enterprise to one debtor. The date of valuation of claims was determined 31st July 2013 (Table 1).

Based on our calculations, we found that the average number of days after the maturity represents the value of 33.5 days. We decided to assign full score only to partners with which the enterprise has been cooperating without the problems from the beginning of the cooperation (2002). In terms of trade conditions, the maturity of invoices is 90 days, but the average payment period in practice is up to 118 days. The surveyed enterprise does not have any information about partner's problems. Thanks to the significance of their cooperation, enterprise tries to tolerate these negative. Based on this information, we can score individual assessment criteria. These values are graphically shown in Table 2.

The general value of claims is calculated by the above mentioned formula (1):

$$GVoC = SVoC * c = 45,750.27 * 0.84 = 38,430.23 \text{ €} \quad (2)$$

The general value of claims of the Polish partner is 38,430.23 €. The general value of claims fixed by breeding method takes into account not only the time value of claims, but also evaluates relationships with customers, the duration of cooperation, personal reasons for accepting a prolonged period of debt repayments etc.. By this method, we abstract from simplified models for the valuation of claims, which abstract from many important parameters.

Table 1 Assessment criteria, weights of significance and scores of individual alternatives

Time after maturity	Length and quality of cooperation	Payment discipline during cooperation	Economic and financial situation of the debtor enterprise	Assumption of debt repayment	Legal status	Number of points
Less than 30 days	Long-term and non-problematic	ADD smaller than or even to GND	Financially healthy enterprise	Over 90 %	Claims are fully secured	5
Less than 60 days	Short-term and non-problematic	ADD higher than GND to 10 days	Occasionally insolvent enterprise	Over 75 %	Security is not always effective	4
Less than 90 days	Long-term but problematic	ADD higher than GND to 20 days	Temporarily insolvent enterprise	Over 60 %	Late payments are penalized	3
Less than 120 days	Single and non-problematic	ADD higher than GND to 30 days	Long-term financial problems of the enterprise	Over 40 %	Claims are enforced by law company	2
Less than 240 days	Short-term and problematic	ADD higher than GND to 40 days	Insolvent enterprise	Over 15 %	Security instruments are inefficient	1
Over than 240 days	Single and problematic	ADD higher than GND more than 40 days	Enterprise in liquidation or bankruptcy proceeding	Less than 15 %	Enterprise does not use enforcement instruments	0
<i>Criterion weight</i>						
4	3	2	1	3	2	

Source: Authors

Table 2 Calculation of the coefficient of enforcement of the claim of the Polish partner

	Criterion	1	2	3	4	5	6	Total
<i>A</i>	<i>Criteria weight</i>	4	3	2	1	3	2	75
<i>B</i>	<i>Scores</i>	4	4	3	4	5	5	25
<i>C = A * B</i>	<i>Weighted points</i>	16	12	6	4	15	10	63
	The coefficient of enforcement of the claim = 63/75							0.84

Source: Authors

4 Conclusion

The aim of the paper was to highlight the importance of knowing the actual value of claims of the enterprise, as the nominal value often represents informative character and does not correspond to the actual current value. In the presented paper, the actual value of claims of examined subject is only 84 % of their book value. The general value of claims was determined by calculation of the coefficient of enforcement of claims through breeding method for assessing six criteria: time after maturity, the length and quality (resp. cooperation of the debtor), payment discipline, economic and financial conditions of the debtor, assumption of debt repayment, legal status.

In terms of prevention, it is important to maintain intensive communication with partners, to inform about their financial and economic situation in order to avoid unnecessary complications. Our recommendation is to designate the person responsible for the management of claims. The manager should be responsible in particular for the negotiation of payment terms, the communication with customers, the collection and analyses of claims, their security and prevention of risking claims. Monitoring of customers should include monitoring their solvency, willingness to cooperate, the quality of business relationships etc.. It is more efficient to ensure the insurance of claims especially in troubled or new customers.

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Study on the Impact of the Transportation to the Economic System Recovery

Weixi Zhang and Jinqiao Zhang

Abstract Regional vulnerability is widespread, and it has become an important factor affecting the development of the economic system, so the study on the impact of the transportation to the economic system recovery is an inevitable requirement for sustainable development of the economic system. First, the article describes the theoretical connotation of economic recovery and its influencing factors; Second, it analyzes the influence mechanism of transportation industry to the economic system recovery, and elaborates the relationship between transportation and economic system recovery using Granger causality analysis methods; Finally, the papers Case of Tianjin empirical analysis to draw conclusions and make policy recommendations accordingly. Finally, the article makes an empirical analysis using the case of Tianjin to draw conclusions and make policy recommendations accordingly.

Keywords Economic system recoveries • Transportation industry • Regional vulnerability • Granger causality analysis

1 Introduction

As the rapid economic development brings social progress, it also caused the economic structure irrational which Brought the world's population, resources, environment, social and cultural disharmony, brought economic system vulnerability. As an important aspect of development economic, industrial structure and regional is the main part of the recovery process of the economic system. Transportation, whose development can lead the development of series of related industries, plays a crucial role in the system recovery of the economic, therefore the study on the influence that the transport effect on the economy system recovery, will have a significant meaning for social, cultural, environmental and sustainable development of resources [1].

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2 The Connotation and the Influencing Factors of the Economic System Recovery Under the Vulnerability

Vulnerability is the resistance or capacity of the economic system to the random unknown disturbances from outside world. It is the attributes of the system itself. It exists in all systems, and is monitored. If you do not timely regulation, there will be crises, and its controllable goal is the produce units – industry [2].

Factors that affect the regional socio-economic system recovery should take the population, resources, environment; environmental factors; social factors; economic factors. Optimization of industrial structure, regional economic growth and per capita disposable income and so on are important content to measure the recovery of the economic system.

3 The Study on the Influence Mechanism of the Transportation on the Economy System Recovery

Industry plays a vital role in the economic system recovery. In general, the more developed of an intra-regional transportation, the stronger of its self-recovery capability in its economic system, the more effective of the people's initiative to restore the regulation of the system, and the more rapid system recovery process in the region in the. Economic system recovery is the organic integration of the recovery of the natural subsystem, economic subsystem and social subsystems, so the impact transportation affect on the economy system recovery for the following three levels respectively:

As an important location factors, transport can contribute to the mobility of the Material, personnel, energy between the regional economic system as well as within the system [3]. On the other hand, perfect transportation systems enable the rapid flow of goods and people and accelerate the restoration and reconstruction of the natural landscape.

Transportation industry serves for the transfer of the flow of production factors, has a strong correlation with the other industries, and is an important component of the economic system.

Transport industry can promote the mobility of production factors, speed up the flow of scientific, cultural and technological exchanges in various social subsystems. Social subsystem recovery, including transport industry can promote the mobility of production factors, speed up scientific, cultural and technological exchanges between the various social subsystems.

4 The Empirical Analysis (A Case Study on Tianjin)

4.1 The Selection of Indicators and Sources of the Data

According to the previous mechanism study of the economic system recovery and the impact of the transportation on the economic system recovery, we can determine the system recovery indicators are the following: GDP growth, labor productivity, social production of material consumption rate (per capita energy consumption), the GDP energy consumption, R & D as percentage of GDP, the proportion of high-tech industries, per capita gross domestic GDP growth, economic structure (three kinds of industrial proportion), the Engel coefficient, population density, population growth rate, employment rate, SO_x, NO_x emissions in daily average and the proportion of GDP, etc.. Transportation-related indicators: regional freight and passenger transport, transport of active employees, Vehicle production.

Taking the annual data of the transport and related indicators of economic system recovery from 1995 to 2010 in Tianjin as the study sample. The related data come from 1995 to 2011 of the “Tianjin Statistical Yearbook,” and the 2011 China Statistical Yearbook. This study used quantitative analysis software of EViews6.0.

4.2 Data Processing and Granger Causality Analysis

Take the Logarithm Take the logarithm of the data, because of the time series data does not change the nature of its timing after taking the logarithm, and the digitizing data is easy to get a smooth sequence, so first take the logarithm of the relevant data, and then the correlation analysis of the relevant data, and finally and the establishment of the model.

Granger Causality Analysis By inspection of econometrics, granger causality test on logarithmic data with the lag period of two bands, while deal with the for, select a Granger causality index, excluding no Granger causality indicators derived Table 1.

5 Conclusions

From the results of Granger causality analysis we obtained, in the case of two Lag period bands, at least 95 % confidence interval, the cargo (X1) is the Granger cause of real per capita GDP, employment rate, average per capita consumption of energy, R & D expenditure, the proportion of primary industry, secondary industry output value of the domestic GDP energy consumption and wastewater ammonia emissions, and it is also the Granger results of the new fixed asset investment;

Table 1 The results of Granger causality test

Null hypothesis	Obs	F-Statistic	Prob.
LNX1 does not Granger Cause LNY1	14	9.46986	0.0061
LNX1 does not Granger Cause LNY10	6	2,294.66	0.0148
LNX1 does not Granger Cause LNY3	14	2.00578	0.1904
LNX1 does not Granger Cause LNY4	14	2.35594	0.1504
LNX1 does not Granger Cause LNY5	9	4.86321	0.0849
LNX1 does not Granger Cause LNY61	14	3.04406	0.0978
LNX1 does not Granger Cause LNY7	14	5.20715	0.0314
LNX1 does not Granger Cause LNY9	14	3.12756	0.0931
LNX2 does not Granger Cause LNY1	14	6.1454	0.0208
LNX2 does not Granger Cause LNY7	14	4.5718	0.0426
LNX3 does not Granger Cause LNY1	14	2.83082	0.1112
LNX3 does not Granger Cause LNY3	14	3.50418	0.0749
LNX3 does not Granger Cause LNY7	14	5.10911	0.0329
LNX3 does not Granger Cause LNY71	14	3.59248	0.0713
LNX3 does not Granger Cause LNY9	14	2.76409	0.1159
LNX4 does not Granger Cause LNY11	6	78.7701	0.0794
LNX4 does not Granger Cause LNY3	14	3.43938	0.0777
LNX4 does not Granger Cause LNY5	9	3.74138	0.1213
LNX4 does not Granger Cause LNY7	14	3.30249	0.084
LNX4 does not Granger Cause LNY71	14	3.90615	0.0601
LNX4 does not Granger Cause LNY81	14	4.71177	0.0398
LNY2 does not Granger Cause LNX2	14	8.29936	0.0091
LNY2 does not Granger Cause LNX1	14	6.78912	0.0159
LNY5 does not Granger Cause LNX2	9	4.46647	0.0957
LNY3 does not Granger Cause LNX3	14	11.6433	0.0032
LNY4 does not Granger Cause LNX3	14	6.23924	0.02
LNY1 does not Granger Cause LNX4	14	3.35841	0.0814
LNY3 does not Granger Cause LNX4	14	6.56897	0.0174
LNY4 does not Granger Cause LNX4	14	5.25338	0.0308
LNY6 does not Granger Cause LNX4	14	4.19767	0.0515
LNY61 does not Granger Cause LNX4	14	3.08332	0.0955
LNY7 does not Granger Cause LNX4	14	3.46119	0.0767
LNY8 does not Granger Cause LNX4	14	3.22996	0.0876
LNY9 does not Granger Cause LNX4	14	2.25851	0.1604

Passenger traffic (X2) is the Granger cause of real GDP per capita and the second industrial output value, and it is also the Granger results of new fixed assets Granger and R & D expenditure; The number of active employees transport (X3) is Granger cause of real per capita GDP, employment rate, the secondary industry output value, secondary industry and the overall energy consumption of GDP, and it is also the Granger results of the average per capita consumption of energy; Vehicle production (X4) is Granger cause of employment rate, R & D expenditure,

the proportion of secondary industry, tertiary industry and sulfur dioxide emissions, and it is also the Granger results of real per capita GDP, employment rate, average per capita consumption energy, primary industry, the proportion of primary industry, secondary industry output value of tertiary industry output value and comprehensive energy consumption of GDP.

The above analysis shows that the economic system recovery transportation industry plays an important role in vulnerability ubiquitous today, mainly as follows: (1) the development of transportation industry has a positive effect on the recovery of the economy systems: Economic system recovery comes from a high level of economic development, technological level, fast economic growth and a reasonable industrial structure. The development of space transportation industry has spillover effects on economic growth in the system, so its development can improve the economics of the rapid system recovery, reduce the redundancy economic recovery. (2) the transportation industry can influence regional social subsystems Recovery: The development of transport is able to pull a regional employment levels, on the one hand to promote labor mobility, improve the quality of labor; on the other hand, promote employment in the entire region, narrow the gap between rich and poor, share resources, improve social equity, improve the intelligence system recovery on such a stage that both labor and capital driven spur economic growth in our country. (3) the transportation industry developments affect natural subsystem by the impact on the energy consumption and pollution emissions: Currently, vulnerability is widespread, and sustainable development is imminent. Transportation promotes the liquidity of human, financial and material, and improve resource utilization, reduce emissions, improve system restore stability.

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On Size Distribution of Manufacturing Firms in China

Yingen Yan

Abstract Most previous research found that firm size distribution may follow a Pareto distribution of a Lognormal distribution. This paper examined the size distribution of manufacturing industrial firms in China using the firm-level data from Chinese Annual Survey of Industrial Firms database. Using Kolmogorov-Smirnov test for goodness of fit, we found that Pareto distribution fit well than Lognormal distribution. The Pareto shape parameter becoming larger over time. Besides, the younger, have national capital investment, export have a higher Pareto index than those older non-national capital investment and non-export, while those have FDI have a lower Pareto index than those do not have.

Keywords Firm size distribution • Pareto distribution • Lognormal distribution

1 Introduction

Since the pioneering works of Pareto and Gibrat, size distributions in economics arising our attention. Firm size distribution is important to economists and government regulators. As Kleiber and Kotz mentioned, “Knowledge of the size distribution of firms is important to economists studying industrial organization, to government regulators, as well as to courts” [1]. The government regulators can handle important information such as industry concentration, taxation, business cycles, firm growth and so on. With it, they can implement antitrust policy and some other macro-economic policies. Besides, statistics are interested in stochastic processes, which also lead the investigations of firm size distribution.

The shape of firm size distribution is highly skewed to the right with an upper tail, which is similar to the body of Lognormal distribution and the tail of Pareto distributions. On one hand, according to Gibrat, firm growth rate doesn't depend up on firm size. Thus, stochastic growth process will lead to a Lognormal distribution. On the other hand, some empirical research found that firm size distribution follows a Pareto distribution, even follows a Zipf distribution in recent research. Besides,

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some empirical research shows that firm size distribution may be different in different time, industry or country.

As microeconomics data increasing, researchers could relax some assumption in mainstream economics. By using microeconomics data, Bernard and Jensen found that those export firms have a high productivity [2]. According to those evidences, Melitz used heterogeneous firm assumption, and “develops a dynamic industry model with heterogeneous firms to analyze the intra-industry effects of international trade” [3]. In the developing of Heterogeneous Firm Trade Theory, some theories assumed the distribution of firm’s productivity follows Pareto distribution as a benchmark for easy to be handled and other many papers assume follows a Pareto distribution of the following even in the field of “New” New Economic Geography.

Since 2009, more and more papers started using Chinese Annual Survey of Industrial Firms Database (CASIF) check if HFT and valid in China. However, nearly no body checked if firm size of the productivity distribution follows a Pareto in China, except Zhang et al. found that top 500 Chinese firms from the year 2002 to 2007 follows Zipf’s law [4]. The purpose of this paper is to investigate the size distribution of industrial firm in China, and found how firm size evolution in China.

2 Theory, Data and Methodology

2.1 Theory

There are some common characters between Lognormal distribution and Pareto distribution in formal research, but few researchers found those characters from the definition of distribution. If X is a random variable with a classical Pareto distribution (Type I), then the C.D.F of a Pareto distribution is $F(x) = 1 - (x/x_0)^{-\alpha}$, if $x \geq x_0 > 0$. Where x_0 is a scale parameter, and α is a shape parameter which also named Pareto index. Thus, the P.D.F. is

$$f(x) = \alpha(x_0)^\alpha / (x^{1+\alpha}), \text{ if } x \geq x_0 > 0 \quad (1)$$

Logarithm both side of Eq. (1), we get $\ln f(x) = -(1 + \alpha)\ln x + \ln \alpha + \alpha \ln x_0$. Which means the density function of a Pareto distribution is a line in a log-log plot with a slope equals to $-(1 + \alpha)$. If $Y = \ln X$ is a normal distribution, and then the random variable X will be a Lognormal distribution. According to the definition, the density function of Y is

$$f(y) = \frac{1}{\sqrt{2\pi}\sigma} e^{-(y-\mu)^2/2\sigma^2} \quad (2)$$

Where μ is the mean and σ is the standard deviation. Logarithm of the density function, we get

$$\ln f(x) = -\frac{1}{2\sigma^2}(\ln x)^2 + \left(\frac{\mu}{\sigma^2} - 1\right)\ln x - \ln\sqrt{2\pi}\sigma - \frac{\mu}{2\sigma^2} \tag{3}$$

Which means the density function of a Lognormal distribution is a second order linear in a log-log plot. However, if $\sigma \rightarrow \infty$, then Eq. (3) will also linear as Eq. (3). If $\alpha \rightarrow 0$, the coefficient will be -1, X also follows Zipf’s law.

2.2 Data Sources, Processing and Description

Following previous research, we use the number of employees as a proxy variable for firm size. The reason for using the variable as a proxy variable is our database has most of those data, almost no missing. The data come from the Chinese Annual Survey of Industrial Firms database collected by China National Bureau of Statistics. It is an unbalanced panel data from 1998 to 2007, and the sample number is 2,026,492 includes all the province of China inland except for Tibet.

In 2003, the National Bureau of Statistics of China started to use the new Industrial classification for national economic activities. In this paper, we based on this new classification and changed the industry code of our sample which before 2003. In the process, we dropped few observations. Besides, we also dropped about 8 % outlying observations from our original database.

2.3 Methodology

Before goodness of fit test, we first fit out data as a Pareto (Type I) distribution and a Lognormal by maximum likelihood estimation (MLE). According to the parameters estimated, we can compare an empirical distribution with a theoretical distribution. In this paper, we use Kolmogorov-Smirnov test the goodness of fit probability plots. Suppose empirical distribution cumulative distribution functions (C.D.F.) is $F(x)$ and theoretical distribution C.D.F. is $G(x)$, then we calculate the maximum distance between those two, $D = \sup[F(x) - G(x)]$. $H_0: F(x) = G(x)$ and $H_1: F(x) \neq G(x)$.

3 Result and Discussion

3.1 Distribution Fit Result and the Kolmogorov-Smirnov Test for Goodness of Fit

Table 1 reports the shape parameter of Pareto distribution. From Table 1, we found that the coefficient (shape parameter) is becoming larger, which means the right tail is thicker over time. In order to test goodness of fit, we use Kolmogorov-Simonov

Table 1 Result of Pareto distribution fit

Year	Coefficient	Standard error	z	P > z	95 % Conf. interval	
1998–2007	0.3663762	0.0002574	1,423.55	0	0.3658718	0.3668806

Table 2 Result of lognormal distribution fit

Year	Parameter	Coefficient	Standard error	z	P > z	95 % Conf. interval	
1998–2007	m	4.808877	0.0007977	6,028.31	0	4.807313	4.81044
	v	1.135587	0.0005641	2,013.2	0	1.134481	1.13669

test, all of the cumulative P value is 0 and cannot reject the null hypothesis, which means Pareto distribution fit is a good fit to the sample.

Table 2 reports the estimates parameter, m becoming smaller and v becoming larger gradually. We also use Kolmogorov-Simonov test. All of the cumulative P value is 1 and reject the null hypothesis, which means lognormal distribution fit is a not good fit to the sample.

3.2 Do Diffident Manufacturing Industries Have Diffident Results?

According to Kolmogorov-Simonov test, we can find that the FSD is a Pareto distribution and the right tail is becoming thicker as times go. However, the database contains 2,026,492 observations include 38 industries. Does diffident industry have different result, such as some of the follow a lognormal distribution? The minimum Pareto shape parameter is 0.243659 (Extraction of Petroleum and Natural Gas industry) and the maximum is 0.5134796 (Recycling of Waste and Scrap). The same as year's sample, all of the cumulative P value is 0, so the Pareto distribution fit is a good fit to the sample.

4 Evolution of Firm Size Distribution

4.1 Age and FSD

Firm size distribution evolving over time, some previous research such as Cabral et or Angelini and Generale show that FSD evolving also as age increase [5, 6]. Thus, we divide observation into five groups, all of the cumulative P value is also 0 but the coefficient is becoming smaller as age added. Which means the right tail of China firm size distribution is becoming heavier over age.

4.2 *Nationality and FSD*

Barrios et al. found that FSD and its evolution for domestic plants are indeed substantially different from that for foreign owned firms [7]. We also check if the firms that have the national capital investment and foreign direct investment different with those do not have such investment. We found that all of the cumulative P value still is 0. The estimated coefficient of national capital firms is 0.374824, which is larger than non-national capital firms. Meantime, the coefficient of firm which has without and FDI is bigger than those do not have any FDI.

4.3 *Export and FSD*

As mentioned above, HFT and NNEG always assume firm size following a Pareto distribution. If this is true, those non-export and export should also follow a Pareto distribution. The result confirms the assumption.

5 **Conclusion**

This paper examined the size distribution of manufacturing industrial firms in China using the firm-level data from CASIF. Using Kolmogorov-Smirnov test for goodness of fit, we found that Pareto distribution fit well than Lognormal distribution. Some characters may affect FSD such as time, industry, the age of firm, nationality of the firm, whether the firm export or is a FDI firm. The Pareto shape parameter becoming larger over time, which means the right tail of FSD in China becoming thicker and the size gap becomes smaller.

Besides, different industry has different shape parameters. The minimum shape parameters industry is Extraction of Petroleum and Natural Gas, while the maximum is Recycling of Waste and Scrap. The younger firm has a higher Pareto shape parameters (smaller size gap) than those older, which is the same as previous research. Only few large enterprises are preserved after reform of state-owned enterprises, so the size gap is smaller in the firms that national capital investment.

Also, the group of export firm has a higher Pareto shape parameters than non-export group. According to HFT, only those with higher productivity will export, so the size gap between export firms is smaller than those non-export firms. FDI is also an import factor for firm size distribution, the size gap of firms have FDI is bigger than those domestic firms, which may confirm the conclusion of Barrios et al. [7].

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Derived from OSMM Method: A Plain Analysis About Oil Security Cost to China's Economy

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Abstract With historical time series of 2001–2010, this paper uses the OSMM method to explore the cost of oil security in China. The cost can be divided into three parts according to the model: Transfer of wealth, potential loss of GDP and disruption loss. With the calculation, results are clear that the most content of the cost is wealth transfer, followed by disruption loss (or “MAC” for Macroeconomic Adjustment Cost) and potential GDP loss. Total cost of the oil can nearly make up to 4 % of the national GDP in the calculation.

Keywords Oil security • OSMM method • China

1 Introduction

With stimulating demand for energy, energy security has gained concentration from the scholars. Several methods have been suggested to work out the energy security cost of different countries and regions, including OECD [1], India [2] and the great energy-consuming country, China.

To measure the oil security cost to China, various kinds of definitions and indicator systems have been built. Leung [3] focused on the transportation of oil and considered the transnational pipelines as the instrument to measure [3]. Apart from the transportation risk, Sun et al. [4] took the stability of oil-exporting countries into consideration [4]. Although many methods, such as G1 method, two-phase DEA-like model and 4-As framework, have been taken to measure the oil security cost in China, they highlight the supply chain rather than the oil price, leading to the lack of price mechanism [5–7]. Therefore, a new method is adopted to reshape our view towards oil security cost to China's economy. According to Oil

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Security Metrics Model (OSMM) developed by Greene and Leiby [8], Greene [9], this paper divides the oil security cost to China's economy into three parts: transfer of wealth, potential GDP losses and disruption losses [8, 9].

2 Methodology

Greene and Leiby [8] pointed out that the costs of oil security could be formed by monetary metrics and non-monetary metrics. The latter metrics refer to political risk, strategic risk and military costs, which would not be discussed in this paper. We mainly make use of the monetary metrics to explain the transfer of wealth, potential GDP losses and disruption losses.

2.1 Transfer of Wealth

Transfer of wealth is created because of oil imports and the high price of oil. Let P_0 be the competitive market price in theory while P_1 is the real price of international crude oil market. Then foreign suppliers gain the benefits through oil trade. Certainly this does not necessarily cause the damage to China's GDP; it is just the change of products' ownership. In the system of OSMM, transfer of wealth can be easily measured as

$$WT = (P_1 - P_0)\Delta Q \quad (1)$$

2.2 Potential GDP Losses

Compared with the transfer of wealth, potential GDP losses can reduce China's GDP. Soaring price could weaken firm's desire to produce. Sugden and Williams [10] held the view that we could have producers' and consumers' surplus losses stand for potential GDP losses [10], which can be expressed as

$$GL = \frac{1}{2}[(P_1 - P_0)(^S Q_0 - ^S Q_1) - (P_1 - P_0)(^D Q_0 - ^D Q_1)] \quad (2)$$

That is exactly the function of deadweight losses. But in a dynamic analysis, this function will be modified and P_t will be replaced by the weighted price

$$\Pi_t = \lambda P_t + (1 - \lambda)\Pi_{t-1} \quad (3)$$

2.3 Disruption Losses

When it comes to disruption losses, adjusted price p_t enters the OSMM. P_t exists in the assumption that there is an equilibrium price different from the current price P_t . As another weighted price, it is defined as

$$p_t = \beta P_t + (1 - \beta)p_{t-1} \tag{4}$$

Greene and Leiby [8] let $p_0 = P_{1972}$ for the oil price has been stable before 1973. Taking data of China into account, we choose $p_0 = P_{1986}$. Following Huntington [11], OSMM concludes the formulation [11]

$$\begin{aligned}
 MAC = \gamma & \left[abs \left(1 - \left(\frac{P_t}{p_t} \right)^{0.75\delta \left(\frac{\phi_t}{\phi_0} \right)} \right) GDP_t \right] \\
 & + (1 - \gamma) \left[abs \left(1 - \left(\frac{P_{t-1}}{p_{t-1}} \right)^{0.75\delta \left(\frac{\phi_{t-1}}{\phi_0} \right)} \right) GDP_{t-1} \right] \tag{5}
 \end{aligned}$$

3 Results and Discussion

Using the data from China Statistical Yearbook, China Energy Statistical Yearbook, Energy Information Administration (EIA) and Greene and Leiby [8], we successfully estimate the oil security cost in correspondence to the price out of equilibrium. As is shown in Fig. 1, in 2,000 dollars, the transfer of wealth reached its peak in 2008, with approximately 56 billion dollars. The highest record of macroeconomic adjustment costs during this period is 36 billion dollars in 2006. Potential GDP losses seem almost unchanged and act as the least among these costs.

Figure 2 illustrates the proportion of total oil security cost relative to real GDP based on 2000. The line representing percentage in Fig. 2, goes nearly the same pattern as oil security cost in Fig. 1, suggesting that oil security cost grows in step with economic development. To start with, the historical time series of 2001–2003 indicated the oil independence in the economy. But it was just temporary. After 2003, China experienced the dramatic increase of oil security cost. At the same time, the transfer of wealth gradually expanded. One possible reason is that China’s accession to World Trade Organization (WTO). In 2001, trade ministers from across the world officially approved China’s entry into the World Trade Organization (WTO) and offered the period of 3 years for adaption. So after the deadline of trade protection, it is not surprising that oil security cost rose. The transfer of wealth came up as the result of international trade, especially in 2006, the year China completely opened its domestic crude oil market to foreign suppliers.

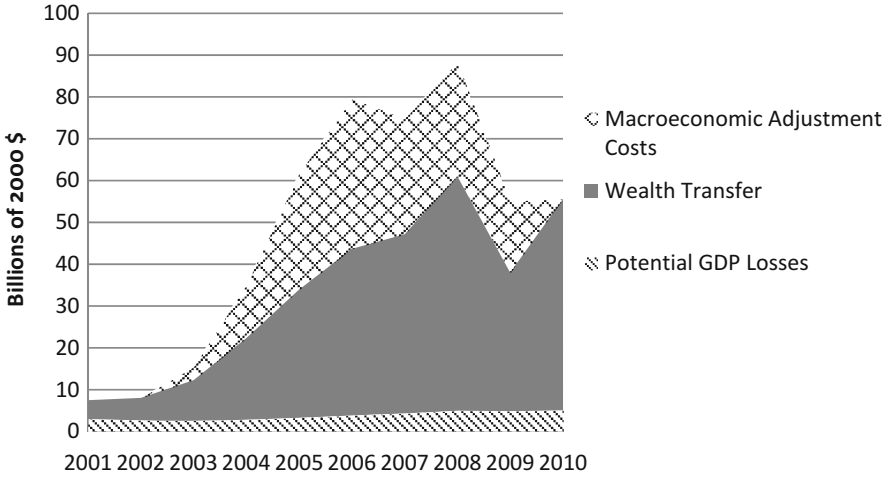


Fig. 1 Retrospective estimates of the costs of oil dependence

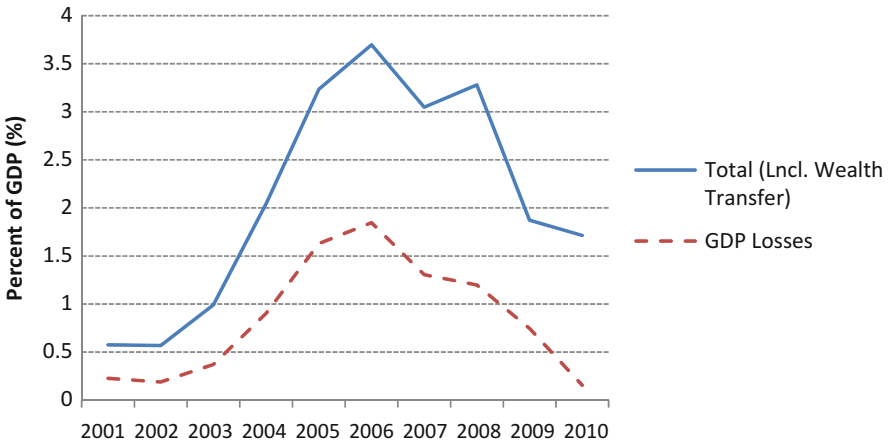


Fig. 2 Estimated oil dependence costs relative to GDP of China

4 Conclusion

In summary, China has its own characteristics in the oil dependence cost. The fluctuation in monetary cost (mainly in MAC and wealth transfer) is contributed by the steps to open China’s energy market since 2001. In other words, opening markets links the bridge between China’s oil cost and international price shock, followed by a great change in the last decade. Recognizing that the reform and opening-up policy will stand in place in the foreseeable future, this quaking trend

will still be dominant in the oil security. Also the monopolized oil industry in China leads to much less fluctuation in the oil business with price shock, which results in the stable tendency in potential GDP loss. Obviously, special economic situation and system in China bring about the present content of oil dependence cost.

Yet we have not taken political risk, strategic risk and military cost into consideration. Although the estimation of oil security cost to China's economy is not complete, we can still regard the results as the guidance to economic development. For one thing, we can invest in technology to improve energy efficiency and to explore alternative energy, minimizing the cost of reliance on oil imports. For another, market-oriented reform is not enough to promote the adaptation to price shock. If necessary, government macro-control is powerful means of dealing with disruption losses.

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Research on Efficiency of Technological Innovation of Manufacturing Industry in Wuhan Based on DEA Method

Wei Zou and Huiling Liu

Abstract Referencing on the research of technology innovation of domestic and foreign scholars, based on the analysis of feasibility of DEA method for the evaluation of manufacturing technology innovation efficiency, this article put forward the Evaluation System of efficiency of Technological Innovation of Manufacturing Industry in Wuhan, composed of two aspects of input and output, and used method of Data Envelopment Analysis (DEA) and Win4DEAP software to evaluate the technological innovation efficiency of industrial enterprises above designated size of Wuhan manufacturing industry in 2011; through the study of the technical efficiency and return to scale of manufacturing technology innovation in Wuhan, the solutions to the existing problems of technological innovation efficiency in Wuhan manufacturing industry was explored.

Keywords Manufacturing in Wuhan • DEA • Efficiency evaluation

1 Introduction

As the main material foundation and industry main body of national economy, the manufacturing industry is developing rapidly in the nearly 10 years, and playing increasingly a prominent role in the development of national economy. The output value of Wuhan manufacturing industrial enterprises above designated size in 2011 reached 771.9 billion Yuan, accounting for 87.89 % of the gross value of industrial output of enterprises above designated size (878.3 billion Yuan), the proportion of sales profit of products has reached 96.39 % [1]. As Wuhan manufacturing industry making an increasingly contribution to the Wuhan economic and social

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development, various problems in the development of Wuhan manufacturing, especially the technology innovation problems arrest more and more attentions.

Scholars in many counties have carried large theoretical and empirical research on technological innovation. As early as in 1912, Joseph Schumpeter for the first time put forward the ideas and concepts of technology innovation in the book "the theory of economic development". Considering that innovation refers to the new combination of production factors finished by entrepreneurs, the purpose of innovation is to get the potential profits [2]; After that, the representative of American economist, Solow held that technology like labor, capital, is the important factor of economic growth, technological innovation is the endogenous variable of economic growth [3]. Followed by them, many scholars have also done a lot of empirical research on technology innovation.

Tang Yanzhao and Zou Shangang [4] put forward the multi-level gray evaluation method of enterprise technology innovation ability, on the basis of gray evaluation theory and by comparison method, providing a reliable basis for the objective evaluation, timely adjustment of enterprise technology innovation strategy [4]. Ma Xiandi, ZhuangYu et al. [5] established enterprise technological innovation ability evaluation model by using DEA method with preferences, Check the practice of five representative enterprise. It is concluded that preference model of DEA method is high flexibility, strong comparability, not only to scientifically evaluate the enterprise's technological innovation, but also to determine the cause by projection analysis, advantageous for enterprise managers to make effective technology innovation strategy etc. Conclusion [5].

Academic circles have done a lot of theory and empirical research on technological innovation using a variety of methods in different regions and areas, however, the study of Wuhan manufacturing industry technological innovation efficiency is very few. This article will combine the current situation of Wuhan manufacturing; select the original indicators of Wuhan manufacturing technology innovation, use DEA method to evaluate its efficiency, aiming to find the existing problems in the development of technology innovation.

2 The Feasibility of DEA Method for the Evaluation of Manufacturing Technology Innovation Efficiency

Analytic Hierarchy Process (AHP), gray evaluation theory and fuzzy mathematics method for multi-objective evaluation, make the evaluation results lack of impartiality because of large amount of calculation and strong subjectivity to determine the weighing values for assessment index. Factor analysis has the relatively strict hypothesis test, leading to frequent index adjustment, and makes the index classification method and the economic explain to relevant index too far-fetched, the analysis results often unsatisfactory.

When evaluate the Wuhan manufacturing industry technological innovation of Wuhan, multiple input and multiple output indicators is necessary to consider, most

of those indicators are difficult to set up the production function and weight in advance. DEA model regards homogeneous unit as frame of reference to make the comparative analysis, having good applicability in evaluating the input and output of technology innovation activity; In addition, the model of DEA model is superior to other methods, because it do not need to set up the production function in advance and weight, and is more objective in the process of evaluation. Finally, the DEA model uses the statistical data to operate, which is not limited by dimension selection of the input and output indicators, and does not need in advance make correlation analysis of indicators, making operation easy. In view of the above reasons, this article chooses DEA method to evaluate the manufacturing industry technological innovation efficiency of Wuhan.

3 The Evaluation System of Efficiency of Technological Innovation of Manufacturing Industry in Wuhan

The previous scholars' selection of the index system of technology innovation is diversified. For example, Wang Haishan [6] put forward evaluation index system of technology innovation in terms of comprehensive strength and level consist of the input index and output index and process indicators of state (or region) and enterprises (or sector) [6]. Zhang Deyuan, Zhang Jiexi [7] built agricultural technological innovation ability evaluation index system consist of the technology innovation environment, technological innovation input and output of technological innovation [7].

Based on the present situation of the development of the manufacturing industry in Wuhan, this article selected six input index of technological innovation and five output indicator of technological innovation to construct Evaluation System of efficiency of Technological Innovation of Manufacturing Industry in Wuhan, as shown in Table 1.

4 The Evaluation of Technological Innovation Efficiency of Wuhan Manufacturing Industry

According to Table 1, this article selects 26 manufacturing industries of Wuhan in 2011 as the research object. This article used Win4DEAP software to calculate the 11 indexes of input and output of technological innovation in Wuhan manufacturing industry in 2011. We got the analysis results of Table 1 through the setting of the software for the following

1. Input orientated DEA
2. Scale assumption: VRS
3. Single-stage DEA

From the above chart shows, there exists the following problem in the technological innovation efficient of Wuhan manufacturing industry.

Table 1 The evaluation system of efficiency of technological innovation of manufacturing industry

	Category	Index	Calculation method
Technology innovation investment	Investment in science and technology	R&D funds input	Inner expenditures for R&D funds
		R&D personnel's input	R & D personals
		R&D institution input	Number of scientific research institutions and development organizations
		Science and technology program input	Number of scientific projects
		Technical innovation input	Expenditures for technical innovation
	New product investment	New product development Input	New product development investment
Technology innovation output	The output of science and technology	Creations and inventions	Creations and inventions
	The output of profit	Operating profit output	Operating profit
	The output of new product	Output of sales revenue of new products	Sales revenue of new products
		New product exports	New product exports
		Output of new products	output value of new products

4.1 Overall Development Is in Good Condition, Some Industry Technology Innovation Efficiency Index on the Low Side

The mean technical efficiency index value of the 26 industries in Wuhan manufacturing is 0.71; 13 industry technology innovation efficiency index is 1.00, which is in a state of technical efficiency effectively; there are five industries that Technological innovation efficiency index is between 0.5 and 1; But to the Furniture Manufacturing, Papermaking and Paper Products, Printing and Record Processing, Raw Chemical Material and Chemical Products, Medical and Pharmaceutical Products, Metal Products, Ordinary Machinery Manufacturing, Special Purpose Equipment Manufacturing, the technology innovation efficiency values are below 0.5, which are in a low efficiency state, the input and output adjustment are needed.

4.2 Some of Those Industries Whose Technical Efficiency Is Inefficient Have an Increasing Return of Scale, While the Others Decreasing

In 13 industries whose pure technical efficiency value is less than 1.0, Timber Processing Of Wood, Furniture Manufacturing, Papermaking and Paper Products, Printing and Record Processing, Rubber Products have a trend of increasing return of scale, more investment into indicators of evaluation system will be good for the industry to promote the efficiency of technology; Food Processing, Raw Chemical Material and Chemical Products, Medical and pharmaceutical Products, Metal Products, Ordinary Machinery Manufacturing, Special Purpose Equipment Manufacturing, Telecommunication Equipment, Computer and Other Electronic Equipment Manufacturing, instruments, Meters, Cultural and Official Machinery presents the diminishing returns of scale, which need to reduce the inputs to improve the efficiency of technology.

4.3 Those Inefficient Industries Are Faced with the Problem of Insufficient Input Redundancy and Capacity

Food Processing, Furniture Manufacturing, Papermaking and Paper Products, Printing and Record Processing, Raw Chemical Material and Chemical Products, Medical and pharmaceutical Products, Metal Products, Ordinary Machinery Manufacturing, Ordinary Machinery Manufacturing, Special Purpose Equipment Manufacturing are faced with input redundancy and the problem of insufficient capacity, which should adjust the resources to increase the innovation efficiency of the nine industries.

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Mergers and Acquisitions of China Rare Earth Industry: A Review and Outlook

Yongmei Cui and Yan Zhao

Abstract China rare earth industry relatively small in scale, features a low concentration rate with numerous businesses, serious waste of resources and ecological damage as well as high-end application development lag. In May 2011, China began to carry out a series of policies to adjust the rare earth industry, lead it into corporate restructuring and intensive development path. First, this paper give a presentation about China's rare earth industry, and then analyzes the mergers and acquisitions of rare earth industry in recent years, review of the relevant laws, regulations and policy documents, summed up the basis of the characteristics and the effectiveness of mergers and acquisitions, and at the end proposed appropriate advice for future development of rare earth industry.

Keywords China's rare earth industry • Mergers and acquisitions • Policies and regulations

1 Current Situation of China's Rare Earth Industry

Rare earths are an important, non-renewable natural resource with increasingly wider applications in economic and social development. Rare earths are a group of 17 chemical elements. According to their atomic weights and physicochemical properties, they are divided into light, middle and heavy rare earth elements. Because of their unique physicochemical properties, they are extensively used in areas such as new energy, new materials, energy conservation and environmental protection, and electronic information [1].

China is among the countries with relatively rich rare earth reserves, China supplies over 90 % of the global market rare earth needs with 23 % of the world's total reserves. Their distribution presents a 'light north, heavy south' pattern.

Since the introduction of the reform and opening-up policies in the late 1970s, China's rare earth industry has seen rapid development. A complete industrial system has been achieved. Despite its rapid development, China's rare earth

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industry also faces many problems. Decades of excessive exploitation and outdated production processes and techniques have severely damaged surface vegetation, causing irrational industrial structure.

2 Mergers and Acquisitions of China Rare Earth Industry

China has strengthened joint supervision advancing the merger and reorganization of rare earth enterprises, and phasing out outdated processes and capacities to realize large-scale and intensive production. Based on the ChinaCenter on Merger and Acquisitions Research ‘ChinaMeger’ database, China Rare Earth Industry Association, Beijing, Shanghai, Chongqing property rights exchange statistics, the data about mergers and acquisitions of China rare earth industry in 2006–2013 as shown follows (Fig. 1).

We can see clearly that in 2006–2010, the quantity and amount of mergers and acquisitions of China rare earth industry are very limited. Our authority don’t realise the problems of the rare earth industry. The rare industry is still in a situation of small in scale, features a low concentration rate with numerous businesses, not many merger and acquisitions. With the problem become bigger and bigger the Chinese government has tightened supervision over it. Great changes have taken place in rare earth industry rare earth market and related rare earth policies in China since 2011. This is due to the Chinese government’s support.

In May 2011, the State Council issued Guidelines on Promoting the Sustainable and Healthy Development of the Rare Earth Industry (hereinafter referred to as the ‘Guidelines’), attaching more importance to the protection of resources and the environment, and the realization of sustainable development. According to the ‘Guidelines’, the government will strengthen control over the mining, production, circulation, import and export, and other links of the rare earth industry, it’s also point out that China will use 1–2 years, basically formed to the large enterprises as the leading model, the top three enterprise group of the south ionic rare earth

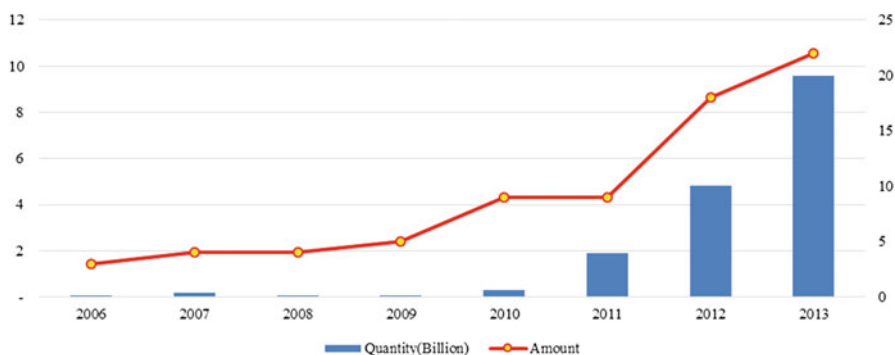


Fig. 1 The amount and quantity of mergers and acquisitions in 2006–2013

industry concentration more than 80 %, namely “1 + 3” pattern. As a point, some other rare earth policies have been put forward. The state has tightened control of the total volume of rare earth mining and mandatorily planned quotas for rare earth production by means of satellite photography, video monitoring, regular inspection, monthly report system, special invoice checking, and opening phone lines to receive reports concerning violations of related laws and regulations, newly adjusted rare earth resource tax standards, pollutant discharge standards for rare earth industry and so on to promoting the rare earth industry. In November 2012, Ministry of Industry and Information Technology of the People’s Republic of China issued the ‘rare earth industrial adjustment and upgrading of special funds management approach’, it’s point out that the central budget allocated special funds mainly used to support the mining of rare earth resources, supervision, rare earth industry green mining, smelting, common key technologies and standards development, application of high technology development and industrialization, public technical service platform construction. In January 2013, the Ministry of Industry and Information Technology (MIIT), along with 11 other authorities, said in a guideline that the government is encouraging mergers in the auto, steel, cement, shipbuilding, electrolytic aluminum, rare earth, electronic information, pharmaceutical and agriculture sectors [2].

All of the regulations and laws aim to incorporate scattered production capacity and encourage the growth of high-tech rare earth application industries with high added value in order to increase enterprises’ international competitiveness, largely facilitate the merging and restructuring of the rare earth industry, promote the mergers and acquisitions activities.

The data about mergers and acquisitions in 2011–2013 quarterly statistical as shown follow (Fig. 2).

In 2011, there were nine transactions; the transaction amounted to 1.89 billion Yuan. After the integration of the rare earth industry this year, the Inner Mongolia Baotou Steel Rare-Earth (Group) Hi-Tech Co had basically control the north of China rare market, But the south of China is still complex.

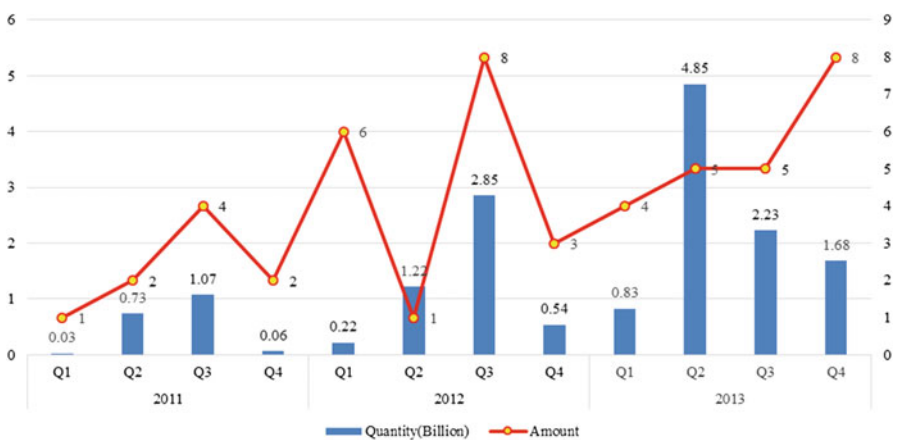


Fig. 2 The amount and quantity of mergers and acquisitions in 2011–2013 quarterly

In 2012, there were 18 transactions; the transaction amounted to 4.82 billion Yuan. The transaction amount increase of 100 % and the quantity increase of 154 %. At August 8, 2012, the Baotou Rare Earth Products Exchange established; At February 27, 2012, Guangdong Province rare earth industry is set up and it's use the Guangdong Rising Assets Management Co., Ltd. as the main group, comprehensively promote the Guangdong Province of rare earth industry mergers and acquisitions and integration of resources. At July 16, 2012, Fujian Metallurgical Holding change the wholly owned subsidiary of Golden Resorts Group Limited name to Fujian rare earth (Group) Co., Ltd., in order to concentrate its resources use the listed company platform. At December 28, 2012, Hunan Rare Earth Group obtain the approval of the People's Government of Hunan Province to established, the initial registered capital of 300 million Yuan, it will be set for the development of rare earth mining, smelting separation, deep processing, application development in one large group of rare earth industry to build the province's rare earth industry development platform. After the integration of 2012, the industry of China rare earth pattern is formed. Baotou Steel Rare Earth dominated the northern Rare Earth system, Jiangxi Ganzhou Rare Earth Group Co., Ltd., Guangdong Province Rare Earth Industry Group, Fujian Province rare earth (Group) Co., Ltd. and Hunan Province-based Rare Earth Group co-leading the development of the south of China rare industry [3], But there is a still great gap to formulate the "1 + 3" pattern.

In 2013, there were 22 transactions; the transaction amounted to 9.58 billion Yuan, the transaction amount increase of 22 % and the quantity increase of 99 %. After the integration of the rare earth industry this year, the rare earth industry now has six leaders, the six groups are mainly based in major manufacturing areas in Baotou in the Inner Mongolia autonomous region, Ganzhou in Jiangxi province, Guangdong province and Fujian province. The six are The North Rare Earth Group; China Minmetals Corp; Aluminum Corp of China; Ganzhou Rare Earth Group Co Ltd; China National Nonferrous Metals Industry Guangzhou Corp; and Xiamen Tungsten Co Ltd.

From now on, the next step will the six group step up efforts to facilitate the merging and restructuring of the rare earth industry, and in the end to formulate the "1 + 3" pattern and make sure the top three enterprise group of the south ionic rare earth industry concentration more than 80 %.

Our data on the specific nature of the transaction statistics are as follows:

In 2012, there were 10 related transactions, accounting for 55.56 % of the entire number of transactions; the transaction amounted to 1.93 billion Yuan, accounting for 40.09 % of the total transaction amount. There were 8 unrelated transactions, accounting for 44.44 % of the entire number of transactions, the transaction amounted to 2.88 billion Yuan, accounting for 59.91 % of the total transaction amount.

In 2013, there were 13 related transactions, accounting for 59.09 % of the entire number of transactions, the transaction amounted to 6.12 billion Yuan, accounting for 63.89 % of the total transaction amount. There were 9 unrelated transactions, accounting for 40.91 % of the entire number of transactions, the transaction amounted to 3.46 billion Yuan, accounting for 36.11 % of the total transaction amount (Fig. 3).

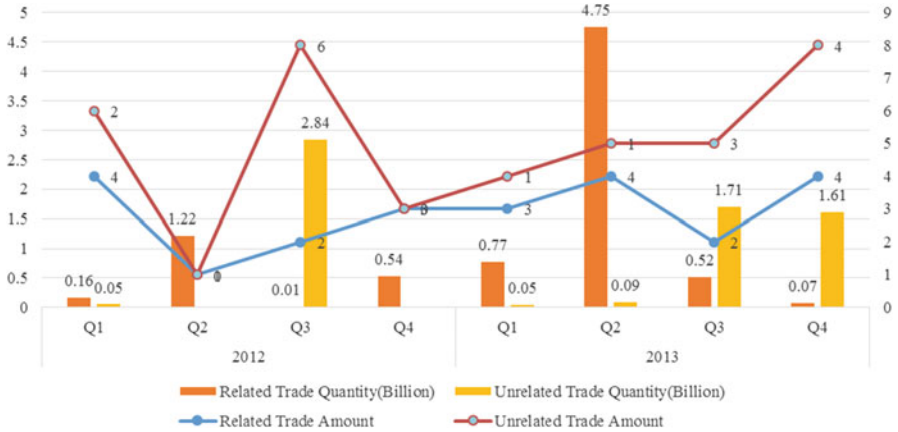


Fig. 3 The specific nature of the mergers and acquisitions transaction in 2012–2013 quarterly

Further analysis of the data can be found that in 2012 events majority concentrated in the upstream and downstream mergers and acquisitions, improve industrial concentration, But in 2013 events majority concentrated in integration within the company, in order to adjust their business structure, strategy layout optimization purposes. Improve the competitiveness of enterprise groups, efforts to enter the forefront of the rare earth industry rankings.

3 Conclusions

In recent years, China has taken comprehensive measures in the links of mining, production and exporting of rare earth goods, the Chinese government has established an inter-departmental coordinating mechanism for the rare earth industry, China has established a relatively complete R&D system, pioneered numerous technologies of international advanced levels in rare earth mining and dressing, smelting, separating, etc.

But there is still space to improve. On this basis, the state still need further improve related policies and laws and regulations regarding the rare earth industry [4], gradually establish a unified, standardized, and highly efficient administrative system for the industry. The Government need push forward merger and reorganization in the rare earth industry, and develop large-scale, highly efficient, and clean production enterprises the six companies will separately carry out mergers in the industry to create large rare earth producers.

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Study on Credit Guarantee in China Based on Interest Conflict

Mingyan Li and Shujun Ye

Abstract Credit guarantee is the main method to solve SMEs' financing problem. In practice in China, the cooperation between bank and credit guarantee institution is not satisfying and guarantee institutions are exposed to excessive risk. Based on Bester's model, this paper aims to study the behavior of guarantee participants under the hypothesis of interest maximization and how such behavior lead to problems mentioned above. It turns out that there exists interest conflicts among the participants when banks take the dominant place and ask for a guarantee proportion as high as possible. Credit guarantee has a rather limited effect on financing problem on condition that it earns enough to run smoothly. Finally, this paper suggests that guarantee institution should enhance its own capability to distinguish the type of SMEs and develop industrial guarantee in order to increase the bargaining ability with banks.

Keywords Credit guarantee • Interest conflict • Bester's model

1 Introduction

Credit guarantee is the main method to solve SMEs' financing problem. In China, credit guarantee system has taken shape since 1999. By the end of 2012, the number of credit guarantee institutions over the country has exceeded 4,200 and provided service for more than 307 thousand SMEs since 2006 [1].

In practice, development of Chinese credit guarantee varies in different regions. But there exists some common problems such as the cooperation between bank and credit guarantee institution is not satisfying and guarantee institutions are exposed to excessive risk. Credit guarantee institutions are weak in the cooperation with banks. Many scholars study on these problems in the view of risk allocation and believe that the unreasonable arrangements of counter-guarantee rate, guarantee fee, and guarantee proportion are responsible for the problems mentioned before. For example, Yang and Hu [2] study the impact of partial guarantee and counter-guarantee on the problem of adverse selection and moral hazard by making a

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mathematical model. They suggest that when the value of counter-guarantee exceeds the loan, an increase in guarantee proportion may reduce the adverse selection and moral hazard. Gu [3] believes that when credit guarantee institution undertake higher responsibility, the bank tends to lighten the approvals, which leads to more high-risk firms obtaining loans. Xiong et al. [4] reach a similar conclusion with a game model. Most of them focus on the outcome of such arrangements and ignore how these arrangements appear. As participants of market economy, maximizing interest is the common goal of banks, credit guarantee institutions, and SMEs. In credit guarantee system, interest of every participants are restrained by each other. The short-term rational choice of one participant may induce damage to the system as a whole in the long run. This paper aims to study the behavior of guarantee participants under the hypothesis of interest maximization and how such behavior lead to problems mentioned before based on Bester's model.

2 The Model

Consider a credit guarantee market with two types of entrepreneurs or firms, $i = a, b$. Each entrepreneurs has the opportunity to undertake a project which requires a fixed amount of investment I . The return to firm's project is given by a random variable $\tilde{R}_i (0 \leq \tilde{R}_i \leq \bar{R}_i)$, with distribution function $F_i(R) (F_i(R) > 0)$. Assume that \tilde{R}_b corresponds to greater risk than \tilde{R}_a in the sense of a mean-preserving spread, such that [5]:

$$E\{\tilde{R}_a\} = E\{\tilde{R}_b\} \quad (1)$$

$$\int_0^y [F_b(R) - F_a(R)] dR \geq 0 (y \geq 0)$$

Entrepreneurs have an initial wealth endowment of $W (W < I)$. They finance their project by borrowing the amount B , $B = I - W$. Assume bank's loan rate and deposit rate are r and π (suppose they are fixed). Both entrepreneurs have no collateral for the bank, and they can get the loan only through credit guarantee. The rate of guarantee fee is $g (0 \leq g \leq 1)$ and guarantee proportion is $\eta (0 \leq \eta \leq 1)$, thus the loan guaranteed is $(1+r)B\eta$. Credit guarantee institution ask for a counter-guarantee proportion of $\delta (0 \leq \delta \leq 1)$. Therefore, the profits of firm i by undertaking the project are given by:

$$\Pi_i = \max \left[\tilde{R}_i - (1+r)B - g(1+r)B\eta, -g(1+r)B\eta - (1+r)B\eta\delta \right] \quad (2)$$

Entrepreneurs pay back the promised amount only when $\tilde{R}_i \geq (1+r)B(1-\eta\delta)$. Let $F_i[(1+r)B(1-\delta\eta)] = A_i$ and the expected profits of firm i can be written as:

$$E(\Pi_i) = A_i \left[(1+r)B - \tilde{R}_i - (1+r)B\delta\eta \right] + \tilde{R}_i - (1+r)B - g(1+r)B\eta \quad (3)$$

The expected profits of credit guarantee institution from one firm is

$$E(L_i) = A_i(1+r)B\eta(\delta-1) + g(1+r)B\eta \quad (4)$$

The bank's expected profits is

$$E(\rho_i) = A_iB(1+r)(\eta-1) + (r-\pi)B \quad (5)$$

The bank's expected profit $E(\rho_i)$ increases as guarantee proportion η goes higher. When $\eta \rightarrow 1$, $E(\rho_i)$ is close to $(r-\pi)B$. No matter what type the firm is, bank receive the constant expected profit. Therefore, bank has the intention to raise the guarantee proportion. For guarantee institution, since $\partial E(L_i)/\partial \eta = (1+r)B[g + A_i(\delta-1)] < 0$, $\partial E(L_i)/\partial \delta = A_iB(1+r)\eta > 0$ and $\partial E(L_i)/\partial g = B(1+r)\eta > 0$, the expected profit of credit guarantee increases with guarantee fee g and counter-guarantee proportion δ and decreases with guarantee proportion η . Credit guarantee institution prefer higher guarantee fee and counter-guarantee proportion as well as lower guarantee proportion. For entrepreneurs, $\partial E(\Pi_i)/\partial g = -(1+r)B\eta < 0$ and $\partial E(\Pi_i)/\partial \delta = -(1+r)A_iB < 0$, its expected profit decreases as guarantee fee g and counter-guarantee proportion δ goes higher. The entrepreneur prefer lower guarantee fee and counter-guarantee proportion.

In the credit guarantee market of China, banks take the dominate place and rely on guarantee institutions to investigate firm's ability of paying back loans. Many guarantee institutions take full responsibility of loans. This paper will study the conflict among participants in guarantee markets under perfect and imperfect information condition respectively.

3 Conflicts with Perfect Information

Under perfect information condition, credit guarantee institution can identify different firms and pass the information on to banks. Entrepreneur will invest only if he receives a loan such that $E(\Pi_i) \geq 0$, that is

$$g \leq -A_i\delta + (1-A_i) \left[\tilde{R}_i - (1+r)B \right] / (1+r)B\eta \quad (6)$$

As shown in Fig. 1, AB is the indifference curve of SMEs. Entrepreneur's expected profit get larger when the line moves to southwest. Since $A_a < A_b$, entrepreneur of

Fig. 1 The indifference curve of SMEs and guarantee institution's expected interest

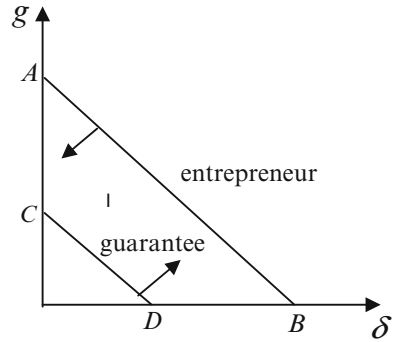
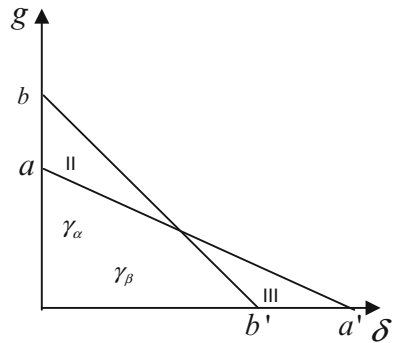


Fig. 2 The indifference curve of different SMEs' expected interest



type *a* will exhibit a higher marginal rate of substitution the entrepreneur of type *b*. This means that they are inclined to accept a higher increase in counter-guarantee rate for a given reduction in guarantee fee as shown in Fig. 2.

Credit guarantee institution will guarantee only if $E(L_i) \geq 0$, that is $g \geq -A_i\delta + A_i$. Line CD in Fig. 1 represents the boundary of indifference curve of guarantee institution. The expected profit gets larger when the line moves to northeast. Let $\alpha(\delta, g)$ represents the guarantee contact. Only in Region I will the guarantee institution sign a contract with entrepreneurs, $\eta \leq (1 - A_i) [\tilde{R}_i - (1 + r)B] / A_i(1 + r)B$. The bank will lend the money only when $E(\rho_i) \geq 0$, that is $\eta \geq (\pi - r) / A_i(1 + r) + 1$. Hence, if credit guarantees process smoothly, one has:

$$(\pi - r) / A_i(1 + r) + 1 \leq \eta \leq (1 - A_i) [\tilde{R}_i - (1 + r)B] / A_i(1 + r)B \quad (7)$$

When $\tilde{R}_i < (1 + r)B / (1 - A_i)$, if the bank set the guarantee proportion at 100 %, guarantee institution will raise the guarantee fee and counter-guarantee rate and makes the contract $\alpha(\delta, g)$ at the northeast of AB. Under this circumstance, entrepreneurs' expected profits are negative and they won't apply for the guarantee loans. When $\tilde{R}_i > (1 + r)B / (1 - A_i)$, even the bank asks for a 100 % guarantee proportion, credit guarantee can go on well. Therefore, on condition of perfect

information, if $\tilde{R}_i < (1+r)B/(1-A_i)$, the bank can only ask for a guarantee proportion up to $(1-A_i)\left[\tilde{R}_i - (1+r)B\right]/A_i(1+r)B$. If $\tilde{R}_i > (1+r)B/(1-A_i)$, the bank can raise the guarantee proportion up to 100%. At this time, bank will get a positive expected profit while both guarantee institution and entrepreneurs' expected profit are positive or equal to zero.

4 Conflicts with Imperfect Information

If information is imperfect, credit guarantee institutions can't identify different firms, and only know the ratio of two entrepreneurs. Assume $A_a(1-\eta_a) < A_b(1-\eta_b)$, the bank gets higher expected profit from type a than type b and guarantee institution is the only source to know about entrepreneurs. Since different entrepreneurs exhibit different marginal substitution rate, under some circumstances, guarantee institution can identify entrepreneurs through a group of guarantee contracts. If two contracts $\gamma_\alpha(\delta_a, g_a)$ and $\gamma_\beta(\delta_b, g_b)$ are provided by guarantee institutions (see in Fig. 2), when $-A_b < g_a - g_b/\delta_a - \delta_b < -A_a$, type b will choose $\gamma_\alpha(\delta_a, g_a)$ and type a will choose $\gamma_\beta(\delta_b, g_b)$ instead. In this situation, guarantee institutions can identify entrepreneurs' type, which require a comprehensive understanding of entrepreneurs. The analysis is similar to perfect information.

Besides the previous situation, two entrepreneurs will choose the same contract to maximize their expected profit. If banks still rely on guarantee institutions to make decision, when type b is mistaken for type a , bank require a guarantee proportion of $(1-A_a)\left[\tilde{R}_a - (1+r)B\right]/A_a(1+r)B$. The indifference curve of guarantee institution is aa' in Fig. 2. If contract is in Region III, entrepreneurs will give up applying. If contract is in Region II, entrepreneurs and guarantee institution will get positive expected profit while bank's expected profit will vary $\Delta E(\rho) = A_b B(1+r)(\eta_b - \eta_a)$. When type a is mistaken for type b , bank require a guarantee proportion of $(1-A_b)\left[\tilde{R}_b - (1+r)B\right]/A_b(1+r)B$. The indifference curve of guarantee institution is bb' in Fig. 2. If contract is in Region II, entrepreneurs will give up applying. If contract is in Region III, entrepreneurs and guarantee institution will get positive expected profit while bank's expected profit will vary $\Delta E(\rho) = A_a B(1+r)(\eta_a - \eta_b)$.

5 Conclusion

Under the hypothesis of interest maximization, there exist interest conflicts among the participants. Firms hope for lower guarantee-fee and counter-guarantee proportion, while banks want high guarantee proportion and guarantee institution prefer higher guarantee proportion and counter-guarantee proportion.

When banks take the dominant place and ask for a guarantee proportion as high as possible, credit guarantee has a rather limited effect on financing problem on condition that it earns enough to run smoothly. Even though information is perfect, guarantee institution has to ask for a high proportion of guarantee fee and counter-guarantee rate, which may lead to the giving up entrepreneurs to apply for a guarantee loan. When information is imperfect, entrepreneurs and guarantee institutions may get positive expected profit, however bank's expected profit may vary to negative. Since guarantee loan is only a small part of bank's business, once the expected profit is below zero, bank will terminate this business immediately.

Based on our analysis above, we suggest that guarantee institution should enhance its own capability to distinguish the type of SMEs and develop industrial guarantee in order to increase the bargaining ability with banks.

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Deposit Insurance Pricing and Model Selection for Chinese Commercial Banks

Xuemin Chen

Abstract Along with the further comprehensive deepening of reform in China, the introduction of explicit deposit insurance system has been formally put on its official agenda. This paper brings forward two new perspectives about deposit insurance pricing model, which one is based on utility functions and another is based on No-Claim Discount (NCD) system. Deposit insurance rates and premiums of each commercial bank are actually measured & calculated with expected loss model; furthermore, this paper gives and designs NCD model embedded rate mode and reference rates for Chinese commercial banks based on hybrid approach in consideration of the premium rate determined using expected loss model.

Keywords Deposit insurance • NCD • Expected loss • Hybrid approach

1 Introduction and Literature Review

The conditions for establishing an explicit deposit insurance system in China have basically been satisfied. It should be particularly noted that Chinese Premier Li Keqiang pointed that “establish deposit insurance system and improve risk handling mechanism for financial institutions” [1], indicating that deposit insurance system has been formally put on the official agenda of Chinese government. From the perspective of technical practice for sound operation of deposit insurance system, the design of deposit insurance rate is taken as a core task.

Ronn and Verma [2], Pennacchi [3], Allen and Saunders et al. [4] investigated deposit insurance pricing model, which has developed into an important approach in deposit insurance pricing model based on option theory. This method, however, has to be based on market indicators, and its role is limited. First of all, it is extremely difficult for market-based model to estimate asset risks of countries with less developed capital market; secondly, not all banks are accessible to

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market-based information. Drehmann [5] considered deposit insurance pricing model based on the consideration of total social cost from the perspective of social welfare.

In practice, the International Association of Deposit Insurance Agencies (IADI) presented deposit insurance pricing method based on risk measurement by quantitative and qualitative hybrid methods, and this pricing method has been applied for deposit insurance in the United States, Canada and other countries. The deposit insurance rates used in the United States were calculated & determined by financial ratio method and debt rating method based on CAMELS rating and supervisory rating through the necessary adjustment of insured financial institutions. The differential rates design for Canada is referred to as “SCORING” model, which is built through composite scoring of quantitative (capital quantitative indicators and other quantitative indicators) and qualitative factors.

The contribution of this paper is mainly that proposes NCD model embedded hybrid approach based on internationally practical hybrid deposit insurance pricing method, and presents the reference rate and rate mode for deposit insurance of Chinese commercial banks by making further use of actually determined rate derived from expected loss model.

2 Two New Perspectives of Deposit Insurance Pricing

2.1 Deposit Insurance Pricing Based on Utility Theory

Assuming that the initial fund of deposit insurance agency is v while the value of asset of insured agency or commercial bank before insured is w , such asset is faced with some certain potential loss; such risk is expressed as random variable X and its probability distribution is $F(x)$. Utility function for insured agency is $u(x)$, while the utility function for deposit insurance agencies is $u_1(x)$.

The insurance premium H should satisfy inequality:

$$u(w - H) \geq E(u(w - X)) \equiv U(w - X) \quad (1)$$

And the contracting insurance premium G for deposit insurance agencies should satisfy:

$$U_1(v + G - X) \equiv E(u_1(v + G - X)) \geq u_1(v) \quad (2)$$

An insurance contract could be concluded at a price there-between only if H^* is greater than G^* . Only such price point P (greater than net premium $E(X)$) is beneficial and reasonable.

As for deductible, the amount paid by deposit insurance agency is expressed as I_d , where $I_d = \begin{cases} 0, & x \leq d \\ x - d, & x > d \end{cases}$; the loss assumed by insured agency is $X - I_d$, and the net premium is $E(I_d(X))$.

If maximum expected utility is taken as an evaluation criterion, it's natural to reach the following conclusion.

Theorem 1 Assuming that the asset of insured financial institution is w , which is faced with potential loss X ; the insured agency is risk-averse, that is to say, its utility function $u(x)$ satisfies $u'(x) > 0, u''(x) < 0$; deposit insurance agency provides policy at the price $E(I_d(X))$; if the premium that insured agency is willing to pay is P , the optimal policy for insured agency should be (re)insurance with deductible d^* , where the optimal deductible d^* is determined by the following equation.

$$P = \int_{d^*}^{\infty} (x - d^*)f(x)dx \tag{3}$$

When considered from the perspective of insurance limit, if maximum insurance limit is expressed as e , the compensation pay-out of deposit insurance agency should be $I_e = \begin{cases} x, & x < e \\ e, & x \geq e \end{cases}$; accordingly, the loss assumed by insured agency should be $X - I_e$. The comparison with foregoing retention model indicates that both models show a symmetric similarity. The same conclusion as reached in previously described deductible model could be reached by exchanging the roles of deposit insurance agency and insured financial institution (i.e. insurer and insured).

2.2 NCD System Embedded Deposit Insurance Pricing

NCD system translation rule could be described using transition probability matrix of Markov Chain. Assuming that the premium is adjusted once a year, and that whether the premium level of policy holder changes in each premium adjustment period depends on its claim record in previous period; Assuming that Y_t means the premium level of insured agency at time point t ; if the premium level at time point t is C_i where $Y_t = C_i$, the premium level would turn into C_j in next year, where $Y_{t+1} = C_j$. If transition probability is expressed as $p_{ij}, p_{ij} = P(Y_{t+1} = C_j | Y_t = C_i)$.

Divide insurance premium into a number of “large” classes that represent the premium rate range determined every year by some certain pricing method; some “small” groups are defined under each of the large classes. NCD system is designed to adjust the “small” groups.

3 Estimation of Deposit Insurance Rate and Model Selection

3.1 *Fundamental Model of Deposit Insurance Rate in China*

At present, the different types of financial institutions show systematic difference in terms of risk characteristics. Hierarchical difference exists between the four state-owned commercial banks, the joint-stock banks, the city commercial banks and the urban and rural credit cooperatives in respect of risk level. For this reason, we could make use of the merits of risk-adjusted rate mode so as to adopt a simplified risk-adjusted differential rate mode based on the respect for China's current objective conditions. Specifically, qualified deposit insurance policy holders could be divided into three levels: At the first level are the four state-owned commercial banks, i.e. BOC, ICBC, ABC, and CCB; at the second level are joint-stock commercial banks including Bank of Communications, China Merchants Bank, Shanghai Pudong Development Bank, Industrial Bank, Huaxia Bank, CITIC Bank, China Everbright Bank, China Minsheng Bank, Shenzhen Development Bank and Guangdong Development Bank, and some city commercial banks in good condition like Bank of Shanghai, Bank of Beijing, Bank of Nanjing, Bank of Tianjin, and Bank of Ningbo; at the third level are city commercial banks and urban and rural credit cooperatives etc.

Therefore, simplified hierarchical rates for deposit insurance in China could be designed as Table 1.

3.2 *Extended Mode of Deposit Insurance Rate in China*

We start with the estimation of deposit insurance rates and premiums of some domestic commercial banks by expected loss method. Expected loss pricing model is to work out deposit insurance rate by determining the expected loss of deposit, that is to say, premium income is greater than or equal to expected loss. This is given by the following equation:

$$\text{Expected loss} = \text{Risk exposure} \times \text{Expected default rate} \times \text{Loss given default}$$

Expected default rate refers to the default probability of commercial banks, i.e. the probability of unplayable deposit induced liquidity crisis, and is dependent on historical factors and expected factors. It could be calculated through

Table 1 Simplified hierarchical discriminating rate of deposit insurance in China (Unit: Bp)

Insurance premium level	The first level		The second level		The third level	
Rate	I	0.1	II	0.5	III	1.0

Table 2 Relationship between credit rating and default rate

Credit rating	AAA	AA	A	BBB	BB	B	CCC	D
Expected default rate (%)	0.02	0.02	0.03	0.07	1.32	5.58	18.6	100

Table 3 The five-level deposit insurance premium rates in China (Unit: Bp)

Capital classification based on “CAMELS”	Regulatory rating					
	A		B		C	
Capital in good condition	I	0.25	II	0.5	III	1
Adequate capital on the whole	II	0.5	III	1	IV	3
Inadequate capital	III	1	IV	3	V	5

Table 4 The NCD system embedded five-level deposit insurance premium rates in China (Unit: Bp)

Capital classification	Regulatory classification					
	A		B		C	
Capital in good condition	I	0.15, 0.25, 0.3	II	0.4, 0.5, 0.7	III	0.8, 1, 2
Adequate capital on the whole	II	0.4, 0.5, 0.7	III	0.8, 1, 2	IV	2, 3, 4
Inadequate capital	III	0.8, 1, 2	IV	2, 3, 4	V	4, 5, 10

fundamental analysis, rating analysis of credit institutions or capital market analysis. According to the Credit Metrics Technical Manual of Riskmetrics Group, the relationship between default rate and rating level is shown in Table 2.

The bankruptcy (default) loss rate could only be estimated by statistical method. Loss given default is normally determined through regression analysis of historical data, implied market data analysis or recovery data discounting. . According to foreign empirical studies on bank failure liquidation rate, the loss given default is 25 % .

Given risk exposure, expected default rate and loss given default, we can get insurance premium rates of Chinese commercial banks by expected loss approach.

It's possible to realize the deposit insurance rates of China show in Table 3 by adopting the quantitative-qualitative hybrid approach and referring to previously calculated results. The regulatory rating is obtained through weighted identification of six risk indicators in accordance with CAMELS rating system, Capital classification is realized depending on total risk ratio and the risk capital ratio. The rates set forth in Table 4 can be realized in the case of embedded NCD system.

The values shown in Tables 3 and 4 were obtained after adjustment based on measured results of expected loss model. Table 4 indicates NCD system embedded rates. The difference of rate between levels in Table 4 could be seen as the refining of capital condition and regulatory rating in practical affairs. For example, “capital in good condition” is divided into two grades, while “regulatory rating A” is refined into two grades. The premium rate of 0.15 is allowable if the rating is at higher part of both levels; the premium rate of 0.25 is allowable if one is at the higher part and the other is at lower part and et.al.

In practice, the determination of rate is relative to the statutory reserve ratio of deposit insurance agency (i.e. the fund size to be kept by deposit insurance agency), which could fluctuate within a certain range. The deposit insurance rate should be finally determined based on the interaction between overall statutory reserve ratio and individual commercial banks' risk profile.

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Research on Chinese Ancient Town Tourism Industry

Wei Li

Abstract With the rapid development of China's tourism industry, the type of tourism products growing increasingly, as well as the ancient town tourism. By comparing about several typical ancient towns, this paper has summed up some main problems in the ancient town tourism industry. For example, stereotyped development, too thick business climate and lacking of protection. At last, on the basis of the above analysis, this paper makes some recommendations: Enhancing the innovative during developing tourism, increasing the protection, implementing partly "hollowing out" and enhancing leisure experience of visitors.

Keywords Chinese ancient town tourism • Problems • Countermeasures

1 Introduction

In recent years, the ancient town has been more and more attractive to tourists. As people's living standards is improving rapidly, the Chinese ancient towns have known for its unique architectural style, heritage of rich historical, deep cultural connotation, as well as the unique quaint ambience by people of all ages, and become a new force in the tourism market.

The research on ancient town tourism really started from 1997 [1]. While the emergence of a large number of papers devoted to the study of the ancient town tourism began from the 2004, and the scholars mainly focus on the ancient town tourism commercialization, the model of operation and management, product innovation, capacity control and so on. This paper will analyze some prominent issues in ancient town tourism industry by looking into seven representative towns.

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2 Status and Problems

This paper had chosen a few of representative ancient towns, analyzed and summarized their development status and problems by fieldwork and collecting information through their official website, academic papers, research report, etc. (Tables 1 and 2).

The survey found that, there are some common problems in the development of the Chinese ancient town tourism industry.

2.1 Stereotyped Development

The ancient town planning often pays more attention to the modern function of the building which out of the transmission of human environment, and make towns get result in stereotyped style. Zhang zhele [4] once said: “Chengdu surrounding town’s main building are in accordance with Chuanxi’s native building’s style, with quartzite paved roads, streets lined with commercial shops on sides, decorative lanterns and rustic styles”. This can’t bring freshness to the tourists and also brings enormous obstacles to ancient town tourism’s development.

Single tourism planning can’t meet visitor’s multi-level need; most ancient towns’ development is limited to sightseeing. Visitors can spend 10 min to take a tour of a town, and then they will spend their all time to taking tea, playing card. The entire tour time is short and tourists can’t have a good interaction with the town. So tourists can’t have a good impression to town’s cultural, and it’s bad for the sustainable development of ancient town tourism.

Table 1 The status of tourism development in 2012

Name	Visitors (millions)	Tourism revenue (billion Yuan)	Development model	Characteristic
Lijiang	1,599.1	211.73	Government-led	Culture rendering
Fenghuang	690.5	53.01	Concession transfer	Recreation and entertainment
Wuzhen	586	42.23	Company operation	Multiple formats resort
Wuyuan	833.6	43.22	Enterprise dominant	Rural scenery
Pingle	840.1	53.96	Scenic spot driving	Movement and vocation
Pingyao	196.52	14.38	Government-led	Ancient architecture
Taier Zhuang	413.54	31.87	Government-led	World war II history + ecotourism

Table 2 Existing problems in tourism development

Name	Problems
Lijiang	(a) Due to quick success, poor planning, resulting in the development of damage
	(b) Water quality rapidly degraded and water quality deterioration need to be vigilant
	(c) Too heavy commercial atmosphere
	(d) Tourism develops the ancient town declines
Fenghuang [2]	(a) Sightseeing tourism development is still the main trend, historical and cultural connotation insufficiently developed
	(b) Historic district uncoordinated
	(c) Tourism development damage the water
	(d) Too heavy business atmosphere
Wuzhen [3]	(a) Lack in the type of tourism products
	(b) Business atmosphere is too thick
	(c) Pollution
	(d) Too many tourists
Wuyuan	(a) Lack in cultural connotations
	(b) Mismanagement
	(c) Inadequate facilities
Pingle	(a) Image positioning is not clear
	(b) Uneven distribution of tourism carrying capacity, seasonal disparities
	(c) Pollution
	(d) Poor protection to old buildings
Pingyao	(a) Development insufficiency
	(b) Poor environment
	(c) Poor lively market
	(d) Poor investment
Taier Zhuang	(a) Have not really established a tourism brand
	(b) Too much entertainment with high price

2.2 Excessive Commercialization

Emerging commercial phenomenon in ancient town tourism is the most controversial research; most scholars believe that the development of the tourism town is a “commercial atmosphere too thick” issue.

First, some scholars believe that the town tourism development is kind of erosion to the town [5]. “Too strong business atmosphere,” not only changed the town external appearance, but also bring demographic changes and the shallowness of the use of national culture.

Secondly, in fact, the weekend and the “Golden Week” will bring tourism more and hotter. Expanding tourism industry exclude a large number of small businesses with local characteristics, but result in being flooded of tourist facilities and featureless travel products. Strong commercial atmosphere in ancient towns is eroding the natural environment and cultural atmosphere unknowingly.

2.3 *Inadequate Protection of Local Culture and Environment*

Residents in the town are the town's real masters, as well as the most active part in the tourism resources. Protection awareness of residents is important to the town's conservation. Scholars ever did a series of research in Nanxun, a famous cultural town in the north of Zhejiang. And they found that, 48 % of people expressed their support for the protection of Nanxun town, but there are 38 % of people expressed "It does not matter" [6]. Judging from the data, we can found that, protection awareness of the town's residents is not high, which greatly affected the protection of the town.

Another scholar noted that the town is currently facing the greatest pressure: rapidly increasing flow of tourists. The number of the tourists had exceeded the limitation of tourists' capacity. Quiet town's ambience was destroyed, and this is called "tourists pollution problems".

3 Countermeasures

Based on the above analysis, I have some Suggestions.

3.1 *Tourism Development Should Be Bold in Innovation*

During the planning and designing, we should highlight the town's own personality. Culture is the soul of tourism development; we should seize bright spot of resources and make rational and effective restructuring to form their own style.

The innovation of the ancient town tourism development follows three aspects (Fig. 1).

Develop tourism resource creatively. Town monomers have enough abundance of resources in general, but difficult to become scale products. Therefore, we need

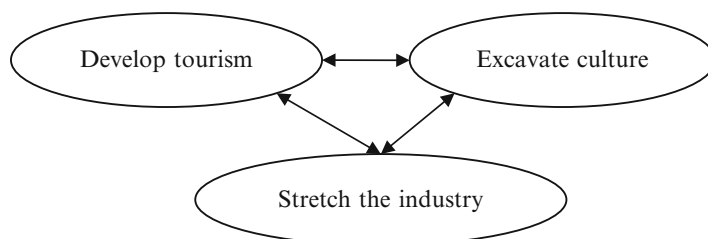


Fig. 1 Innovation strategies

for effective for the formation of similar spatial concentration of resources, thus forming influential and appealing products.

Excavate culture creatively. A town's culture is the accumulation of people's extraordinary life through thousands of years. It's very plain and spurious. The development of tourism should extract those elements of life to create highlights and wider dissemination.

Stretch the industry chain creatively. Old town is a product of farming civilization. So, ancient town has many agricultural products and handicrafts. Development of tourism should use modern industrial methods to form the industrial chain which let town's economic development. Town's tourism development should focus on innovation, make full use of existing resources town, maximize performance, and bring a wealth of experience to the tourists.

Notably, these three aspects are inseparably interconnected.

3.2 Commercial Development and Cultural Protection

Separating commercial and cultural area appropriate and timely, completing supporting facilities. Commercial offers visitors a place for recreation and cultural scenic places offer visitors to experience local culture and folk customs. Focusing on the former is in order to achieve economic-based; Focusing on the latter is in order to achieve social-based. Maintain the tranquility of the cultural area, allowing visitors to be in a calm state of mind, have a better insight and have a better understand of the deep cultural connotation of the town. In the business district, we should complete transportation and other facilities.

3.3 Partly "Hollowing Out"

At present, in China's academic circles, there are two points of view: "hollowing out" and against "hollowing out". Scholars who hold the "hollowing out" ideas think that, in order to keep the town's integrity, we should let all of residences to move out, repair the town and send in managers. Scholars who hold the opposite ideas think that, "hollowing out" will make ancient towns lost their traditions and cultures.

Some scholars hold the idea: partly "hollowing out", allowing residents to continue to stay here. Government should give residence some subsidies, but forbid them privately to renovated ancient houses. In this case, it avoids to causing the town to become a static landscape, and maintains the vitality of the town, as well as improves the housing conditions of the inhabitants.

Clearly, "hollowing out" ideas and against "hollowing out" ideas are both one-side. In order to maintain the town's original and protect the tradition, we should use the partly "hollowing out".

3.4 Strive to Do Sightseeing Tours, as Well as Increase Tourists' Leisure and Experience

A popular saying in china is that, china's tourism is transforming from sight-seeing to leisure-type tourism. This is not discreet enough. After all, most of the people in the world live in a small circle, and they want to see a wider world. Even if human labor time has reduced, living conditions has being rich, people still had the need to expand their horizons? Therefore, sight-seeing tourism is still the main form of tourism. And we also should pay attention to increase visitors' leisure and experience.

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Dynamic Relationship Between Energy Efficiency and Its Determinants in China

Weidong Li

Abstract Energy efficiency is very important for the sustainable development of China's economic growth. This paper analyzes the long-run equilibrium and short term dynamic relationship between energy efficiency and its influential factors related to economic structure, technological progress, energy consumption structure and environment factor. A co-integration analysis is performed to empirically verify a number of hypotheses. Time series variables over the periods from 1978 to 2010 are employed in empirical tests. It is found that there is a long-term co-integration relationship among energy efficiency, energy consumption structure, economic structure and environment factor in the past three decades. Economic structure is the main influencing factor of energy efficiency.

Keywords Energy efficiency • Co-integration • Carbon emission

1 Introduction

Energy shortage and environmental pollution have become the bottleneck of China's sustainable development. Based on the statistics of BP Statistical Review in 2011, energy consumption in China is 20.3 % of total energy consumption in the world. The energy consumption in China has surpassed the United States and become the largest energy consumption country since 2010. Global energy consumption growth in 2011 moderated along with the world economy. All of the net growth took place in emerging economies, with China alone accounting for 71 % of global energy consumption growth [1]. Scale-oriented economic development in China has given rise to the problems associated with high energy consumption and serious environmental pollution. Chinese government announced CO₂ emission targets of reducing CO₂ emissions per unit of GDP by 40–45 % by 2020 with 2005 as the base year. This suggests that the sustainable development of China's economy requires more effort than before. Indeed, it has long been recognized that the effective management of energy production and consumption should lie at the centre of any strategy for China's sustainable development [2–4]. How to improve

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energy efficiency has become an urgent problem for China. So it is necessary to take in-depth study on the influencing factors and mechanism of China's energy efficiency. To explore ways and means of improving energy efficiency has a strong practical significance.

2 Literature Review

Studies on energy efficiency can be mainly classified into three parts: measurement, performance evaluation and relationship between energy efficiency and its determinants. A number of previous studies have contributed to the energy efficiency measurement and evaluation. S. Jebaraja, S. Iniyani review the different types of models such as energy planning models, energy supply–demand models, forecasting models, renewable energy models, emission reduction models, optimization models [5]. Kamphol Promjiraprawat and Bundit Limmeechokchai assess Thailand's energy policies on renewable electricity generation and energy efficiency in industries and buildings [6]. Ying Fana, Hua Liao, Yi-Ming Wei examine the changes of energy own-price elasticity as well as the elasticity of substitution between energy and non-energy (capital and labor) in China during the periods of 1979–1992 and 1993–2003. They find the accelerated marketization contributes substantially to energy efficiency improvement since 1993 [7]. Boyd and Pang, Hu and Wang develop a total-factor energy efficiency index and apply DEA to evaluate China's regional energy efficiency [8, 9]. Yiming Wei, Hua Liao and Ying Fan conduct an empirical analysis of energy efficiency in iron and steel sector in China by using Malmquist index [10]. Honma and Hu employ the total-factor energy efficiency model to evaluate the regional energy efficiency in Japan [11]. Zhang et al. use the DEA window analysis to investigate the dynamic trends in the total-factor energy efficiency of a sample of developing countries [12]. Wang Q. makes a comparison between energy efficiency between Chinese and selected countries [13]. Sun, J.W. discusses the difference of the decrease of energy intensities between OECD countries from 1971 to 1998 [14].

However, there is limited empirical study on the relationship between energy efficiency and its determinants. For example, Edenhofer's study on how to improve energy efficiency by energy shift [15], Farla's research on the relationship between energy efficiency and economic structure in Holland [16], Jenne's study on the interaction between British industry structure and energy efficiency [17]. Such studies have largely related energy efficiency to economic structure.

Domestic scholars have also carried out extensive research for China's specific situation. Dong Li analyzes the relationship between China energy intensity and per capita GDP with the panel data of 30 provinces during 1998–2004 [18]. Wei Chu and Shen study on the provincial energy efficiency with DEA method [19]. Zhou Yong and Li discuss about the impact of industrial structure. They find that the change of industrial structure influence the energy intensity significantly [20]. However, Han et al. find industrial structure changes do not promote the

improvement of energy efficiency from 1998 to 2000 [21]. Li and Zhong discuss the impact of technological progress on energy efficiency with the industrial sectors sample in China from 1993 to 2003 and find that technological progress is the important factor of energy intensity [22]. Jiang and Shi study the impact of market-oriented reform on China's energy intensity and reckon China's market-oriented reform and opening policy improve energy efficiency significantly [23, 24].

Above research is helpful for us to better understand the cause of energy efficiency change. Most researches examine one of factors (such as industrial structure, technological progress, policy) that influence energy efficiency. But energy efficiency is correlated with economic structure, technical levels, energy structure, energy price, market level, etc. Even some conclusions are contradicted. In order to know clearly the influencing factors and mechanism of China's energy efficiency, this paper reports the empirical study of the impact of different determinants on China's energy efficiency from 1978 to 2010.

3 Methodology and Data Description

3.1 Co-integration Analysis

Because energy efficiency is influenced by factors such as economic structure, technical levels, energy structure, energy price, market level, etc. To examine the relationship between energy efficiency and its determinants, co-integration method and vector error correction model are considered. When the variables are co-integrated, then in the short term, deviations from this long-term equilibrium will feed back on the changes in the dependent variable in order to force the movement towards the long-term equilibrium.

The Johansen method is the most widely used procedure for estimating multi-variate co-integrated systems. Assume that the vector of variables Y has the following VAR representation.

$$Y_t = \sum_{i=1}^k A_i Y_{t-i} + \varepsilon_t \quad (1)$$

where Y_t consists all n variables of the model and ε_t is a vector of random errors.

3.2 Variable Choice and Data Resource

There are many methods to calculate the energy efficiency. Energy intensity is always reckoned as the measurement index of energy efficiency. In this paper we use the total economic output divide by the total energy consumption as the energy

efficiency (denoted as EF). Here the real GDP is the representation of total economic output index. EF can be calculated as follows:

$$EF = Y/EC \quad (2)$$

Here, Y represents real GDP, EF represents energy efficiency and EC represents total energy consumption. The real GDP is based on the constant price in 1978.

With consideration of transitional economy and rapid industrialization of China and literature review, it can be found that economic structure, technological progress, energy consumption structure, environment are the major influencing factors of energy efficiency.

Economic structure is an important factor influencing energy efficiency. We use PSI and PTI to describe the proportion of the secondary industry value added and the proportion of the tertiary industry value added. Total Factor Productivity (TFP) is selected to measure technological progress. The TFP data is taken from Zhao Zhiyun and Chao-feng's results with Solow residual method [25].

Energy consumption structure is measured by the proportion of coal consumption in total energy consumption. The data of energy consumption structure are collected from China Energy Statistical Yearbook in different years. We use PCC to describe the proportion of coal consumption.

Environment is a necessary influence factor of energy efficiency. The economic development level, market degree and openness of China's economy are considered as the representative of environment factor. GDP per capita is chosen as the measure of economic development level. GDP per capita is collected from the China Statistical Yearbook in different years. GDP per capita is denoted by GDPPC. Marketization index is chosen to reflect the market level. Marketization index is collected from Zeng's results [26]. Marketization index is denoted by MI. Imports & Exports ratio is chosen to reflect the openness level of China's economy. The indicator reflects the degree of trade openness. Imports & Exports ratio is the total sum of imports and exports divided by GDP. Total sum of imports and exports and GDP are collected from China Statistical Yearbook in different years. Imports & Exports ratio is denoted by IER.

4 Empirical Analysis of Dynamic Relationship Between Energy Efficiency and Its Determinants

Prior to the co-integration analysis, the stationary of time series should be tested. The ADF results show that all of the variables except GDPPC are stationary after differencing once, suggesting that all of the variables except GDPPC are integrated of order I (1). There are one or more co-integration relationships among them.

Co-integration tests are conducted by Johansen method. The Johansen method applies the maximum likelihood procedure to determine the presence of co-integrating relationship among energy efficiency and its determinants using

time series over the period from 1978 to 2010. The testing results show there are five co-integrating relationship among energy intensity, energy consumption structure and economic structure at the 5 % significance level. The co-integrating equation is as follows:

$$EF = 4.004 * IER + 2.244 * MI - 99.985 * PCC - 59.286 * PSI + 3.717 * PTI + 10638.19TFP \quad (3)$$

The co-integrating Eq. (3) shows economic structure is the main influencing factor of energy efficiency. PSI has a significant negative impact on energy efficiency. PTI has a significant positive impact on energy efficiency in the long-run equilibrium.

The above equation shows a significant positive correlation between technology progress and energy efficiency. The result is same as the conclusion of Li Lianshui and Zhong Yong. They find technological progress is the important factor of energy efficiency. In this regard, we can use the theory of technological progress to explain. Early stage of development in the economy, science and technology and equipment is lagging behind, the extensive mode of production activities to large investment of resources. With the deepening of the process of economic development and industrialization, technological progress has gradually become the main driving force of growth, advanced technical knowledge and equipment will be a wide range of applications, which had a positive effect on energy efficiency.

The co-integrating equation indicates that energy consumption structure has a significant negative impact on energy efficiency in the long-run equilibrium. According to the results, holding other variables fixed, if the proportion of coal in energy consumption was reduced by 1 unit, energy intensity would decrease by -99.985 unit. The results suggest that China should reduce the proportion of coal in energy consumption and improve the development of tertiary industry to increase energy efficiency in the future.

The co-integrating equation shows a significant positive correlation between China's economic development and energy efficiency. The coefficient of IER and MI are all positive. In the process of market reforming, enterprises have stronger incentives to optimize efficiency and profitability, which is conducive to improvements in energy efficiency. The result is similar with the findings of Ying Fana, Hua Liao, Yi-Ming Wei and Jiang Wen, Shi Dan. They find the market-oriented reform and opening policy, accelerated marketization contribute substantially to energy efficiency improvement [7, 23].

5 Conclusions

During the period from 1978 to 2010 in China, economic structure was up-graded, energy consumption structure improved steadily and energy efficiency increased continuously. There was a particular tendency for the proportion of coal in energy consumption to decline. It would be reasonable to predict that this trend will continue, based on the fact that, as discussed above, there is a long-term

co-integration relationship among energy efficiency, energy consumption structure, economic structure and environment factor in the past three decades.

From the above empirical analysis, some suggestions are provided as follows:

At first, economic structure is the main influencing factor of energy efficiency.

The proportion of the secondary industry value added has a significant negative impact on energy efficiency. The proportion of the tertiary industry value added has a significant positive impact on energy efficiency in the long-run equilibrium. So the industrial structure should be changed and upgraded continuously. More efforts need to develop the tertiary industry.

Secondly, the proportion of coal in energy consumption should be reduced. On the one hand, energy efficiency is affected by energy consumption structure in the short-run. Energy consumption structure has a positive effect on energy efficiency, which indicates that decreasing the proportion of coal in energy consumption will contribute to improvement of energy efficiency. However, since coal will continue to account for a large percentage of primary energy consumption in China in the long-run, the utilization efficiency of coal should be improved and the proportion of coal in energy consumption reduced.

At last, technological progress is the important factor of energy efficiency. We should accelerate the adoption of technology innovation and supercritical and multiple combined production technologies to provide “green power”, which is highly efficient, clean, water saving and environmental friendly.

In summary, energy efficiency should not be restricted to just energy policy, but should become an integral part of most government policies including those for manufacturing industry, transport, environment, taxation and social security. Energy efficiency is relevant to all the society. All the society including the individuals, companies and government should change the attitudes and expectations on the energy consumption to improve energy efficiency through education and information exchange.

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Part II

Industrial Security

Evaluation of Corporate Credit Environment

Min Li and Jiange Li

Abstract In recent years some large-scale business enterprises in China began to implement credit risk management system. This article dedicated to the research of external credit evaluation index system of enterprise environment, it is an integral part of the business enterprise credit risk evaluation technology, mainly used in large-scale business enterprise credit risk management practices to meet the business demand for credit risk management. We analyzed the effect of national, regional and industry credit environment for enterprise customers by the perspective of macro-and meso.

Keywords Business enterprises • Credit assessment • Credit environment

1 Introduction

1.1 Problems

According to the National Bureau of Statistics, in 2012, China's merchandise wholesale trade sales 32.7 trillion yuan, accounting for 63.0 % of China's GDP that year. Business enterprises are wholesale industries, commercial enterprises than productive enterprises are faced with higher credit risk, which is the basic issue commercial enterprises that currently exist. In fact, in recent years, customer defaults have occurred frequently, business enterprises face a variety of risks impact of market risk, exchange rate risk and credit risk, serious impact on China's circulation industry healthy operation and safety. In this context, business enterprise credit risk management techniques become increasingly important. Credit risk management capability is a measure of the core competitiveness of business enterprises. In this article, we do not intend to fully demonstrate business enterprise credit risk management technology research, only focus on one of the clients corporate credit environment evaluation techniques.

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1.2 Research Summary and Structural Arrangements

Domestic researchers have had some success in the credit environment study. Central Branch of People's Bank of China, Fuzhou, credit management research group [1] in the study of regional credit evaluation index system environment to Fujian as a case of regional environmental construction status of the credit evaluation, analyze problems and constraints Credit Environment Construction in Fujian and propose countermeasures to improve regional credit environment. Their rating system includes seven aspects of economic development, the level of financial development, the credit system, the level of government credit, corporate credit level, the legal environment of credit, credit culture and environment. Chunqing Zhang and Jia Cao [2] analyze the credit environment factors and summarize that the economy, government action, system, culture is four factors on environmental credit. Song [3] builds a regional credit environment rating index system and evaluation model by AHP and factor analysis. He constructed the index system from individuals, businesses and government.

The construction and effective operation about credit risk management system of corporate is affected of the credit environment outside the enterprise. We believe that corporate external credit environment should include national, regional and industry credit environment three levels of content. First, different countries due to aspects of their level of economic development, law, culture, and values different from their credit environment is not the same. Credit economy of developed countries is higher than that of developing countries. Secondly, because of the differences of geography, policy, natural resources, administrative resources, social resources, credit environment of different regions of the same country quite different. China is a very typical example. Differences in the credit environment will affect the business enterprise credit risk management capabilities. Finally, due to the differences in factors about development stage, the extent of government policy support, different sectors of the credit environment are often different. In evaluating the credit risk of companies in different industries, we needs to consider the level of industry credit environment.

In summary, we analyzed the effect of national, regional and industry credit environment for enterprise customers by the perspective of macro-and meso. Our goal is to focus on risk assessment of the credit environment outside the enterprise. Such studies will be able to meet the needs of business enterprise on customer credit risk management.

In the first section, we describe the current problems of business enterprises, introduce research results of domestic scholars on these issues and give a logical analysis on this issue; In Sects. 2, 3 and 4, we turn to introduce national regional and sector evaluation techniques on credit environment and index system. Finally, Sect. 5 of this article we do a brief summary.

2 National Credit Environmental Assessment

National Credit environmental assessment includes evaluation of national credit system and its operation, the national economic environment assessment, evaluation of the national credit culture. National credit system mainly consists of credit monitoring system, credit system and credit education system serving. The main function of a credit monitoring system is based on credit-related laws and regulations or industry practices responsible for the supervision, management, the current national credit system, credit behavior of credit subject. Credit service system mainly consists of credit supply system, credit information and technical services systems, which core function is to provide credit and credit information technology services. Credit supply system is mainly composed of banks and other financial institutions, governments, business, etc. Credit information service system mainly consists of credit institutions, credit rating agencies, credit insurance companies, commercial debt collection agencies, credit guarantee companies, credit institutions, credit management and consulting agency. We use 14 indicators to evaluate national credit environment, which selected from the country’s economic environment, cultural environment and credit system and detailed in Table 1.

Table 1 National credit environmental assessment indicator system

Index name	Index value	Index name	Index value
GDP per capita	High, medium, low	Credit monitoring system	Yes or no
Ratio of total bank credit to GDP	High, medium, low	National credit crisis early warning system or mechanism	Yes or no
The proportion of the population employed high school text	(0 %, 100 %)	Adequacy of credit supply	Ample, adequate, inadequate
Social integrity status	High, medium, low	Credit agency	Relatively sound, generally sound, no sound
Credit laws and regulations	Better, general, imperfect	Credit information and technical services	High, medium, low
Adverse information database	Yes or no	Honesty education propaganda	Larger, general, small
Social credit information sharing mechanism	Yes or no	Credit knowledge of investment in education	Larger, general, small

Table 2 Regional credit environmental assessment indicator system

Index name	Index value	Index name	Index value
GDP per capita in the region	High, medium, low	Regional credit crisis warning system	Yes or no
Ratio of total bank credit and the region's regional GDP	High, medium, low	Adequacy of credit supply	Ample, adequate, Inadequate
The proportion of the population employed high school text	(0 %, 100 %)	Regional credit agency	Relatively sound, generally sound, no sound
Integrity status area	High, medium, low	Credit information and technical services	High, medium, low
Adverse information database area	Better, general, imperfect	Honesty publicity and education efforts	Larger, general, small
Regional credit information sharing mechanism	Yes or no	Credit knowledge of investment in education	Larger, general, small
Local regulatory agencies credit	Yes or no		

3 Regional Credit Environmental Assessment

In general, the more economically developed regions represent a higher degree of credit, the credit system is also better. We consider regional credit environment because of the level of economic development of our country is very uneven. Regional credit environmental assessment is part of evaluation for external credit environment of corporate. Credit environmental differences between first-tier cities, second-tier cities and third-tier cities are also larger. We use 11 indicators to evaluate regional credit environment, which selected from the regional economic environment, regional credit culture environment, regional credit system and detailed in Table 2.

4 Industry Credit Environmental Assessment

Different industries in the national economy is different, which often leads to differences in industry credit environment. Enterprise are management by industry associations. Credit system is uneven in different industries. In evaluating the credit risk of companies in different industries, the industry needs to consider the level of corporate credit environment. Trade credit environment is an abstract economic category. We use nine indicators to evaluate regional credit environment, which selected from the industry credit level, industry credit monitoring system, industry credit culture and education system and detailed in Table 3.

Table 3 Industry credit environmental assessment indicator system

Index name	Index value	Index name	Index value
Industry credit dependence	Industry asset-liability ratio	Industry credit risk early warning system	Yes or no
Industry cycles	Start-up, growth, maturity, decline	Industry dishonesty disciplinary mechanisms	Yes or no
Industry status	Very important, important, unimportant	Industry integrity education efforts	Larger, general, small
Industry associations supervision	Large, generally, smaller	Industry credit culture	Good, fair, poor
Industry credit information system	Yes or no		

5 Conclusions

Through the above analysis, we focused on evaluation index system of enterprise for the external credit environments. We studied the evaluation index system of national, regional and industry. Currently, our research has been applied to a credit insurance company, used to evaluate the capabilities of credit risk management for business enterprise. Practice has proved that our approach is feasible.

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Security Concept and Characteristic Research in Chinese Tobacco Industrial Security

Xiuting Du and Kangqi Xiao

Abstract With the continuous development of economic globalization, the security problems in industries are unfolding incrementally and attracting more and more attentions. Chinese tobacco industry security is both an important component of national economic security and industrial security. For the Chinese tobacco industry, it faces uncertain and changeable environment currently. In this paper, the theory of industrial security defines the connotation of the Chinese tobacco industry security, summarizes the characteristics of Chinese tobacco industry security and has reference meaning to the establishment of Chinese tobacco industrial security system.

Keywords Industrial security • Tobacco • Concept • Characteristic

1 Introduction

Since the very beginning of the twenty-first century, the rising economic globalization tide has important influences on each country's economic development and economic security. And Industrial security has become a common issue faced by all countries in the world. Chinese tobacco industry is an important industry in the national economy. Chinese Tobacco tax is a major item of fiscal revenue. Chinese tobacco industry securities are both important component of national economic security and important component of industrial security.

Because of the particularity of tobacco products, Chinese tobacco industry gradually establishes state tobacco monopoly and management system that is unified leadership, vertical management and distribution monopoly, which are considered as the guarantee and basis of tobacco industry, as a starting point of

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the State Council issued the “Tobacco Monopoly Regulations” in 1983. At the same time, the advantages of the tobacco industry from original reform measures are disappearing or gradually disappear in the new situation. The pressure to sustain the growth of taxes and profits over 10 years, intensified and magnified the potential safety hazard of the tobacco industry, and has even given rise to many new tobacco industry security risks. The development of Chinese tobacco industry faces severe challenges. Therefore, the research on Chinese tobacco industry security problem has important theoretical significance and application value in the current.

2 The Summary of Industrial Security Theory

About from the 1960s to the 1990s, Japan, USA and other capitalist countries began to shift their strategic focus from political and military security to national economic security and the national economic security issues were incorporated into the national strategy and management system. In order to achieve greater development from the point of view, the countries which face dramatic changes in the international competitive environment are thinking about how to maintain their own strategic interests and economic securities in the process of economic globalization.

With the development of economy and society, the concept of national economic security extends to be more central. So far, the research on industrial security involves mainly on the relevant international trade, especially the trade protectionism and national industry protectionism. Those researches are used mainly from the following logics: Economic security is an important component of national security and a guarantee of national prosperity and development, but the research on industrial security is the core of the national economic security. So the key to guarantee national economy security is to ensure industrial security.

At present, there are four kinds of representative viewpoints about the definition of industrial security. The first viewpoint emphasizes the control of industrial security; it thinks that industrial security is that the domestic capitals control the industrial in people’s livelihood [1]. The second viewpoint emphasizes the competitiveness of the industry security. It thinks the core issue of industry security is industry competitiveness and the competitive industries do not have industrial security problems generally [2]. The third viewpoint emphasizes the ability of industrial security, it thinks national industry not only has the ability to survive and develop, but also has ability to resist and compete with unfavorable factors at home and abroad. The fourth viewpoint emphasizes the state of industry security. It thinks that the status is not threatened by existence and development of industries [3]. The standpoint of Morgan Li is representative of the definition of industrial safety. He believes that the main body of a country’s industry security is an independent industry of a country. Industry security includes two respects of survival and development, so a country’s industry security degree can be obtained from the degree of threat [4]. At present, the research on tobacco industry security is

still a blank, not yet forms the theory system [5]. Although some scholars have studied on it, most of them are developed from industry regulation, enterprise management, competitiveness, and microcosmic aspect.

3 The Definition of Tobacco Industry Security Concept

According to the domestic and overseas scholars' study on the industrial security, tobacco industry security is defined in this paper as follows: Tobacco industry security refers to the status that the survival and development is not being threatened or threatened but can be dissolved. The definition of tobacco industry security contains four meanings:

The first is the subject of tobacco industry security. According to The National Economy Industry Classifications standard, the tobacco industry is mainly involved in tobacco planting in the primary industry, tobacco products and tobacco industry equipment manufacturers in the second industry and wholesale and retail of tobacco products in the tertiary industry. That just shows that tobacco industry covers a wide field and is related to different industries. A series of industrial chain in tobacco business such as cultivation, production processing, transportation, wholesale, retail offer economic and social benefits and bring jobs.

The second is that tobacco industry security includes two aspects: subsistence and development security. Subsistence security mainly refers to state that none of these three cycles that market or market share, profit margins and industrial capital is threatened in tobacco industry. Subsistence security is the static description of tobacco industry security. That is to say the tobacco industry has the ability to continue to survive and protect itself. Development security refers to the rising of tobacco market value or market share and industry technology innovation or industry to catch up or lead is not be threatened status.

The third is that tobacco industry security is opposite to tobacco industry threats. In fact, they are two aspects of a single issue. The more tobacco industry is threatened, the more insecure tobacco industry is, i.e., tobacco industry security is much lower. So judging whether our country industry is safe or not, we can not only directly evaluate security index, but also get from the industry is threatened. Usually, the latter method can grasp the status of tobacco industry security accurately, and then carries on the security warning. It has practical significance to take timely measures.

The fourth is that tobacco industry security problem is not unique to open markets, but also exists in the closed markets. The closed markets enlarged industrial security problems and even produced new industry security issues that are not existed before.

4 The Characteristics of Chinese Tobacco Industry Security

4.1 *Characteristics 1*

Chinese tobacco industry can be divided into upstream, midstream and downstream of the three links. Upstream tobacco agriculture that refers to the raw materials required by tobacco industry cigarette products is the foundation of the whole tobacco industry. Midstream tobacco industry that refers to manufacture of tobacco products is the core of the tobacco industry. Downstream tobacco business that refers to the sales of tobacco products is an important link of the tobacco industry and the vast number of consumers. Tobacco Company is the bridge of the three links and plays a special function.

4.2 *Characteristics 2*

Tobacco products are run by the state. Enterprises and capitals in other industries and even other sectors of the state-owned capitals are not free to enter the tobacco industry production and management. Outside capitals, especially foreign capitals are heavily restricted. The national categorize all tobacco enterprises as the control of China National Tobacco Corporation (State Tobacco Monopoly Administration). All related to tobacco production and business activities in addition to the retail business of cigarette products and some of the accessories production is only run by various industry at all levels within the China National Tobacco Corporation and its subsidiary. Therefore, the tobacco industry has the characteristics of monopoly. That is to say the industry chain and value chain of tobacco industry are completely closed run within the industry and that leads the tobacco industry to form a highly closed operation system. So the current tobacco industry security and the highly closed running system are closely related to each other.

4.3 *Characteristics 3*

In the planned economy when the market has a huge gap, system of combining production and operation power with tobacco monopoly administration right has greatly accelerated the development process of Chinese tobacco industry. It plays a great role in the rapid development of Chinese tobacco industry. However, taking the products of the planned economic into the environment of market economy is the greatest drawback in Chinese tobacco industry system under the condition of

market economy. The system of distinction between government and enterprises is not in conformity with market economy principles. Enterprises cannot really get rid of the direct control of the government; Local governments will start from their own interests by using the exclusive rights to block local market to hinder the circulation of regional tobacco market. Those bring many disadvantages to tobacco industry development. With further development of market economy, an important task for tobacco industry security is how to overcome these drawbacks and guarantee the healthy development of tobacco industry.

4.4 Characteristics 4

With people become healthier conscious and the increases of tobacco tax, smoking costs is rising. The rising global campaign against smoking gradually makes smoking behavior be constrained. Smoking social and cultural environments decays increasingly. Restrictive market demand makes the basic driving force for tobacco industry growth weaken increasingly. Affected by this, Chinese tobacco industry in the future must face overcapacity, price promotion weakly, inventory increased problems and challenges. In addition, along with multinational tobacco companies' large-scale restructuring and penetrating to Chinese market, Chinese tobacco enterprises are facing more and more severe competition. Now, in all kinds of competition pressure synergistic reactions, the tobacco industry which is under the aegis of the monopoly system will face huge market risks. Therefore, Chinese tobacco industry security possesses considerable urgency.

4.5 Characteristics 5

Tobacco industry security possess dynamic feature with two meanings: One means that tobacco industry security problem is perennial. With economic development and relative changes of tobacco industry competitiveness, different times have different tobacco industry security maintenance. This is determined by the relative change of the tobacco industry competitiveness in various historical periods and the economic development. The other means that the means and ways to realize tobacco industry security are not stay the same and remain static but advance with the times and have dynamic changes. Security protection of tobacco industry is not permanent. The only purpose of government regulation is to provide a preparation period to let the domestic industry gain a firm foothold and upgrade gradually so as to establish a stronger international competitiveness.

5 Conclusion

The rising tide of economic globalization has an important influence on the economic development and economic security of all countries. Chinese tobacco industry security is an important part of national economy security and industry security. In this paper, the theory of industrial security defines the connotation of Chinese tobacco industry security, summarizes the characteristics of tobacco industry security and even has reference meaning to the establishment of tobacco industrial security system.

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Research on China Industrial Security Early Warning Based on BP Neural Network

Huihui Wang and Wei Bu

Abstract This research is major on the industrial security. Based on the connotation of industrial security, the industrial security evaluation index system is constructed from four aspects: industrial development potentiality, industrial international competitiveness, industrial foreign degree of dependency and industry control superiority. On this basis, we design BP neural network models to establish China industrial security warning system and make an empirical analysis to predict the degree of safety. Based on the analysis, the paper puts forward some counter-measures to keep the industrial developing of china.

Keywords Industrial security • BP neural networks • Early-warning

1 Introduction

Industrial security means the capability for a country to continue survival and develop of national industries in an open economy, in the process of international competition, which reflects the predominate role on main part of national industry [1]. As china has opened its economy since 1978, opening-up that our basic state policy, achieve the spanning development for industry. However, as the China market opens further, the problems of industrial security in China are increasingly severe, for example: some sectors are controlled by foreign money which continues to pour into China; National industrial products are often faced foreign “dual investigations”. Overseas mergers of China’s corporations have been failure one after another [2]. All the problems alarm us that industrial security is important.

The current researches on industrial security are mainly focused on the research of special industries, such as: the oil industry, the equipment manufacturing industry or the automobile industry and so on [3]. Few of researches are major on the whole of industry. In addition, most domestic scholars predict the value of the

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single index firstly, and then input the value into BP neural network to obtain the warning degree [4, 5]. However neural network as an important tool in the machine learning fields can do predicting effectively. We use industrial economical index of this year as input vector to predict the warning degree of next year. In this paper, we choose the whole industry as the research subject. Based on the connotation of industrial security, the industrial security evaluation index system is constructed from four aspects: industrial development potentiality, industrial international competitiveness, industrial foreign degree of dependency and industry control. On this basis, we design BP neural network model to establish China industrial security warning system and make an empirical analysis to predict the degree of safety.

2 Research Methods and Early Warning Index

2.1 Research Methods

Factor analysis is a multivariate statistical method which used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. The main idea of factor analysis is to search for correlated variations in response to unobserved latent variables, which are not or a little correlated. The observed variables are modeled as linear combinations of the potential factors, plus “error” terms. The information gained about the interdependencies between observed variables can be used later to reduce the set of variables in a dataset.

Back propagation, an abbreviation for “backward propagation of errors”, is a common method of training artificial neural networks, which was proposed by Rumelhart and McClelland led team of scientists in 1986 [6]. From a desired output, the network learns from many inputs, similar to the way a child learns to identify a dog from examples of dogs. BP neural network is widely used recently.

The paper uses the combination of factor analysis and artificial neural networks to eliminate the overlapping information, and the complex problem becomes simple.

2.2 Early Warning Index

Based on the connotation of industrial security, the industrial security evaluation index system can be constructed from four aspects: industrial development potentiality, industrial international competitiveness, industrial foreign degree of dependency and industry controlling power. The index system including 4 secondary indices and 16 third grade indices were founded.

Industrial development potentiality is foundation of enterprises to survive and develop. We use four indicators to measure it, they are growth rate of industrial added value, industrial labor productivity, capital cost and industrial labor cost.

International competitiveness refers to competitiveness for a specific industry of a country or a region in the production efficiency; which is the ability to meet the market demand, profitability and other aspects. It is reflected in trade competitiveness index, manufacturing value added accounted for the global manufacturing value added, the manufactured finished products exports as a proportion of global and industry market concentration.

Industrial foreign dependency rate is mainly refers to the degree of dependence on the international market in the import and export, technology, capital and other aspect. It is an important index to judge the openness of a country or region and the dependency on international market. Mainly includes the foreign dependency rate on import, the foreign dependency rate on export, the foreign dependency rate on foreign capital and foreign dependency rate on foreign technology.

Industrial controlling power refers to the control force from foreign capital, which control enterprises through industrial control. Thereby, it controls price determination of national products and the flow of wealth. It mainly includes the degree of control from foreign capital on market, equity, technology and output value of new product etc. (Table 1).

Table 1 The evaluation index system of industrial security

First grade index	Second grade index	Third grade index	
Industrial security	Industrial development potentiality	Growth rate of industrial added value	
		Industrial labor productivity	
		Capital cost	
		Industrial labor cost	
	International competitiveness		Trade competitiveness index
			Manufacturing value added accounted for the global manufacturing value added
	Industrial foreign degree of dependency		The manufactured finished products exports as a proportion of global industry market concentration
			The foreign dependency rate on import
			The foreign dependency rate on export
			The foreign dependency rate on foreign capital
			The foreign dependency rate on foreign technology.
			The degree of control from foreign capital on market
			The degree of control from foreign capital on equity
			The degree of control from foreign capital on technology
Industrial control		The degree of control from foreign capital on output value of new product	

2.3 Data Source

The data which we used to calculate warning index comes from China Statistical Yearbook, China Industry Economy Statistical Yearbook, China Statistical Yearbook on Science and Technology.

3 Construction of BP Neural Network Early Warning Model

3.1 BP Neural Network Model

Data Preprocessing Because of the magnitude difference between various indexes, processing data must be done before constructing the BP neural network model; The common method is to normalize the original data. It used to bring all values into the range $[0,1]$ or $[-1,1]$. The method in this paper be used is the Min-max normalization, that is:

$$x_i^* = (x_i - \min x_i) / (\max x_i - \min x_i) \quad (1)$$

In this formula, $\min x_i$ is the minimum value of index x_i , $\max x_i$ is the maximum value of the index x_i .

Determine the number of layers. Robert Hecht-NielSen proved that any continuous function in closed interval can be approximated by one hidden layer BP artificial neural network [6]. Based on the theorem, a three-layer BP artificial neural network can complete the mapping from n dimension to m dimension. So, this paper uses one single hidden layer network, which is three-layer BP artificial neural network.

Determine the number of input layer nodes. The number of input layer nodes is determined by the number of the indices. That is: there are correspondence between the number of input layer nodes and the number of the indices. So, the number of input layer nodes is 16.

Determine the number of hidden neurons. The function of hidden layer neurons is to extract inherent law from the sample and store it. Each neuron in the hidden layer has a weight; however, every weight is a parameter which can enhance the ability of network mapping. When we determine the number of hidden neurons, we must pay attention to that: if the number of the hidden layer neurons is too small, then the neural network cannot give enough rules, if the number of the hidden layer neurons is too much, then the neural network may get some unnecessary information. With many times simulation, we determine the number of hidden neurons is 4.

Table 2 Warning interval

Score	Security state	Warning light
[85, 100]	Very safety	No warning
[65, 85]	Safety	Light warning
[45, 65]	Basic s safety	Basic warning
[25, 45]	Insecurity	Serious warning
[0, 25]	Not safe	High warning

Determine the output nodes. The selection of the output nodes correspond to the evaluation results, so we need to determine the expected output. In the training stage of the BP artificial neural networks, the expected output value of sample is a known quantity. It can be given by historical data or estimated value that is estimated by statistical method. In this paper, we use the result that is estimated by factor analysis. We use the factor analysis module in SPSS17.0 software. Factor analysis was performed on the standardized data.

From the result we can find that the cumulative variance rate of the three factors can gain 90.6 %. So we extract the top three factors F1, F2 and F3. We calculate the factor scores through the factor loading matrix, for example,

$$\begin{aligned}
 F1 = & 0.11 * \times 1 + 0.90 * \times 2 + 0.06 * \times 3 + 0.09 * \times 4 + 0.08 * \times 5 \\
 & + 0.07 * \times 6 + 0.02 * \times 7 + 0.08 * \times 8 - 0.1 * \times 9 \\
 & + 0.07 * \times 10 - 0.09 * \times 11 - 0.03 * \times 12 - 0.09 * \times 13 - 0.04 * \\
 & \times 14 - 0.09 * \times 15 - 0.08 * \times 16.
 \end{aligned}$$

Then we get the total scores Z by summing up three factor scores with the weight-each factor accounting for variance contribution rate, where

$$Z = (0.65 * F1 + 0.16 * F2 + 0.096 * F3)/0.906.$$

Then divide the total scores into five intervals, see Table 2.

4 Calculation of Safety Degree and Early Warning

Taking the preprocessing data from 2005 to 2010 as training data, and running the BP model program, we get the structure of BP neural network. Let the data of 2011 be testing sample. The simulation results agree with the fact (seeing Table 3), which indicates the BP model is workable. Finally, input the data of 2012 to BP model, then the warning state of 2013 is achieved. The process is completed with the matlab 7.0.

The results show, from 2011 to 2013, the industrial safety degree of China is in the light warning interval, but the score is on the decline. The industry of China need be improved preparedness.

Table 3 2006–2013 industrial safety degree

	Year	Score	Warning state
Training sample	2006	0.67986	Light warning
	2007	0.89627	No warning
	2008	0.84216	Light warning
	2009	0.64651	Basic warning
	2010	0.69253	Light warning
	2011	0.7832	Light warning
Testing sample	2012	0.76368	Light warning
Prediction	2013	0.71423	Light warning

5 Policy Recommendations

We suggest that the authorities should improve the coordination mechanism, and strengthen the design of top level strategy. Encourage social forces, such as professional societies, semi official organizations, and news media, to help the government to supervise the industrial security. Construct the investigation mechanism of industrial security of foreign takeovers. On the premise of intellectual property protection, strengthen the supervision of monopoly behavior for multinational companies, to protect the normal competitive order of market.

Increase fiscal funds to support industrial and information technology innovation, lead local government and company to increase R&D funds. Promote to conduct diversified global commerce strategy, avoiding excessively depend on foreign countries. Construct monitoring and early warning system of industrial security, and encourage domestic companies to set up R&D centers and library in foreign countries, or purchase R&D facilities on the verge of bankruptcy. Encourage energy intensive industries to start multinational operating, not only to satisfy the energy demand of China, but also advance the economy development and employment of host country.

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Modeling and Simulation for the Regulation of Trading-Based Market Manipulation in Stock Market Based on Swarm

Shuo Liu

Abstract Considering the importance of stock market in the national financial system, it requires the market regulator to avoid any illegal behaviors in the market. This paper establishes an agent-based modeling simulation model system based on Swarm in order to study the regulation of trading-based market manipulation carried out by institutional investors. Following the simulation model system establishing, a series of simulation experiments in different market situations are implemented based on the simulation model system. And the experiment results verify the effects of so called “self-adaptive regulation”.

Keywords Simulation • Regulation • Self-adaptability • Swarm

1 Introduction

The stock market is an important investment and financing market for investors and enterprises, so the market regulator must keep the market running smoothly and avoid illegal behaviors as far as possible. Institutional investor is a typical kind of investors in stock market, which have abundant financial strength. So the institutional investors can affect the price of stock even the market movements through stock trading. If the institutional investors carry out trading-based market manipulation to make extortionate profits, the market order and benefits of other investors will be destroyed [1]. So the effective regulation is necessary. But trading-based market manipulation is a kind of immediate behavior, so prior control and instant regulation which requires regulator to adjust his supervision in real time according to the market situation may be the effective strategy. This paper establishes an agent-based modeling simulation model system based on a similar multi-oligopoly Cournot model in Swarm, and then carries out a series of simulation experiments to

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study the decision-making features of institutional investors, and finally proposes an effective regulation strategy for avoiding the trading-based market manipulation so called “self-adaptive regulation”.

2 Theoretical Model Analysis

In this part, we use a similar multi-oligopoly Cournot model to show the reason why institutional investors tend to collude with each other in trading-based market manipulation. Then key regulation factors and the self-adaptive regulation strategy will be proposed. This part is the theoretical basis of the simulation model system.

2.1 The Similar Multi-oligopoly Cournot Model

The institutional investors always have abundant financial strength and their stock trading behaviors will affect the stock price even the whole market. These properties make the institutional investors be quite the same as the oligopoly firms in ordinary commodity market. As the small and medium-sized investors are always the price takers, so we assume that the stock price will be set by the institutional investors who invest in the stock. And we assume that there are n institutional investors participating in market manipulation and they will maximize their yields through the stock trading volume “ q_i ” ($i = 1, 2, \dots, n$). If the trading price of stock is P_0 , the payoff function of institutional investor i ($i = 1, 2, \dots, n$) can be shown as formula (1) [2].

$$\begin{aligned}\pi_i &= q_i [P(q_1 + q_2 + \dots + q_{i-1} + q_i + q_{i+1} + \dots + q_n) - P_0] \\ &= q_i [P(Q) - P_0]\end{aligned}\quad (1)$$

Formula (1) means the yield of institutional investor i will not be determined only by his own decision but also by other institutional investors’.

It’s not hard to solve the Nash equilibrium which makes the institutional investors maximize their own yield in interactive strategies environment by used of the reaction function of each yield function. If we supposed the best decision set for each institutional investor is $(q_1^*, q_2^*, \dots, q_n^*)$, the sum of the best decisions Q^* which equals $q_1^* + q_2^* + \dots + q_n^*$ should satisfy the condition shown as formula (2).

$$P(Q^*) + \frac{Q^* \cdot P'(Q^*)}{n} = P_0 \quad (2)$$

If the n institutional investors collude with each other to be a whole big institutional investor, the best decision named as Q^{**} should satisfy the condition shown as formula (3).

$$P(Q^{**}) + Q^{**} \cdot P'(Q^{**}) = P_0 \quad (3)$$

Comparing formula (2) with formula (3), we can infer that $Q^* > Q^{**}$, the inequality means if the institutional investors collude with each other they will use fewer trading volume of stock to manipulate the market and the behavior will be detected more difficultly by the regulator. So institutional investors strongly tend to collude with each other in trading-based market manipulation, and effective regulation is necessary.

2.2 The Key Regulation Factors

The stock trading in market is continuous, so the regulation strategy should be able to affect the decision-making features of institutional investors who plan to manipulate the stock price and market movements. We treat regulator as two factors involving in the institutional investor's payoff function; the two factors are the probability of investigation P_R and the punishment index N . The two factors are marked as P_{Rt} and N_t at time t . So the total expected yield of institutional investor i ($i = 1, 2, \dots, n$) will be changed to formula (4).

$$\pi_i = \sum_{i=1}^T (1 - P_{Rt} - P_{Rt} \cdot N_t) \cdot q_{it} [P(Q_{nt}) - P_{0t}] \quad (4)$$

From formula (4), we can infer that fixed regulation factors will reduce the total expected yield but not affect the decision-making features of institutional investors. So it requires for the regulator to adjust regulation factors timely according to the market situation, which means a kind of self-adaptive regulation strategy.

3 Modeling and Simulation

In this part, an agent-based modeling simulation model system based on theoretical model analysis is established. And a series of simulation experiments will be carry out to verify the effects of so called "self-adaptive regulation".

Table 1 The main properties and actions of the simulation agents

Agent	Variable in simulation model: property	Action: function description
Iinvestor	(1) InvestQ: the stock trading volume	(1) Invest: deciding the change of stock trading volume “investQ”
	(2) Profit: the expected profit	(2) Compare: computing the expected yield “profit” and comparing it with “lastprofit” in order to optimize the decision making
	(3) Lastprofit: the expected profit of last simulation cycle	
Regulator	(1) PR: the probability of investigation	(1) SetPR: deciding the change of the probability of investigation “PR”
	(2) N: the punishment index	(2) SetN: deciding the change of punishment index N
		(3) Compare: computing properties
StockMarket	StockPrice etc.: public information	(1) Price: stock pricing
		(2) Get: getting the public information

3.1 The Simulation Agents

According to the theoretical analysis, there are at least two kinds of simulation agents involved in the simulation model system, which are institutional investor named as “Investor” and market regulator named as “Regulator”. To make the simulation environment and behavioral features of agents come close to the real market, two functional simulation agents named as “GALCS” and “StockMarket” will be added in the simulation. The “GALCS” will endow the agents with self-adaptability and the “StockMarket” will be the information channels among simulation agents [3]. The main properties and actions of agents are described in Table 1.

3.2 The Process and Information Flow of the Simulation

As the simulation model system is programmed by OOP and the simulation process involves action calls among agents, so the best measure of describing the simulation process is to use action sequence and information flow, which is shown as Fig. 1.

3.3 Simulation Experiments

After programming the simulation model system in Swarm, we can activate the simulation system. The first step of the simulation is to set up the parameters [4]. We set up “PR” and “N” to be 0.3 and 0.3; the stock price named as “StockPrice” to

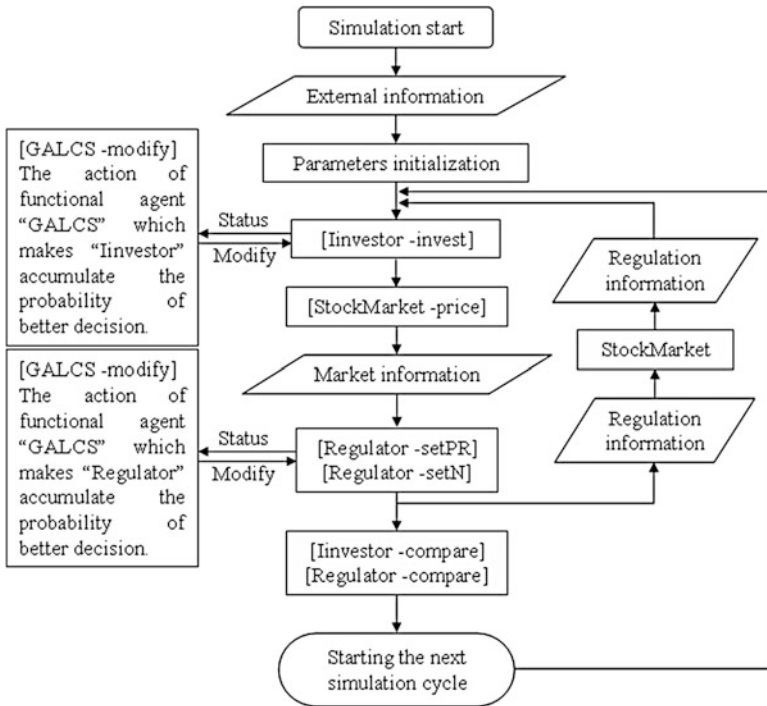


Fig. 1 The process and information flow of the simulation

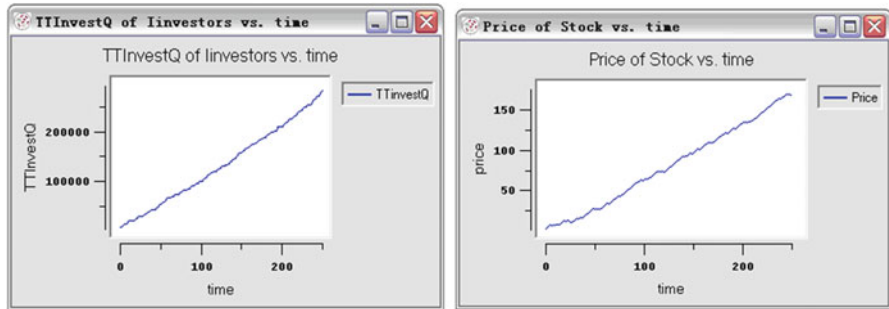


Fig. 2 The total trading volume and price movements of stock without any regulation

be 15; the initial volume of stock held by each institutional investor to be 20,000; the number of institutional investors to be 10. Then we will run the simulation process to study the effects of “self-adaptive regulation”. We use the simulation model system to carry out two experiments; one is without any regulation measures, and the other is with so called “self-adaptive regulation”. The movements of total trading volume and price of stock in each experiment are shown as Figs. 2 and 3.

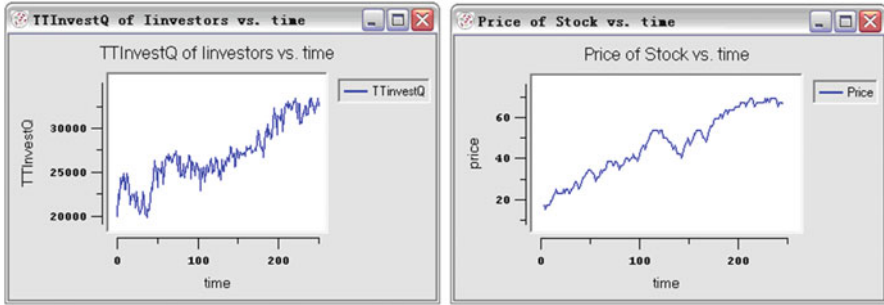


Fig. 3 The total trading volume and price movements of stock with self-adaptive regulation

Comparing Fig. 2 with Fig. 3, the total trading volume and price of stock shown in Fig. 3 are much fewer. These results show the influences of the self-adaptive regulation strategy that the institutional investors reduce the trading volume of stock and the price of stock moves more normally. These results show that the so called “self-adaptive regulation” is effective for avoiding the trading-based manipulation.

4 Conclusion

The institutional investors strongly tend to collude with each other in market manipulation, and market manipulation will destroy the market order and the benefits of other investors. So the effective regulation strategy is necessary. According to the theoretical model analysis, an agent-based modeling simulation model system based on Swarm is established and a series of experiments are carried out afterward, the experiment results show that the “self-adaptive regulation” will avoid the collusion and market manipulation of institutional investors to a large extent.

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Research on RFID Technology for Aquatic Products Safety

Xinquan Wang, E. Xu, Dehai Shen, Ye Zhang, and Chunxiao Liu

Abstract Food safety is a serious problem in the world, and aquatic products safety is an important part of food safety, So many scholars have been studying it. To deal with the problem, the paper proposed a method based on RFID radio frequency identification technology that is also known as electronic tags. The method uses the RFID technology to identify the aquatic products and manage the whole aspects of the supply chain, such as its breeding, catching, processing, logistics, storing and so on, which bring a revolutionary change to aquatic products safety. And meanwhile, the advantage of application of RFID technology was analyzed.

Keywords RFID technology • Aquatic products • Quality safety

1 The Components of RFID

The RFID system, a non-contact automatic identification of communication technology, generally consists of two parts of hardware components and software components and is widely used in food safety fields all over the world.

1.1 Hardware Components

Hardware components include tag, reader and writer. Label is a mini wireless transceiver, its internal chip, chip stored in the identification data information [1]. Tag with persistence, receiving information spread through sex is strong, information storage capacity and variety, etc. And tag support, speaking, reading and writing features, target objects can be modified at any time and update the

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information. Reader is data capture and processing device, a handheld and fixed in two forms. Reader through wireless receiving and transmitting information, by receiving radio waves to read data from the tag. Reader at the same time is also responsible processing systems [2]. The most common is the passive radio frequency system, when the reader in the tag, inspire the electromagnetic wave, electromagnetic field, are formed around the tag through the activation energy was obtained from the electromagnetic wave the microchip circuit in the tag, and converting chip into electromagnetic waves, and then sent to reader and converts it into data, control computer can process the data and can identify and manage these data.

1.2 Software Components

Software component is divided into the RFID system, RFID middle ware and application background. RFID is necessary for communication between tag and reader feature set. RFID middle ware is running between reader and background processing system of a set of software, to play the role of a bridge. Back end application software is made up of the tag after a reader and RFID middle ware the standardization of the filtered data.

1.3 The Working Principle of RFID

The RFID system for communication between Tag and Reader in general use inductive coupling and coupling of electromagnetic scattering direction in two ways.

1. Inductive coupling method

Inductance coupling induction magnetic field is used for energy transfer and data exchange. Form the electromagnetic field around when the Reader, Tag coil by electromagnetic field voltage and inspired to provide work for energy. Transfer data from the Reader to the Tag communication needs a parameter, such as amplitude, frequency or phase, such as Reader receiving data is implemented by changing the parameters. This approach generally applicable to low frequency RFID, such as the typical frequency of 125 KHZ, 225 KHZ and 3.56 MHz, recognition distance is less than 1 m, was typical for 10–20 cm range.

2. Electromagnetic scattering coupling method

Hit the target, the reflection information carried at the same time, this way according to the space of the electromagnetic wave propagation rule, generally applicable to the relatively high frequency [3].

2 The Advantage of RFID Used in Aquatic Products Safety

Comparing with the traditional bar code, the advantage of RFID technology is as following.

1. Quick scan: One bar code can scan a bar code; RFID technology at the same time for multiple RFID tag for identification.
2. Small size, shape, diversity: RFID on the reading is not required for the size and shape. And RFID development tend to be miniaturization and diversification, so that for different products.
3. Strong pollution resistance and durability: The traditional bar code that is the carrier of one-dimensional bar code paper, so vulnerable to pollution, but RFID for materials such as water, oil and chemicals has a strong resistance. In addition, because the bar code is attached on the plastic bags or outer packing carton, so are particularly vulnerable to wreck; RFID chips data volume label is to exist in, so you can from fouling.
4. Reusable: Can not change after today's bar code printing up, RFID tags can be repeated to add, modify, delete, RFID data volume label in storage, convenient information update.
5. Three thousand characters of data, and RFID highest capacity, can reach several Megabytes of data. With the development of the carrier of memory, data capacity there is also a growing trend. Future items needed to carry data quantity will be more and bigger, the volume label can expand capacity demand also increases accordingly.
6. Data security: Because RFID electronic information is stored, so the data content can use password protection, avoid content was forged and altered.

3 The Application of RFID in Aquatic Products Safety

RFID technology is more and more attention, especially after the twenty-first century. Abroad, RFID technology is developing very rapidly in very wide range. As industrial automation, business automation, and traffic control management and so on many fields has been covering the use of radio frequency technology, specific such as cars, trains and other traffic monitoring; Highway automatic charge system; Animal management; Automated assembly line production; Security access check; Vehicle anti-theft and so on. Started relatively late in our country, because of the RFID technology, the application of the field is not as widely abroad, the main application of card only. RFID card is mainly applied to public transportation, subway, school, social security, etc. Like Shanghai, Beijing and other cities have adopted the bus card. RFID card in recently, our country successfully applied in the second generation of citizen Id card. Believe in the near future the RFID technology development prospects will be better and better.

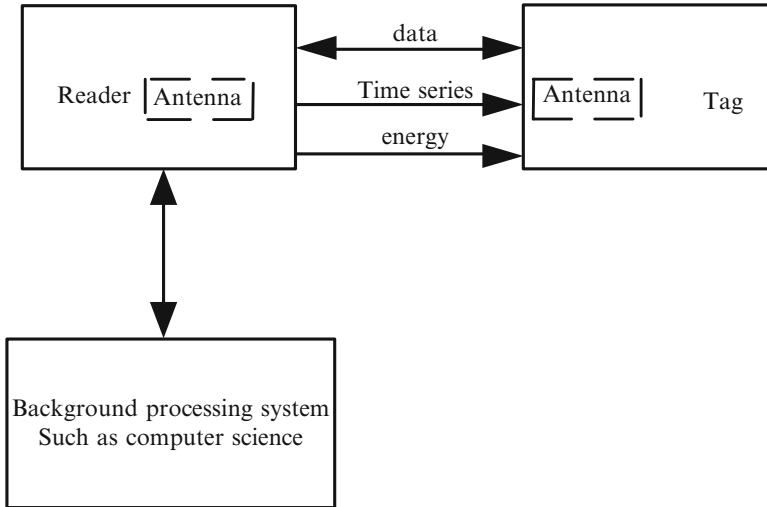


Fig. 1 System structure

Radio frequency identification technology according to the length of the distance and long distance RFID radio frequency identification is divided into a short distance. Short-range radio frequency identification products is not affected by the environment, without oily be soiled, dirt, etc., can replace the bar-code in such an environment, for example, using an assembly line in the factory to track the object. Long distance RFID products are mainly used in traffic, to recognize the distance up to dozens of meters, such as highway automatic charge, etc.

RFID ultra-high frequency (UHF) label due to the direction of the electromagnetic scattering characteristics (Backscatter), Metal (Metal) and Liquid (Liquid), and other environmental sensitive [4], which can lead to the working frequency of Passive tags (Passive tag) with Metal on the surface of the object or hard work under Liquid environment, but such problems with the development of technology has been safe, for example, SONTEC tag the company developed can read under the environment of the Metal or Liquid in good application of Passive label products, to facilitate the deployment of RFID applied in the environment or circumstances [5].

The structure is showed as Fig. 1.

4 Conclusion

As a non-contact automatic identification technology, RFID technology is combined with the radio, computer and chip manufacturing, and other multidisciplinary new technology, not only widely used in many aspects, such as product, management, life, its application also bring revolutionary change for retail, logistics and other industries. The economic benefits of its began to appear in front of the world.

In the field of circulation of commodities, is expected to RFID as a constantly improving technology, whether from the technical maturity or standards, or is the demand of the market both in the early stages of development [6]. Although RFID technology develops at home and abroad, the gap is not obvious. RFID production technology constantly changing, the RFID application system is still at the time of the study should actively respond to.

And RFID intelligent security technology in aquatic products safety should be studied hardly. The RFID industry in the development of generic technology and has a large potential forward-looking technology research. Now began to appear a lot of technical specification, used for electronic tag chip application design and low power consumption circuit design, based on different application objects of uhf RFID tag antennas and microwave frequency. RFID electronic tag on privacy of individual users and enterprise users' safety and the protection of business secrets on the application of the RFID electronic tag system attacks and prevent problems, the RFID electronic tag technology security, and many other aspects. Available tag chip security algorithm and its realization technology has been researched. Communication between Tag and Reader data security can be through a variety of authentication and encryption ways and means of implementation, such as when the RFID electronic Tag is locked to send the password to unlock the data Reader. But also consider to the cost of the RFID electronic tag, because it directly affects the computing power and the strength of the algorithm. In addition, it also can be used to encrypt messages flow password encryption method. Stream cipher plaintext message refers to the bit by bit encryption. If you are using a stream cipher encryption algorithm and USES the hardware implementation, pseudo noise code compared with white noise signal statistical characteristics, so the whole system has strong anti-interference ability, and diversification of the form and structure of the pseudo noise code, software and keys can be changed at any time.

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Part III
Empirical Studies

Factor Analysis for Raw Dairy Production Fluctuations: An Application of Microeconomic Theory

Fei Li

Abstract This study attempts to apply the supply and demand elasticity theory and the cobweb model to reveal the main factors and motivation impacting the raw dairy production fluctuations from the perspective of the elasticity of supply and demand. The result indicated that in the supply side, short-term supply of raw milk is not as elastic as the long-term supply of raw milk. In the demand side, the demand for raw milk lacks elasticity. The price of the reconstituted milk in the model of demand for raw milk response impact the processing capacity of dairy processing enterprises, of which the processing capacity is more influential for the demand for raw milk.

Keywords Factor analysis • Equilibrium price theory • Elasticity of supply and demand • Raw dairy

1 Introduction

Previous studies and debates on milk industry are mainly on the distribution and consumption side. Yet empirical studies that examined the supply side, which has significance for the income and welfare of the peasants, have not been done. However, the importance of the research on the supply side of the milk industry can never be underestimated. Therefore, this study explored the motivation impacting the raw dairy production fluctuations from the perspective of the elasticity of supply and demand by applying the equilibrium price theory and cobweb theory [1]. The significance of the study lies in avoiding large fluctuations in raw milk production and for guiding the healthy development of the dairy cow raising industry. The structure of this essay is organized below: the second part is the

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theoretical foundation. The third part indicates data resources. The empirical analysis is conducted in the fourth part. Conclusion and inspiration are made in the final part.

2 Theoretical Foundation

The equilibrium price theory of the micro-economy theory, as well as cobweb theory for the analysis of the elasticity of supply and demand, is applied in this study. Supply elasticity and demand elasticity are the two core concepts involved. Supply (demand) elasticity refers to the percentage in the volume of the supply (demand) change caused by 1 % change in price of certain commodity. The theory of the equilibrium price for the analysis of the elasticity of supply and demand has provided an effective way for conducting research in fluctuations of the raw milk production. Cobweb theory, another micro-economy theory, is applied to examine price fluctuations on the impact of the yield of the next production cycle with elasticity theory. It is a theoretical model for analyzing the market equilibrium. It is suitable for agricultural production in which lag production exists. According to previous study, production cycle for raw milk is generally 2 years. Due to relatively long production cycle, enterprises made decisions on current production output based on market price change and expected trend, which is in full compliance with the prerequisite condition for examining commodities by Cobweb Model.

Therefore, this study applied the equilibrium price theory and the cobweb model to reveal the main factors and motivation behind affecting the raw milk from the perspective of the elasticity of supply and demand.

3 Data Sources

Based on empirical research methods and accessibility of the sample data, this study used time series data in the empirical analysis. The sample period is from 1995 to 2010.

4 Empirical Analysis

4.1 Analysis for Supply Elasticity

There are many factors impacting supply elasticity, of which time is a one of the most important factors. Generally speaking, when price changes, supply is very difficult to be adjusted accordingly right away. Therefore, supply elasticity is almost zero in short term. In other words, within a short time after price changes,

the amount of supply almost does not change. Within a short time after price changes, the adjustment range is quite limited since the scale of production cannot be changed although small changes can be made by adjusting production factors [2]. Therefore, short-term supply is lack of flexibility. In the long run, farmers can adjust the scale of production after price changes, the supply can be fully adjusted, and thus in the long run supply elasticity is rich.

Many studies indicated Naravi Model and Wickens and Greenfield Model (WG Model) are widely used econometric models used for estimating agricultural supply response. WG Model is based on an inventory adjustment demand equations to explain the changes of the acreage (production). In supply response of the raw milk, the feature of being perishable for raw milk determines that inventory does not exist.

Therefore, this article uses price change of the alternative product to build Ravi model. Model used is as follows:

$$\begin{aligned}
 LnQ_t = b_o + \sum_{i=1}^2 \alpha_i LnP_{t-i} + \sum_{i=1}^2 \beta_i LnQ_{t-i} \\
 + \sum_{i=1}^2 \gamma_i LnOP_{t-i} + LnT_t + LnZ_t + LnZ_t + \mu_t. \tag{1}
 \end{aligned}$$

In the above model, Q_t and Q_{t-i} , respectively refer to the current and lagged i period of raw milk production. P_{t-i} refers to the lagged i period of the national average purchasing price of raw milk. OP_{t-i} refers to the meat price of lagged i period. T_t refers to current unit output of the dairy cow. Z_t refers to number of current dairy cow; μ_t is a random error term.

According to the present type estimation of the lagged distribution mode, appropriate lag order of the explanatory variables Q_{t-i} , P_{t-i} , OP_{t-i} is 1, 1, 1 respectively in the model. Eviews 6.0 is applied for the estimation of the model. According to the result, the variables have relatively high explanatory indicated by high value of R^2 and adjusted R^2 ($R^2 = 0.8882$ and adjusted $R^2 = 0.8874$). Due to the failure of the DW test, LM test is adopted. The companied ratio of the χ^2 test ratio reaches 0.298, greater than 0.05 level of confidence. Therefore, the null hypothesis can not be rejected. And there is no first order autocorrelation for residual serial.

The empirical results show that: lagged 1 year purchase price of the raw milk price has a significant positive impact on raw milk output and the parameter coefficient is 0.799, which indicates that the increase of the lagged one period purchase price of raw milk will yield a significant increase in raw milk production. The lagged response period of output of raw milk for purchase price of the raw milk is 1–2 years. Lagged one period output of raw milk also has a significant positive impact and the coefficient is 0.501021. It means that when the impact of the increase of the raw milk output can only be reflected the second year after farmers decided to raise the output of the raw milk. Lagged one period of meat price has a significant negative effect on output of raw milk and the coefficient is -0.401 .

Possible reason is that when the lagged one period of meat price increased, two consequences may take place. One is that the farmers may sell the dairy cow with relative low unit output. The other is that some farmers may raise other stocks instead of dairy cow. It caused the decrease number of the dairy cows and it may affect the raw milk production. Number of the dairy cows has a positive impact on output of raw milk and the coefficient is 0.399. Namely 1 % change of the number of the dairy cows leads to 0.399 % increase of the output of the raw milk. Among the factors affecting output of raw milk, unit yield of dairy cow is the most significant and the coefficient is 1.298.

As far as the supply elasticity calculated in the model is concerned, short-term price elasticity is 0.799 while long-term price elasticity is 1.597. Model indicates that short-term supply elasticity of raw milk is less than 1. It means that there is a lack of flexibility in short-term supply. While the long-term supply elasticity of raw milk is much greater 1. It means that it is rich in flexibility in long term supply of raw milk. That is to say, in the long term, the purchase price of the raw milk has great impact on the output of the raw milk. Especially when the benefit of the breeding declined significantly, it is quite possible for farmers to sell the dairy cows as beef cattle.

Because of time series data and the small sample size, conclusions have to be further demonstrated by stationary test. Stationary test shows variables are non-stationary. Since the sample interval is relatively short, the stationary conclusion of the test is less reliable. By the stationary test for the residual, test results rejects that the residual series have unit root. Even though the reliability of the cointegration test is low, this conclusion explains the estimation to a certain degree.

The above analysis shows that: impact of the unit yield of raw milk on output is the most significant while the increase of the output caused by herd size increment is relatively low. It shows that China's current dairy farming is still at the primary level and large gap exists in individual dairy cows' yield. High-yield dairy cows and low-yielding dairy cows have a significant impact on farmer's income. With the improvement of the raising technology and the increase of the breeding scale year by year, cows yield also increases year on year.

In summary, short-term supply elasticity of raw milk is less than the long-term supply elasticity. It indicated that farmers are greatly impacted by the production cycle, especially under the circumstances when there is lack of correct prediction and guidance of the specialized institutions [3]. Farmers will determine their own farming scale, thus increasing the risk of raising dairy cows. This has negative impact on the vital benefits of farmers.

4.2 Analysis for Demand Elasticity

Dynamic demand model below was adopted in this study when the impact of factors such as such as lagged price, actual processing capacity, and substitute products on demand is taken into consideration.

$$\text{Ln}(Q)_t = X + \sum_{i=0}^2 \alpha_i \text{Ln}P_{t-i} + \sum_{i=1}^2 \beta_i \text{Ln}Q_{t-i} + \sum_{i=0}^1 \gamma_i \text{Ln}K_{t-i} + \tau_t \text{Ln}PI_t + \mu_t. \quad (2)$$

In the above equation, Q_t , Q_{t-1} and Q_{t-2} stand for current demand, lagged one term demand and lagged two terms demand respectively. Due to the perishable nature of milk, current supply equals to current demand. PI_t stands for the average price imported milk powder restored to the average price of the raw milk. P_{t-1} and P_{t-2} stand for lagged one term average purchase price and lagged two terms average purchase price respectively. K_t and K_{t-1} stand for current term capital stock and lagged one term capital stock of the dairy processing enterprise respectively, representing for actual dairy processing capability of raw milk. Here μ_t is a random error term.

According to the present type estimation of distribution lag model, the appropriate lag order of the explanatory variables P_{t-i} , Q_{t-i} , K_{t-i} is 1, 1, 1 respectively. Eviews 6.0 is adopted for estimation.

From test results we can see that the variables have relatively high explanatory indicated by high value of R^2 and adjusted R^2 ($R^2 = 0.9994$ and adjusted $R^2 = 0.9991$). Due to the failure of the DW test, LM test is adopted. The companion ratio of the χ^2 test ratio reaches 0.351, greater than 0.05 level of confidence. Therefore, the null hypothesis cannot be rejected. And there is no first order autocorrelation for residual serial (stationary test in demand response is the same as in supply response). P-value of F statistics showed that the coefficients of the explanatory variables are quite significant. It means that the variables have good explanatory power for the changes in the explained variables.

The empirical results from the table indicated that: the signs of the coefficient for the explanatory variables are consistent with the theoretical prediction. Seen from the estimated parameter values, different explanatory variables have different impacts on the demand for raw milk. 1 % change in current amount of the capital leads to 0.499 % change in the demand for raw milk. 1 % change in the amount of the capital of lagged one term only leads to 0.229 % change in demand. Therefore capital is the explanatory variable that is more influential for raw milk demand. And the price elasticity of raw milk is quite small shows extreme lack of flexibility. This indicates that the increase of purchase price of raw milk has little impact on price for overall demand for raw milk produced by dairy processing enterprises because from the demand perspective, the short-term price increase may not have much impact on total demand for raw milk but only change the distribution between different dairy processing enterprises. However, in the long run, dairy-processing enterprises can reduce dependence on raw milk by improving product structure and looking for new substitutes of raw milk. Therefore the short-term price increase is likely to mislead market expectations of the farmers for raw milk and it has negative impact on stability of the income of the dairy farmers in the long run.

Import of milk powder has a significant positive impact on the demand for raw milk produced by domestic dairy processing enterprises as we can see the coefficient is 0.2399. The reason is that imported milk powder and domestically

produced raw milk are substitutes. Once the price of imported milk powder increases, dairy-processing enterprises will turn to purchase domestically produced raw milk. It increases the demand for raw milk thus increases the price of raw milk, which leads to the increase raw milk output. The deeper reason is as follows: the price of reconstituted milk is much lower than the price of raw milk and easier to be preserved for quite a long time. Profit yielded from producing products using reconstituted milk is more than seven times higher than the profit yielded from producing products using raw milk. Huge profit difference makes dairy processing companies prefer to use reconstituted milk. Relevant statistics in “China Dairy Yearbook” shows that China’s total imports of milk powder reached 117.8 million tons equivalent to more than 876.92 tons of reconstituted milk during 19 years from 1992 to 2010. In addition, during this period China also imported large quantity of whey powder, which was mainly used for making dairy beverage other than the food for infants and young children. Such great amount of imported milk powder has threatened overall survival and healthy development of domestic cow raising industry.

5 Conclusions and Inspirations

In summary, two main factors, namely, the price of the reconstituted milk in the model of demand for raw milk response impact the processing capacity of dairy processing enterprises, of which the processing capacity is more influential for the demand for raw milk.

The above analysis indicated that demand for raw milk lacks elasticity. Changes in both long term and short-term purchase price of the raw milk cannot change the total demand for raw milk. It only changes the distribution of the raw materials between the dairy processing enterprises. Under this circumstance, the price of raw milk changes frequently sometimes appears to be artificially high when farmers compete for milk and sometimes appears to be artificially low.

In all, this study investigated the main factors and motivation impacting the raw milk by applying the supply and demand elasticity theory and the cobweb model. The above analysis indicated that: in the supply side, short-term supply of raw milk is not as elastic as the long-term supply of raw milk [4]. It implied that farmers are greatly impacted by the production cycle, especially under the circumstances when there is no correct prediction and guidance from the experts in specialized institutions, farmers will determine their own farming scale, thus increasing the risk of raising dairy cow. This has negative impact on the vital interests of farmers. In the demand side, the demand for raw milk lacks elasticity. Changes in both long term and short-term purchase price of the raw milk don’t change the total demand for raw milk. It only changes the distribution of the raw materials between the dairy processing enterprises. Under this circumstance, the price of raw milk changes frequently sometimes appears to be artificially high and sometimes appears to be artificially low.

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Characteristics of Duality Economy Transition in Chinese Agricultural Sector

Ji Ren

Abstract Changes in the level of agricultural marginal productivity, labor force population and agricultural wages are important indicators of national economic development stages. Calculation of the agricultural sector through the relevant data of the survey conducted, the labor shift has changed, the marginal productivity of our country over the past decade can be drawn in a rapid increase, in the level of long-term and short-term agricultural workers' wages and agriculture wages both showed an upward state. By comparing the current agriculture marginal productivity and agricultural wages in China, and in accordance with the theory of Dual Economy transition we can reduce our current stage of economic development, as well as China's labor policies should be taken for the next stage.

Keywords Lewisian turning point • Ranis-Fei model • Agricultural marginal productivity • Agricultural wages

1 Introduction

China's labor market presents tremendous changes after the reform and opening. These trends represent in these phenomena: A large number of rural surplus labor migrations to urban labor market, wage growth, capital and non-capital sector departments income gap. In recent years, there was a "labor shortage" arise in China's eastern coastal areas while the agricultural sector income growth and so on.

According to the dual economic theory, during the conversion of the country's economy from the duality economy to unitary economy, some iconic phenomenon will occur such as surplus labor absorbed and exhausted the income gap between skilled and unskilled workers reduced etc.

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2 The Theory and Model

2.1 The Theory

In 1954 British economist Lewis brought forward the dual economic model, which took the viewpoint of classic economics in explaining the process and changes of economic development. The model assumed that at the primary stage of economic development a country or a region's economy was made up of modern industrial and traditional agricultural sectors. In the traditional agricultural sector, constant increase of population reduce the marginal productivity of the agricultural labor force, to a very low level even zero [1].

Under such condition, there is no effect to the overall production when displacing labor force away from the agricultural sector, the income of the agricultural sector remains at survival level. Meanwhile the capital accumulation in the modern industrial sector promoted its expansion and the demand for labor force [2]. Employment in this sector might exceed population increase, creating a good opportunity for absorbing surplus labor of the agricultural sector [3].

In the early stage of the economic development the marginal labor force in agricultural sector is zero, meaning unlimited supply of labor force. With the constant expansion of modern industrial sector, the surplus agricultural labor force is gradually reduced, the labor shortage begin to appear [4], wages are facing upward pressure, two departments of labor market are becoming integrated [5].

The above theory suggests that a country or a region will experience multitude changes in all aspects when it moves from duality economy to unitary economy.

According to the theory, this paper intends to analyze changes of agricultural labor force population, agricultural productivity and real wages, then investigate the relationship between the two, finally get the judgment on change trends in the non-capital sector labor market.

2.2 The Model of Calculation

In the calculation of the marginal productivity of the agricultural sector, applying the Cobb – Douglas agricultural production function to estimate the production flexibility of agricultural labor.

$$Y = Ae^{\lambda t}(Q_N N)^\alpha K^\beta (Q_L L)^\gamma \quad (1)$$

There into, $Q_N N$ is for the labor, K is for the capital stock, $Q_L L$ is for land area, parameter λ is for the rate of technological progress, the parameters α, β, γ are for the production elasticity of labor, land and capital respectively. Assumed to be linear homogeneous functions, then, $(\alpha + \beta + \gamma = 1)$. After rewriting logarithmic form it can be obtained by the following formula:

$$\ln Y_t = \ln A + \lambda t + \alpha \ln(Q_N N)_t + \beta \ln K_t + \gamma \ln(Q_L L)_t \quad (2)$$

As the intermediate inputs in agricultural production has great impact on output, in order to fully consider the impact factors of the dependent variables, this paper takes into account the element of intermediate inputs.

For a clearer observation on the agricultural wages in the calculation, the crops had been separated into food crops and cash crops to observe.

After appropriate treatment to the above data, the averaged production flexibility can be obtained through regression calculation. And using the agriculture real added-value divided by the total agricultural labor time to draw the average productivity of agriculture.

Finally, multiply the average productivity of agriculture by production elasticity of agriculture labor to get the agricultural marginal productivity. In the calculation of real wages of agricultural workers, the paper applies division calculation between the annual wage of agricultural workers and price index of agricultural products.

3 The Transition Characteristics in the Agricultural Sector

3.1 *Changes of China's Agricultural Labor Force Population*

Under the condition of the decrease of the total agricultural employment numbers, the rise of the rural labor migration amount reduces the new surplus labor force amount.

The data from the Ministry of Agricultural and the National Bureau of Statistics show that rural labor migration numbers increased gradually in recent years. Information from the Ministry of Agricultural illustrate that rural labor migration numbers increased from 5.066 to 12.609 million, led to the percentage of migration changed from 16.0 to 27.5 %.

As the increase of rural labor migration numbers and the rise of proportion of labor shift, the number of workers enter into other industries will be increase continually. Meanwhile the surplus labor force amount will be declined gradually (Fig. 1).

3.2 *Changes of Marginal Productivity and Agriculture Wages*

Using the above production function to calculate the level of productivity of food crops and cash crops in rural and agricultural wages in our country from 1995 to 2006, the following results were obtained (Fig. 2).

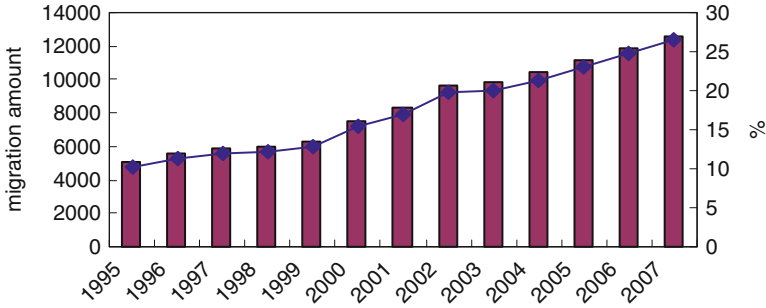
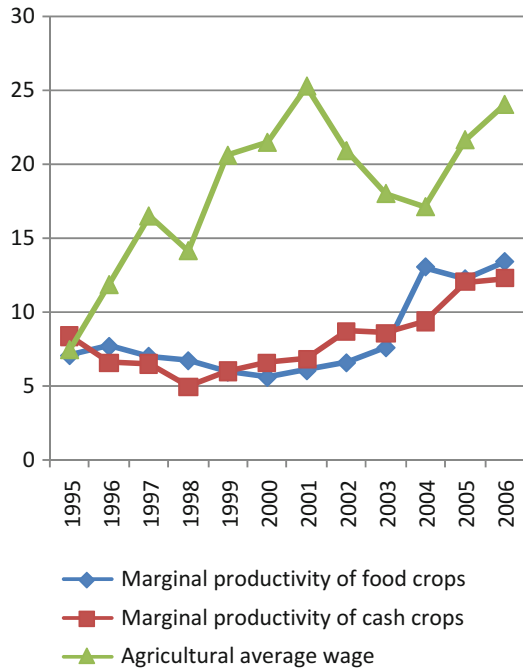


Fig. 1 Rural labor migration amount and the percentage (Data from the Ministry of Agricultural and the National Bureau of Statistics)

Fig. 2 Changes of the agricultural real wage level and marginal productivity



As shown in the calculation results, China’s agricultural wages has presented overall upward trend since 1995. Although there was a temporary downturn for the agricultural wage in 2003–2004, this can be considered as a data defect caused by inconsistent standards applied by the new survey method.

While the marginal productivity of food crops and cash crops are also showing increasing trend overall, particularly the growth rate of the marginal productivity showed a big change.

4 Conclusions

From the above analysis we can know, the marginal productivity of the agricultural sector and agricultural wages in China showed the following changes between 1995 and 2006.

First, because of the shift of a plenty of agricultural labor force, we can see the population of rural surplus labor force is declining and the unlimited supply of labor force is coming to the end.

Second, the average productivity and marginal productivity in the agricultural sector are increasing rapidly, the marginal productivity (average of marginal productivity of food crops and cash crops) reached 8.1 % per annum averagely. Marginal productivity of food crops and cash crops are showing rapid rising trend. In particular, the marginal productivity of food crops which presents a more substantial increase, with an average annual growth rate of 8 %, with an average annual 4.9 % for the cash crops marginal productivity.

Third, the wage level in the agricultural sector has been greatly improved with an annual growth rate of 13 % in the past decade, with 22.5 % growth rate for Long-term workers and 11.4 % for short-term.

Forth, the gap between the agricultural average daily wage and the average marginal productivity levels is gradually reduced, especially after 2003, the increasing of marginal productivity and the decline of agricultural wage growth brought the two closer.

According to the analysis of the above changes using the theory of dual economics, it shows that the marginal productivity of agriculture is infinitely closing to the level of agricultural wages.

We can speculate that, following the further improvement of the agricultural marginal productivity, the future wage level of agricultural sector will be determined by the level of marginal productivity, while surplus labor in the agricultural sector will becomes short. Therefore there are reasons to believe that important changes in this period imply the arrival of an economical turning point in the agricultural sector, so our agricultural sector should enhance the labor policy in order to conform to the needs of national economic development as a response to this trend.

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A Survey on Work Stress and Job Burnout of Railway Drivers on Safety Performance

Ziruo Jia

Abstract In order to research mutual influence relation among work pressure, job burnout and safety performance, improve locomotive driver's safety performance, and ensure safe railway transport, this paper proposes a locomotive driver's work pressure, job burnout and safety performance model which takes job burnout as intervening variable. By use of survey data on locomotive driver from Beijing Railway Bureau, this paper discusses the influence relation between 5 dimensions of work pressure and 3 dimensions of job burnout and safety performance through structural equation model. The research result shows that the job burnout plays an intermediate role between locomotive driver's work pressure and safety performance, there exists positive correlation relation between work pressure and job burnout, and the work pressure has a prediction function on job burnout; there exists negative correlation relation between job burnout and safety performance, and the job burnout also has a prediction function on safety performance.

Keywords Railway driver • Work stress • Job burnout • Safety performance • Structural Equation Modeling (SEM)

1 Introduction

Ensuing operation safety has been the highest goal of railway transportation all the time. In related workers being engaged in railway transportation, railway drivers are the most important link that ensures railway transportation safety. Related domestic and foreign researches on railway accidents show that proportion of railway accidents caused by drivers is about 80 % [1]. Increase in working difficulty, which is caused by work importance, technical requirement, operating mode and management mode of railway drivers will not only result in sharp increase in their labor intensity and mental stress but also objectively increase difficulty in their career development. Some European researches have shown that [2] long-time operation of railway drivers will lead to work pressure and reduce work efficiency. If they stay in long-term excessive work stress, job burnout will be caused, which

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will generate work faults, form potential safety hazards and cause accidents [3]. For railway drivers, this will be directly reflected by reduction in their safety performance level.

2 Research Hypothesis

Practical researches show that safety performance is a component of work performance, so it should have relationship with work stress and job burnout.

2.1 Work Stress

Chinese railways are featured by wide coverage, complicated rail track, many types of trains and engines, increasingly improved running speed and gradually increased difficulty in technology. Thus, they should be taken into full consideration when we study Chinese railway drivers' work stress. By summarizing predecessors' research results related to railway drivers' work stress [4], in combination with interviews and surveys on and by classification and integration, the author's researches hold that railway drivers' work stress includes five dimensions like work itself, interpersonal relationship, career development, organizational factor and work-family conflict.

A number of researches have shown that work stress has impacts on work performance [5], while there have been no researches supporting the relationship between work stress and safety performance. Work stress directly affects individual cognition, which results in reduction in operational capacity. Therefore, it can be inferred that work stress has significant impacts on safety performance.

2.2 Safety Performance

Railway drivers' safety performance refers to the situation that they finish operating tasks safely, which is the most important component of railway drivers' work performance. Safety performance model constructed by Neal and Criffin [6] distinguishes content and antecedent factors of safety performance and mainly includes two dimensions, i.e., safety compliance and safety participation. Safety compliance includes railway drivers follow safe operation rules and finish tasks by safe methods. Safety participation includes mutual assistance among colleagues, safety promotion plans, enthusiasm for safety and improvement in workplace safety etc. To ensure that the reproduction of your illustrations is of a reasonable quality, we advise against the use of shading. The contrast should be as pronounced as possible.

2.3 *Job Burnout*

Generally, scholars deem that job burnout is a specific result caused by long-term and continuous work stress. In related researches on dimensions of job burnout, researchers usually recognize and adopt three dimensions of job burnout revised by Maslach and Jackson in 1996, i.e., exhaustion, cynicism and reduced professional accomplishments. Empirical researches of many scholars also prove the causal relationship between work stress and job burnout and job burnout also has mediating effect between work stress and other outcome variables. There are related researches on the mediating effect of job burnout between work stress and work performance, for instance, Yongxin Li deems that job burnout has predicting effect on work performance. This thesis will study job burnout in the relationship between work stress and safety performance as a mediating variable.

2.4 *Research Hypothesis and Model*

Based on foregoing analyses, the following hypotheses are proposed:

Railway drivers' job burnout is a mediating variable between their work stress and safety performance, i.e., railway drivers' work stress is an antecedent variable and of their job burnout and safety performance is an outcome variable of job burnout.

3 Data Statistics and Analysis

SPSS17.0 and AMOS17.0 are used for data statistics and analysis, which mainly includes a test on validity and reliability of the questionnaire and a test on railway drivers' work stress, job burnout and safety performance.

3.1 *Sample Description*

All Chinese railway drivers are male, and their educational background is basically the same. When surveys and statistics are carried out, statistics is only implemented for information about age and working age. Specifically, working age refers to the work years of railway drivers being engaged in locomotives.

Railway drivers taking part in the questionnaire are male. Most of them are aged from 31 to 40, such trainmen account for 72.7 % of all respondents, i.e., the number of the work years of railway drivers being engaged in locomotives mainly centers on 11–15, accounting for 66 % of all respondents.

3.2 Model Test

According to SPSS17.0 analysis, Cronbach’s α coefficient of each dimension in the scale is over 0.7. Generally speaking, the reliability test will be passed if Cronbach’s α coefficient is 0.7.

According to the results, it is shown that path coefficient between railway drivers’ work stress and job burnout is 0.317, railway drivers’ work stress has positive relationship with job burnout; the path coefficient between railway drivers’ job burnout and safety performance is -0.308 and railway drivers’ job burnout has negative relationship with safety performance.

Pressure caused by railway drivers’ work itself and work-family conflict has significant positive relationship with exhaustion, cynicism and reduced professional accomplishment, i.e., the higher the pressure caused by railway drivers’ work itself and work-family conflict is, the higher the degree of their job burnout will be (Fig. 1).

Railway drivers’ interpersonal relationship has significant negative relationship with exhaustion and cynicism, i.e., Railway drivers’ interpersonal relationship will not make them suffer exhaustion and cynicism; Railway drivers’ interpersonal relationship does not have correlation with reduced professional accomplishment, which implies that interpersonal relationship has no impacts on railway drivers’ reduced professional accomplishment.

Railway drivers’ career development does not have negative correlation with exhaustion or cynicism, which indicates that career development does no affect railway drivers’ exhaustion or cynicism; Railway drivers’ career development has significant negative relationship with reduced professional accomplishment, which implies that the better the career development of railway drivers is, the lower the degree of their reduced professional accomplishment is.

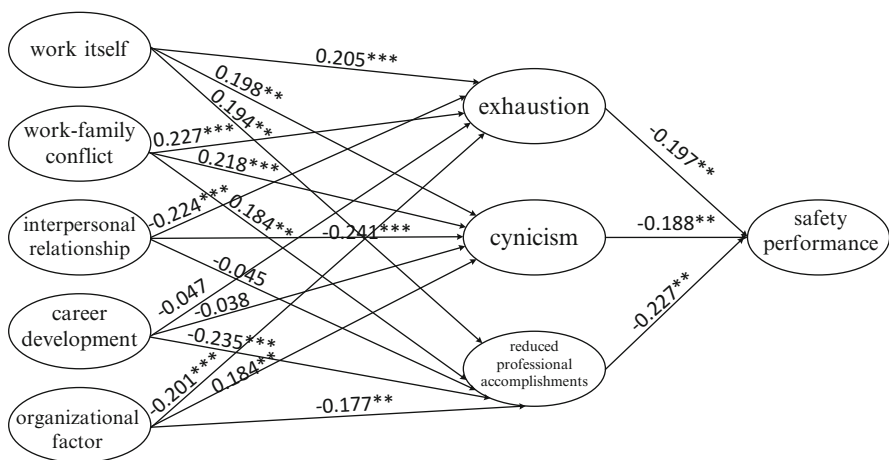


Fig. 1 Modified results of SEM

Organizational factor of the organization where railway drivers work has significant negative correlation with exhaustion, cynicism and reduced professional accomplishment, i.e., the higher the level of organizational factor is, the lower their job burnout will be.

The three dimensions, i.e., railway drivers' exhaustion, cynicism and reduced professional accomplishment, have significant negative relationship with safety performance, which indicates that job burnout has negative predictive effect on safety performance. In addition, the higher the level of job burnout is, the lower the level of safety performance will be.

4 Conclusions

To study the relationship among railway drivers' work stress, job burnout and safety performance, the author studies related documents, carries out theoretical and empirical analyses, establishes work stress — job burnout — safety performance, and puts forward corresponding research hypotheses. By empirical researches, the following research conclusions are drawn:

1. Five dimensions about railway drivers' work stress, i.e., work itself, work-family conflict, interpersonal relationship, career development and organizational factor are obtained. Meanwhile, it compiles a questionnaire on railway drivers' work stress and job burnout, and implements a reliability and validity test on the questionnaire, which ensures effectiveness of the research tool.
2. Railway drivers' job burnout is a mediating variable between their work stress and safety performance. Railway drivers' work stress has predictive effect on their job burnout, and their job burnout has negative predictive effect on safety performance.
3. Railway drivers are the most critical link in railway transportation. Railway drivers' work stress has close relationship with their job burnout and safety performance, and is an important factor affecting their safety operation. Safety is a fundamental for railway transportation. Based on this, railway management department should pay full attention to railway drivers' work stress and job burnout, carry out effective pressure management, improve railway drivers' safety performance and guarantee railway transportation safety.

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Study on Aggregate Employment and Employment Training of Migrant Workers in China from 2008 to 2012

Yiming Zhang, Wei Wang, and Chang Liu

Abstract In 2012, the total quantity of migrant workers increases continuously, however, along with the economic structure and industrial structure adjustment of the central and western regions, their ability to absorb migrant workers strengthen constantly, which leads to a steady decline in the proportion of inter-provincial migrant workers. Therefore, the paper demonstrates the situation of migrant workers from the aspects that the job market segmentation affects fair employment of migrant workers, the employment discrimination of migrant workers is serious, and the employment training of migrant workers are difficult to be solved in the short term. At last, resolving measures and suggestions are put forward hereto.

Keywords Migrant workers • Education • Employment training • Employment quality

1 Background

Employment is vital to people's livelihood. Under the new situation of building a harmonious socialist society, the flow and employment of migrant workers begin to present some new characteristics and development trend [1, 2]. The report at the 18th Party Congress pointed out that it is necessary to promote and achieve higher employment quality, to do a good job of youth employment through focusing on college graduates and the employment of rural-urban migrations, urban people who have difficulties and veterans, wherein the peasant worker group is the employment group emphasized by the central government, and they are also the group with relatively low employment quality from the aspects of employment environment, treatment, rights and interests, stability, etc. [3, 4]. In 2012, the total quantity of migrant workers increases continuously, however, along with the economic

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structure and industrial structure adjustment of the central and western regions, their ability to absorb migrant workers strengthen constantly, which leads to a steady decline in the proportion of inter-provincial migrant workers. Although the wages of migrant workers increases steadily and the problem of arrear of wages arise, the trend of older migrant workers is highlighted day by day, moreover, less labor skills, low rate of signed labor contract, low level of social security, poor living conditions and other problems are still prominent.

The labor market demand in China is mainly concentrated on two categories, including the production, transportation and equipment operators and the general business service staffs, which account for 66.4 % of the employment and recruitment demand, that's about 2/3. The structural contradiction about migrant workers employment is still obvious and the problem of serious shortage of skilled workers has not alleviated [5, 6]. Therefore, to realize the sustained effect of the demographic dividend in the process of economic development of China, the high quality employment of migrant workers must be promoted [7]. The high quality employment of migrant workers is related to the construction improvement of China's labor market, and the sustainable development of economy and social harmony thereof.

2 Aggregate Employment of Migrant Workers

From 2008 to 2012, the number of migrant workers, including migrant workers and local migrant workers, is increased constantly, wherein the aggregate migrant workers of the whole country in 2012 reach 262.61 million, the migrant workers is 163.36 million, the migrant workers of residents is 129.61 million, the migrant workers go out with the whole family is 33.75 million, the local migrant workers is 99.25 million, that's the increase of 9.83 million, 4.73 million, 3.77 million, 0.96 million and 5.1 million respectively, and the growth rate were 3.9 %, 3.0 %, 3.0 %, 2.9 % and 5.4 % (see Table 1).

Table 1 Number of migrant workers

	2008	2009	2010	2011	2012
Aggregate migrant workers	22,542	22,978	24,223	25,278	26,261
Migrant workers	14,041	14,533	15,335	15,863	16,336
(1) Migrant workers of residents	11,182	11,567	12,264	12,584	12,961
(2) Migrant workers go out with the whole family	2,859	2,966	3,071	3,279	3,375
Local migrant workers	8,501	8,445	8,888	9,415	9,925

Unit: Ten thousands

Table 2 Constitution of educational levels of migrant workers

	Non-migrant workers	All migrant workers	Local migrant workers	Migrant workers going outside	Young migrant workers younger than 30 years old
Illiterate and semi-illiterate	8.3	1.5	2.0	1.0	0.3
Primary school	33.8	14.3	18.4	10.5	5.5
Junior high school	47.0	60.5	58.9	62.0	57.8
Senior high school	8.0	13.3	13.8	12.8	14.7
Technical secondary school	1.5	4.7	3.3	5.9	9.1
College degree or above	1.4	5.7	3.6	7.8	12.6

Unit: %

3 The Education of Employed Migrant Workers

At present, the education level of migrant workers of our country is mainly the junior middle school, wherein the young migrant workers and migrant workers have relatively higher education levels. In 2012, the proportions of migrant workers with illiteracy, primary school, junior high school, high school and technical secondary school or above degree of educational levels were 1.5 %, 14.3 %, 60.5 %, 13.3 % and 10.4 %. The educational level of migrant workers was significantly higher than that of non-migrant workers. The educational level distribution of China's migrant workers presents a phenomenon that the educational level of migrant workers is higher than that of the local migrant workers, and the educational level of migrant workers is obviously higher than non-migrant workers (see Table 2).

4 The Employment Training of Migrant Workers

In 2012, most migrant workers still do not take part in any skill training, and the proportion of young migrant workers participated in agricultural technical training is low (see Table 3). However, the proportion of older migrant workers accepting agricultural technical training is higher than that of the young migrant workers, therefore, the distribution shows that the lower the age level is, the less willing to accept agricultural technical training. This illustrates that the rural young labor forces tend to work in non-agricultural industries, and the non-agricultural industries employment tendency makes young migrant workers more willing to accept non-agricultural vocational skills training and to be employed in cities and tow.

Table 3 Training conditions of migrant workers of different age groups

	Participated in agricultural technical training	Participated in non-agricultural vocational skills training	Participated in neither of the trainings
16–20 years old	4.0	22.3	76.0
21–30 years old	6.2	31.6	66.0
31–40 years old	11.0	26.7	68.0
41–50 years old	14.9	23.1	69.5
Above 50 years old	14.5	16.9	74.5

Unit: %

5 Suggestions for Countermeasures of High Quality Employment of Migrant Workers

Firstly, strengthen the construction of a comprehensive vocational skills training base. All regions need to integrate vocational education and training resources to realize rural labor transfer training, on-the-job worker training, skills training, examination identification, training for migrant workers backing home to run business and reemployment training by creating a comprehensive vocational skills training base. According to the situation that existing training institutions are mainly concentrated on cities, it is necessary to strive to promote training entities to extend to villages and towns and then carry out introductory training by relying on the villages and towns to form a perfect vocational education training system gradually.

Secondly, carry out vigorously the vocational training of laborers. Under the chance of the implementation of “skills training project for millions of rural youths”, all regions should carry out vigorously the vocational training of laborers, especially the non-agricultural employment training of migrant workers, through vestibule schools, comprehensive vocational training bases, and all kinds of vocational education and training institutions, and the surplus rural labor forces should be organized to participate orientation trainings and order-form short-term training to enhance the employment ability of migrant workers.

Thirdly, carry out the enterprise training comprehensively. Each region has to organize migrant workers with conditions and willing to start businesses actively to implement the training of improving entrepreneurial ability to improve the entrepreneurial ability thereof. The labor and social security department of each region should establish enterprise training expert advisory committee, and combine the industry and commerce, the tax administration, the finance and other entrepreneurial ability, the policy training, the opening guidance, the small-sum guaranteed loan, the small and micro businesses operation and other supportive polices to encourage migrant workers to start businesses and enterprises.

Fourthly, give full play to the important role of trade unions for the protection of rights and interests of migrant workers. In the process of promoting the employment of migrant workers, one should pay attention to the protection of the rights and interests of migrant workers and take it as the main concern of the trade union work in the new age. In the organizational process of trade unions, migrant workers should be absorbed as far as possible to join the organizational system of the trade union to achieve the true protection of rights and interests of migrant workers, avoid illegal rights protection spontaneously organized by migrant workers and maintain social stability.

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An Empirical Analysis on Tax Growth Pattern Since Economic Reform in China

Yijun Li

Abstract This paper attempts to investigate the tax growth pattern in China by establishing the supply and demand tax growth model. It is different from the traditional model since it considered not only the supply side but also considered the demand side by introducing financial demand on the basis of traditional model. The supply capability of tax growth determined by economic growth. The demand capability of tax growth determined by government financial behavior and fiscal policy. Economic growth pattern, coverage of tax system, progressive degree of tax system and tax administration capability are the impacting factors from supply side. Type of fiscal policy, tax revenue task, financial transfer payment system are the impacting factors from demand side.

Keywords Empirical analysis • Tax growth pattern • Traditional model • Supply and demand tax growth model

1 Introduction

This paper attempts to investigate tax growth pattern in China by establishing the supply and demand tax growth model. It is different from the traditional model since it considered not only the supply but also considered the demand side by introducing financial demand on the basis of traditional model. This model is made of two parts: one is the supply capability of tax growth determined by economic growth. The other is the demand capability of tax growth determined by government financial behavior and fiscal policy [1]. The structure of this essay is organized below: the second part is the theoretical foundation. The third part illustrates research method and data resources. Conclusion and inspiration are made in the final part. Economic Growth Pattern. Coverage of Tax System. Progressive Degree of Tax System, Tax Administration Capability. Impacting Factors from Supply Side Type of Fiscal Policy, Tax Revenue Task Financial Transfer Payment System Impacting Factors from Demand Side.

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2 Theoretical Foundation

There are many factors impacting tax growth. These factors can be divided into two groups: one group is from the supply side and the other group is from the demand side.

2.1 Impacting Factors from Supply Side

Economic Growth Pattern Economic growth pattern is generally classified into two categories: extensive economic growth and intensive economic growth. There is low efficiency and low value-added tax growth under the extensive economic growth mode while there is high efficiency and high value-added tax growth under the intensive economic growth mode. High value-added tax growth can provide more tax sources.

Coverage of Tax System Tax coverage is determined by how advanced and how sophisticated the tax system is. The more advanced and the more sophisticated the tax system is and the wider the tax coverage is, the less the tax leaking-out and the less economic growth enter tax basis.

Progressive Degree of Tax System The higher progressive degree of the tax system the faster tax grows [2]. The bigger proportion of the income tax with progressive property, the higher progressive degree of the tax system is. The bigger proportion of the fixed tax, the lower progressive degree of the tax system is.

Tax Administration Capability The more advanced technology is applied in tax administration and the higher the tax administration capability is, the more tax revenue can be generated.

2.2 Impacting Factors from Demand Side

Type of Fiscal Policy Type of fiscal policy has different demand for tax revenue and it has a profound impact on the scale and the speed of tax growth. Even the same type of fiscal policy has different demand for tax. When a fiscal policy includes not only the tax policy but also expenditure policy, the two kinds of policy have different impacts on tax growth and the ultimate result is often uncertain.

Tax Revenue Task Tax revenue task is endowed with high authority for the sake of security. The limitation in tax supply ability may be overwhelmed by the demand pressure for completing revenue task. Therefore, the demand for completing tax revenue task is the most important factor for determining actual tax growth in China.

Tax-Sharing System Tax-sharing system is a financial system arrangement under which government at all levels has corresponding power and responsibility.

Financial Transfer Payment System Financial transfer payment system is another institutional factor for demand for tax.

3 Research Method and Data Source

3.1 Hypothesis

Hypothesis to be tested are as follows:

Hypothesis 1 Model assumption for tax revenue increase from 1978 to 1996 is supply oriented.

Factors impacting tax growths during the period mentioned above presented following features:

From the supply side, economic growth pattern during this period is extensive economic growth under which there is low efficiency and low value-added tax growth. Tax law system was in transition period with limited tax administration capability and loose control for tax incentive. From the demand side, because of the relatively tight fiscal policy and the non-tax revenue increase, the demand for tax revenue was relatively weak. Therefore tax growth rate was relatively low.

Hypothesis 2 Model assumption for tax growths during the period of 1997–2010 is demand oriented since great change occurred in the factors impacting tax growth.

Factors impacting tax growths during the period mentioned above presented following features:

From the supply side, economic growth pattern during this period is intensive economic growth under which there is high efficiency and super-high value-added tax growth. Economic growth speed slowed down compared to previous period. The super-high tax growth is due to the fully shown advantage of the new tax system and the significantly improved tax administration capability rather than economic growth. Under the super-fast tax growth pattern in recent years, tax supply was overwhelmed by tax demand. From the demand side, during this period of time, the expansion fiscal policy was implemented and tax-sharing system, transfer payment system, etc. emerged. The expansion fiscal policy, as well as tax-sharing system and transfer payment system is the institutional factors and policy factors impacting tax growth while expansion fiscal policy is the dominant impact factor and it great demand for tax growth which made fiscal demand present a reverse moving tendency relative to economic development [3, 4]. Thus, it led to the objective results of tax growth much higher than GDP growth.

Hypothesis 3 Model assumption for tax revenue for the whole period of 1978–2010 stably increased. Tax growth has presented following features:

From the supply side, major restricted factor for tax growth is not GDP growth rate but the advance degree of tax law system and tax administration capability.

Stable tax growth is one of the major targets pursued by the government for the need for macro-economy control and for political need.

Tax growth is mainly determined by the fiscal demand of the government but not the reflection of the social and economic relationship and economic fluctuations. Therefore, tax growth is not closely correlated with economy growth.

3.2 Data and Data Resources

The time-series data on GDP, Tax Revenue and related index are obtained from the China Statistics Yearbook (1979–2011) and China Taxation Yearbook (1979–2011). Two factors are considered for choosing 1978 as the starting point of the research: one is that 1978 is the year when China started to implement the policy of reform and opening-up and China started to implement market mechanism. It is the basic point of the research that the theoretic and empirical was taken in the macro-economic environment. The other is that 1978 is common starting point of the year tax growth cycle and the year of the tax reform. It is better to examine the tax reform procedure and tax growth pattern and analyze the important factors affecting tax growth in a more objective way, which makes the research conclusion more persuasive.

3.3 Empirical Test

Three assumption models above mentioned for tax growth explained the tax growth pattern and reasons behind. However, empirical test should also be conducted to examine how the description of the proposed model matches the actual tax growth pattern.

4 Conclusion and Inspiration

4.1 Economic Factors

During the interval of 1978–2002 there is a certain degree of unfitness between tax growth and economic growth. However, the decisive effect of economic growth on tax growth can't be denied. The trend of tax growth rate and the trend of economic

growth rate are quite similar and there is significant co-linearity tax growth and economic growth. The law of economic growth determining tax growth can be fully verified.

4.2 Institutional Innovation Factors

There existed an obvious lagged effect for tax reform stimulating tax growth. The growth energy stored in tax reform in 1994 was released after 1997. That can be reflected in the increase of the intercept (by decreasing tax loss from existed economy) and the increase of the coefficient of the tax growth (by increasing the advance degree of tax system and taxing capability from the economy growth).

4.3 Policy Factors

During the interval of 1978–2010, fiscal policy implementation has great impact on tax growth pattern. When tight fiscal policy is implemented, tax growth is relatively low compared to economic growth [5]. When expansion fiscal policy is implemented, tax growth is relatively high compared to economic growth. The turning points of them are almost at the same time around 1998. If no active fiscal policy were applied, tax revenue might have continued to stably grow with the stimulation of the economic growth and tax reform. However, the explosive tax growth in reality would be impossible.

4.4 Budget Factors

Budget arrangement should be reformed so that it not only ensures the long-term balance of the national fiscal revenue and expenditure, but also makes an adjustment of the single year fiscal revenue and expenditure in accordance with current year economic situation and balances the contradictions between stability and elasticity.

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An Empirical Analysis on Quantity Demand of Life Insurance in China

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Abstract This study attempts to apply quantitative methods investigate the macro-economic and demographic determinants on the quantity demand of life insurance using time series data in China. Analysis indicated that GNP Per capita has been consistently found to be significant predictor of total life insurance consumption. Pension fund system has no positive effect on life insurance consumption. And the individual coefficient estimates level of education, marriage rate and dependency ratios are not significant. The study intends to obtain some enlightenment of the life insurance market in China.

Keywords Quantity demand • Determinants • Life insurance • Time series

1 Introduction

Previously numerous studies and debates on life insurance have been mainly carried out in US, Singapore and other developed countries. Yet empirical studies that examined life insurance in China have not been done. However, the importance and the prospective growth of China life insurance markets cannot be underestimated due to its absence of insurance coverage before 1982, its huge population size and potential demand for life insurance. The structure of this essay is organized below: the second part is the theoretical foundation. The third part illustrates research method and data resources. The empirical analysis is conducted in the fourth part. Conclusion and inspiration are made in the final part.

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2 Theoretical Foundations

The demand for life insurance is a function of many factors: Neumann [1] categorized the factors affecting life insurance purchases into four main groups: the ability to purchase life insurance, including the disposable personal income and the amount of liquid asset holdings; the needs for purchasing life insurance, including number of dependants, number of marriages and age of a population; the willingness to purchase life insurance, including attitudes toward the life insurance product and price expectations affecting the future value of the life insurance; and the exposure to life insurance [2]. The exposure might be a physical one, such as the higher opportunity of being contacted by agents in an urban area. The exposure could also be a mental one, such as the extent of formal education a person has. Other more delicate needs may be also important, such as making use of tax advantages by savings through life insurance.

3 Research Method and Data Sources

3.1 Research Method

The primary purpose of this study is to investigate the macro-economic and demographic determinants on the quantity demand of life insurance using time series data in China. The following part provides a literature review of the factors that are found to have significant relations with life insurance purchase behavior in previous empirical evidence.

Population Life insurance demand, like the demand for any other goods or services, is expected to increase with the increases in the size of the population. Applying multiple regression, Mantis and Farmer [3] found that the size of a population is positively related to the potential demand for life insurance. The larger the population, the more life insurance will be purchased.

This variable will not be directly used in our analysis. Instead, the estimated mid-year population, referring to the total population in China, will be used to standardize the variables examined in the study to avoid spurious correlation with dependent variables and to reduce the multicollinearity among variables in time-series regression analysis.

GNP Per Capita Neumann [1] argued that individual disposable personal income is a significant determinant of life insurance demand. In a study conducted at micro level, Lewis [4] and Campbell [5] found a positive relationship between demand for life insurance and income. In studies conducted at the macro level, Truett and Truett [6] came to the same conclusion. Chen et al. [7] obtained similar

results by multiple regression using Singapore's macro data. Chen [8] found that the likelihood of owning life insurance, the amount of coverage and premium spending are positively associated with household annual income or net worth.

Disposable personal income measured by per capita GNP and inflation adjusted per capita GNP is used in this study. This measure has increased from RMB317.57 to RMB1530.97 from 1982 to 1998.

Occupational Status Chen [8] found that employment was positively related to the demand for life insurance in the US. However, Lau [9] did not support this conclusion using Singapore data. Lau [9] argued that this finding was due to the high correlation between employment and income variables. Because of the above reason noted, we will not use it as independent variable in this study.

Dependency Ratio Dependency ratio is usually thought to positively affect the demand of life insurance. This is consistent with the study of Campbell [5]. It indicated that the main purpose of life insurance is to protect dependents from financial distress against economic insecurity on the premature death of the primary breadwinner. In a cross-sectional study covering 45 countries, Browne and Kim [10] showed that dependency ratio is one of the important factors that lead to variations in the demand for life insurance across nations [11]. Dependency ratio is derived by dividing the number of dependents by the number of persons who are economically active.

The dependency ratio in China continuously declined from 78.11 % in 1982 to 46.5 % in 1998. This is mainly due to the declining fertility and increasing female labor force participation that has happened in most countries since the 1970s. It is expected that this declining dependency ratio has directly affected life insurance demand in China. This variable is included in our study.

Age Age was found to have a negative relationship with the demand for life insurance [8, 12, 13]. The reason for diminishing need for life insurance is that as an individual gets older, life insurance becomes more expensive to purchase. In addition, the individual is relieved from the responsibility and financial obligation to take care of his/her children's needs such as education when children grow up and become self-supporting. However, in studying the odds of owning a specific life insurance product by a person, Chen [8] found that age of a person is positively related to the probability of owning life insurance except for term insurance. This is consistent with the findings of Truett and Truett [6]. Since this variable is highly correlated with dependency ratio, it will not be used in this study, either.

Education Level Life insurance demand is expected to vary directly with education [14]. This is confirmed by studies performed at the micro [12, 15] and macro [6, 7] levels. This is because individuals with more years of schooling will have a higher degree of risk aversion and have a greater awareness of the necessity of life insurance in general.

The proportion of the graduates from institutions of higher learning among total population is used to reflect the level of education in China. This is the closest and available measure for education level and will be used in this study. This measure has been increasing from 4.5 graduates per thousand populations in 1982 to 6.7 graduate per thousand in 1998.

Marriage Rate A married individual has a higher propensity to purchasing a life insurance policy than a single individual. This argument is confirmed by the studies of Hammond et al. [12] and Ferber and Lee [16], who found that married couples were expected to spend more on life insurance than unmarried households.

Female first marriage rate is used as an independent variable in this study. This ratio had decreased from 18 per thousand populations in 1982 to the highest of 15 per thousand in 1998.

Inflation Inflation is another factor in determining expenditure decisions on life insurance purchase [17]. The demand for life insurance is expected to decline in inflationary periods either through shifting purchase of permanent insurance to the lower premium term insurance or by cutting the purchase of all types of life insurance. Empirical evidence by supported this hypothesis. Babbel [18] verified that consumers reduce their purchases even if the life insurance policies were indexed with indexed policies during inflationary (expected or realized) periods in Brazil.

The inflation rate will not be directly used in our analysis. Independent (per capita GNP) variables and dependent variables (per capita amount of coverage and per capita premiums spending) will be adjusted for inflation by using the consumer price index (CPI), which measuring the price changes over time of a fixed basket of goods and services commonly consumed by households will be used in order to make them comparable over different years. The CPI data is obtained by comparing the yearly Consumer Price Index (CPI) with that of basic period, from Dec. 1977 to Nov. 1978.

Social Security In US, pay-as-you-go Social Security System has two different impacts on life insurance purchases. The pension fund will be taken as an independent variable in this study.

Since 1949, China's cradle-to-grave social welfare system, underwritten by the state, has been designed to deliver social services and benefits to the urban areas mainly through state-owned enterprises. It was a classic pay-as-you-go system based on current workers paying the pensions of previous generations. Economic Reform took place in 1978 and GDP created by private sector is taking an increasingly larger share in the country's total GDP. The new pension fund system is to provide a minimum standard of living for retirees. Under the new order, enterprise, employees, and government finance it through a combination of pooled funds and individual accounts on a mandatory and voluntary basis. China is clearly not patterning the new system after any single country. It incorporates characteristics of old-age security schemes found in Singapore and many

industrialized countries dominated by US. However it is more similar to the pension fund system in US.

Finally, other social and economic variables will not be examined in this study either due to their high correlation with variables included in this study or caused by data unavailability.

From the above literature review, five selected explanatory variables will be employed to test quantity demand of life insurance in the China context including Gross National Product (GNP) per capita, dependency ratio, marriage rate, education level and pension fund. Multiple regression method will be employed to perform this analysis. Some of the factors discussed above may be expected to affect life insurance purchases in similar patterns across countries, namely per capita GNP, dependency ratio, education, and marriage rate. However, other factors may have different effects on life insurance purchases from country to country, such as the pension financing method. The pension fund is expected to affect life insurance demand differently from that of the CPF contribution rate in Singapore but may be similar to that of the US Social Security. Thus, the effect of pension system on the life insurance demand in China may not be significant.

We propose the following equation as the demand for life insurance protection:

$$Y_t = \beta_0 + \beta_1(\text{GNP}_t) + \beta_2(\text{DR}_t) + \beta_3(\text{EDU}_t) + \beta_4(\text{MAR}_t) + \beta_5(\text{PF}_t) + \varepsilon_t \quad (1)$$

Where, Y_t = measure of life insurance purchases in year i ; GNP_t = GNP per capita in year t ; DR_t = dependency ratio in year t ; EDU_t = graduates from higher learning institutions among total population in year t ; MAR_t = female first marriage rate in year t ; PF_t = Pension Fund in year t ; ε_t = a random error term.

Multiple linear regression model is often employed to estimate demand models. Hence, the functional form we use is specified in above equation. To estimate life insurance demand in this study, four equations will be adopted altogether for our regression analysis. According to the dependent variables used, the four alternative equations for each year are: Annual premium equation, Amount of coverage equation.

Average premiums per capita equation, Average coverage per capita equation, (The last two are standardized by population size).

The various β_i coefficient will be tested using the student t -statistics. The 10 % significance level is selected as criteria for rejecting the null hypotheses.

3.2 Data Sources and Empirical Analyses

The data for this study covered the time period from 1982 to 2009. The starting point we choose is from year 1982 since it is the year that information on life insurance was first available. It statistically analyzes the main factors affecting life insurance purchase in China. Generally speaking, the selected five independent variables fit the model very well according to the adjusted R^2 .

4 Conclusion and Inspiration

In summary, for coverage and coverage per capita equations tested, per capita GNP has been consistently found to be significant predictor of total life insurance consumption. Pension fund system has no positive effect on life insurance consumption. And the individual coefficient estimates level of education, marriage rate and dependency ratio are not significant.

The consistency of the empirical evidence in this study with those previous studies conducted in other countries shows that the factor commonly cited to affect life insurance demand can be generalized cross-countries, i.e., it is not country-specific. Even with the diversity in culture and stage of development of the life insurance industry, income factor was found to have significant impact on life insurance purchases in countries such as Mexico, the US, Singapore [19]. However, our findings also show that China pension system is found to have little positive effect on life insurance consumption. This is consistent with the finding of Fitzgerald [20] on Social Security on the US life insurance consumption. It proves that different pension system has different impact on life insurance purchases. In the US, pay-as-you-go Social Security System has two different impacts on life insurance purchases that offset each other. On the one hand, Fitzgerald [20] and Lewis [4] showed that when social security payments (retirement benefits) are taken as a source of income to recipient's condition upon the wage earner's survival, it increased the demand for life insurance. On the other hand, when social security is viewed as part of a household's wealth, it decreases the demand for private insurance [4, 5, 20]. Further research by Fitzgerald [20] claimed that these two effects largely offset each other so that social security has little net positive effect on life insurance demand. In Singapore Central Provident Fund (CPF), a confined contribution plan is distinct from the US pay-as-you-go Social Security System, a confined benefit plan. The CPF fund is regarded as a substitute and has a negative effect on life insurance demand [7]. China is clearly not patterning the new system after any single country. It incorporates characteristics of old-age security schemes found in Singapore and many industrialized countries dominated by the US. However it is more similar to the pension fund system in the US. And the pension system in this study has the same effect on insurance purchase as pay-as-you-go Social Security System in the US. Namely China social security has little net positive effect on life insurance demand.

On the whole, the results are not completely consistent with the hypothesis defined. This might be due to the following factors that affect life insurance consumption: Small Sample Size, Interest Rate, Reform of Life Insurance Industry, Reform of China's Welfare System, and continuing Transformation of State-Owned Sector.

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Empirical Analysis on the Relationship Between Industrial Structure Adjustment and Energy Consumption in China

Keshen Jiang and Honglei Niu

Abstract According to the industrial structure evolution and the energy consumption change in China, this paper investigated their relationship with the method of grey incidence analysis. The results show that: at present, the industrial structure upgrading has some effect on the energy consumption, but it is constrained by the economic laws and the current situation; although the mechanization of agriculture is speeding up, the proportion of its added value still has the lowest correlative degree with energy cost; the influence of tertiary industry on the total energy consumption is not as big as respected; to develop energy-saving technologies and products vigorously is the fundamental way to achieve the goals of sustainable development.

Keywords Industrial structure • Grey incidence analysis • Energy consumption

1 Introduction

China is facing some deep-seated contradictions between development and environmental protection, and the optimization and upgrading of industrial structure is widely regarded as an effective way to control energy consumption. The main goal of some current studies was to evaluate the effect of industrial structure adjustment on energy consumption. In academic circles, in the year 1971, Ehrlich and Holden [1, 2] firstly proposed the “IPAT” equation to reflect the environmental pressure from the population growth, and they thought that population size, economic development level and scientific and technological level would play some driving effect on the environment, which could be expressed by the equation like

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$I = P \times A \times T$, where I is environmental pressure, A is per capita GDP, and T represents the scientific and technological level; as early as 1991, it was pointed out by Grossman and Krueger that size effect, structure effect and technique effect are the three environmental influence channels of economic growth; Using the model Zhengnan Lu confirmed that the changes of industry structure had a direct impact on energy demand and energy consumption structure; It is thought that the structural change was one of important influencing factors of energy consumption, but the influences on various kind of energy products were not exactly the same; the empirical research by someone indicated that the changing proportion of industries determined the total energy consumption in some degree. Based on the China's input-output table, Yingzhi Xu [3] constructed an input-output model so as to calculate the driving coefficients and the driven coefficients of the different sectors and discovered that different sectors showed different relevance effects on energy consumption and some of them even played a key role. The studies above from different angles had reached some conclusions as follows: with the industrial structure adjustment and optimization and the acceleration of industrialization, the dependence of economic and social development on energy sources would be reduced; the change of energy efficiency caused by the industrial structure adjustment would be restricted by resource endowment, factor inputs, technical level and so on.

In such a background, based on the grey system theory this paper will do an empirical research on the grey relationship between industrial structure adjustment and energy consumption.

2 Overview of the Industrial Structure Evolution and Energy Consumption in China

Since China's reform and opening up, the proportions of three industries have been changed very much. After 1985, our country entered into the industrial age, and one of the characteristic changes were as follows: The proportion of tertiary industry was more than that of the secondary industry, and the economic growth became driven by the secondary and tertiary industry but not by the primary and secondary industry as before. The primary industry, the secondary industry and the tertiary industry accounted for 28.2 %, 47.9 % and 23.9 % of GDP respectively in the year 1978, and the proportions became 10.1 %, 45.3 % and 44.6 % in 2012. The leading industry was firstly the primary industry, secondly became the secondary industry and turned into the tertiary industry at last, and such a series of changes agrees with Clark's Law.

As one of the essential elements of the economic development, energy plays an important role in promoting the economic development and social progress. With the rapid growth of economy, energy consumption in China had been rising

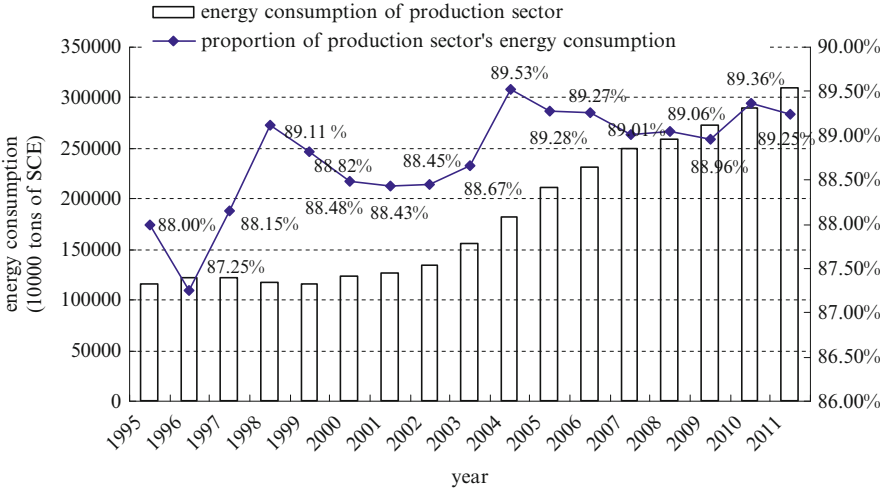


Fig. 1 Fluctuating curves of industrial structure from 1978 to 2011 in China (Source: Statistical yearbook of China in 2012)

faster from 571 million tons of SCE in 1978 to 3.62 billion tons of SCE in 2012, and the average annual growth rate reached 5.6 %. As shown in Fig. 1, in 1995–2011, the energy consumption of production sector increased rapidly from 11.5 to 3.1 billion tons of SCE, which nearly accounted for 90 % of China’s total energy consumption. So it is very important for sustainable development to improve energy saving and emission reduction in production fields.

3 Grey Incidence Analysis on the Relationship Between Industrial Structure Evolution and Energy Consumption in China

3.1 Basic Principles of Grey Incidence Analysis

Grey theory, founded by Deng Julong in 1992, is a new method for researching little data, uncertainty and poor information. The method is applied very broad now, because it is easy to learn but have high accuracy and feasibility. Energy consumption and industrial structure belong to the same complex grey system, so grey incidence analysis model could be used to research the relationship between them, which could be effective without the requirement for the magnitude and regularity of samples [4].

3.2 Specific Analysis Steps

1. According to the relevant Chinese Statistical Yearbooks and Chinese Energy Statistical Yearbooks, select the raw data and determine the analysis sequences. The proportions of added value from 1995 to 2011 for primary industry, industrial sector, construction industry, tertiary industry are set as a system relevant factor X_i , where i is the ordinal number of a factor, $i = 1, 2, \dots, m$, and let the energy consumption at the same time as a system characteristic factor X_0 .
2. Do the non-dimensional data of treatment in order to sensitively reflect the changing characteristic. At the beginning calculate $Y_0(t)$ and $Y_i(t)$, $Y_0(t) = [X_0(1) - X_0(1), X_0(2) - X_0(1), \dots, X_0(n) - X_0(1)] = [Y_0(1), Y_0(2), \dots, Y_0(n)]$, $Y_i(t) = [X_i(1) - X_i(1), X_i(2) - X_i(1), \dots, X_i(n) - X_i(1)] = [Y_i(1), Y_i(2), \dots, Y_i(n)]$, which are considered as the image of zero starting point of X_0 and X_i . And then calculate $Y'_0(t)$ and $Y'_i(t)$, which calculation process is as follows:

$$Z_0(t) = [X_0(1)/X_0(1), X_0(2)/X_0(1), \dots, X_0(n)/X_0(1)] = [Z_0(1), Z_0(2), \dots, Z_0(n)]$$

$$Z_i(t) = [X_i(1)/X_i(1), X_i(2)/X_i(1), \dots, X_i(n)/X_i(1)] = [Z_i(1), Z_i(2), \dots, Z_i(n)]$$

$$Y'_0(t) = [Z_0(1) - Z_0(1), Z_0(2) - Z_0(1), \dots, Z_0(n) - Z_0(1)] = [Y'_0(1), Y'_0(2), \dots, Y'_0(n)]$$

$$Y'_i(t) = [Z_i(1) - Z_i(1), Z_i(2) - Z_i(1), \dots, Z_i(n) - Z_i(1)] = [Y'_i(1), Y'_i(2), \dots, Y'_i(n)]$$

3. The improved comprehensive correlative degree is computed. In this way the paper can more fully indicate the similarity between the two sequences of behavior and the proximity of changing rate relative to the starting point. And such a kind of correlative degree is a weighted average of the improved absolute grey correlative degree and the relative grey correlative degree. The original calculation formula for absolute correlation degree is

$$\epsilon_{0i} = \frac{1 + |s_0| + |s_i|}{1 + |s_0| + |s_i| + |s_i - s_0|}, \text{ and in this paper it is transformed into}$$

$$\epsilon_{0i}^* = \frac{1}{2} \frac{1 + |s_0| + |s_i|}{1 + |s_0| + |s_i| + |s_i - s_0|} + \frac{1}{2} \frac{1}{1 + d_{0i}}, \text{ where } |s_0| = \left| \sum_{t=2}^{n-1} Y_0(t) + \frac{1}{2} Y_0(n) \right|,$$

$$|s_i| = \left| \sum_{t=2}^{n-1} Y_i(t) + \frac{1}{2} Y_i(n) \right|, |s_i - s_0| = \left| \sum_{t=2}^{n-1} (Y_i(t) - Y_0(t)) + \frac{1}{2} (Y_i(n) - \frac{1}{2} Y_0(n)) \right|,$$

and $d_{0i} = \sum_{t=1}^n |Y_i(t) - Y_0(t)|$. So the improved calculation formula for relative

correlation degree is like this: $r_{i0}^* = \frac{1}{2} \frac{1 + |s'_0| + |s'_i|}{1 + |s'_0| + |s'_i| + |s'_i - s'_0|} + \frac{1}{2} \frac{1}{1 + d'_{0i}}$,

where $|s'_0| = \left| \sum_{t=2}^{n-1} Y'_0(t) + \frac{1}{2} Y'_0(n) \right|$, $|s'_i| = \left| \sum_{t=2}^{n-1} Y'_i(t) + \frac{1}{2} Y'_i(n) \right|$, $|s'_i - s'_0| = \left| \sum_{t=2}^{n-1} (Y'_i(t) - Y'_0(t)) + \frac{1}{2} (Y'_i(n) - \frac{1}{2} Y'_0(n)) \right|$, $d'_{0i} = \sum_{t=1}^n |Y'_i(t) - Y'_0(t)|$. Based

Table 1 Improved comprehensive grey incidence between energy consumption and industrial structure in China

Industry	Improved comprehensive grey incidence (ρ_{0i}^*)
Primary industry (X_1)	0.3846
Industrial sector (X_2)	0.4379
Construction industry (X_3)	0.4569
Tertiary industry (X_4)	0.5041

on the two kinds of improved correlative degrees above, the comprehensive correlative degree can be calculated as follows: $\rho_{0i}^* = \theta \varepsilon_{0i}^* + (1 - \theta)r_{i0}^*$ ($\theta \in [0, 1]$), where set θ be equal to 0.4.

4. According to the steps above ρ_{0i}^* is got, which was shown in Table 1. And sort ρ_{0i}^* into order by size, the larger the value is, the greater the degree of correlation is, and via versa.

3.3 Results of Grey Incidence Analysis

Because the energy consumption and industrial structure together constitute a system, making correlation analysis between them will help decision-makers effectively adjust and control the system, which has more practical significance. According to the data in Table 1, sort the improved comprehensive correlative degrees of the four kinds of industries in China by size, and the sequence is got like this $\rho_{04}^* > \rho_{03}^* > \rho_{02}^* > \rho_{01}^*$, where ρ_{01}^* , ρ_{02}^* , ρ_{03}^* and ρ_{04}^* indicate the correlation degrees of primary industry, industrial sector, construction industry and tertiary industry, respectively. It is evident that the degree of grey incidence of tertiary industry is the largest one, that of primary industry is the smallest among them, and the industrial sector and construction industry come in second and third. With the boom in the tertiary industry, such an industry does have more influence on the energy consumption than before, because so far its advantage in energy conservation and emission reduction hasn't been brought into full play. Although the mechanization of agriculture is speeding up, the proportion of primary industry output still has the lowest correlative degree, which means that the industry is developing with the distinct characteristic of low energy consumption and pollution than the other industries. When the rapid economic development is relying on energy input, and industrial sector is characteristic of high investment and energy cost, a slight adjustment of its proportion may result in a large energy consumption change. Nowadays the sector's characteristic of high energy consumption has not altered fundamentally and so its varying proportion still has a relatively large impact on the energy consumption. Although the industrial sector is dominant in national economy, its growth should be controlled properly. At this stage our government takes new-type urbanization as the strategic focus for the economic restructuring and the fundamental approach to the removal of urban-rural dual

structure, which has brought both opportunity and challenge to the construction enterprise of China. In this context, the construction industry developing in the energy-efficient mode has especially great realistic significance to control the total energy cost.

4 Conclusions

This is a paper of empirical study on the industrial structure evolution, the energy consumption and the relationship between them in China, based on the improved grey incidence analysis model. The results find that: at present, the industrial structure upgrading has some effect on energy consumption, but it is constrained by the economic laws and the current situation; the influence of tertiary industry on the total energy consumption is not so big as it is respected, indicating that its development lags behind, its internal structure is at a low level, and the energy-saving advantage is not fully realized.

In conclusion, it is very necessary to begin with the adjustment of industrial structure in order to speed up the low-energy industries instead of the high-energy industries; especially, we should promote the high value-added technology industry of low energy consumption and emission, and focus on the development of tertiary industry with low energy cost; in addition, although the construction belongs to the energy-intensive industries, because of its important guarantee function to the economic progress, the industry should be expanded with limits. In the long time, to develop energy-saving technologies and products vigorously is the fundamental way to achieve the goals of sustainable development.

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Whether the Instability of CPI Weakens the Validity of the Monetary Policy Regulation: Based on the Data of China from 1996 to 2011

Qian Li

Abstract In recent years, People's Bank of China has taken strong monetary policies for many times, thus leading to the slow-down of the rise of CPI. However, the mutual effects between the real economy and people's inflation expectation lead the CPI to fluctuate more uncertainly, and then cause the increase of inflation uncertainty. This article draws the conclusion that inflation uncertainty has a significantly negative influence on the real GDP. Moreover, although the aggressive monetary policy is effective in the short term, the effects are declining in the long run.

Keywords Inflation uncertainty • Monetary policy • VAR model

1 Introduction

Macroeconomy tends to grow in a steady and moderate way in 2011, where the fluctuation of quarter-on-quarter economic growth will be modest compared to that of 2010. At present, domestic demand is still having relatively strong growth momentum and national income is increasing continually, which has initially controlled the rapid rising trend of prices. In the third quarter of 2011, China's GDP saw year-on-year rises of 9.1 %, CPI rose by 5.7 % and the trade surplus amounted to 62.69 billion US dollars. China's Central Bank often takes several monetary policy methods, of which the open-market operation has a relatively modest effect in spite of its producing slow effects, unlike which, changes of the reserve requirement often impose too big an impact, thus giving rise to excessive

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risk and also the changes of deposit and loan interest rate often have a tremendous influence on people's direct investment decisions [1].

Liu Jinqun Pan Fanghui [2] proved that there was not only a balanced relationship in the long term but also an error correction mechanism that uses the error correction model to correct between the rate of growth of the money supply and the inflation rate. Liu Jinqun, Zheng Tingguo and Sui Jianli [3] did the dynamic process inspection with the model of ARFIMA-FIGARCH and found that the inflation rate and the uncertainty are of long memory based on the inflation rate data from January in 1983 to October in 2005, which should be taken into consideration when making policies.

The paper combines the qualitative and quantitative methods to do a systematic study on inflation uncertainty in China and also focuses on the relationship between money supply and the economic growth denoted by the real GDP. Through the empirical analysis, their reciprocal influence can be obtained.

2 The Connotation and Monetary Policy Regulation Mechanism of China's Inflation Uncertainty

The uncertainty means that economic agents are not able to know accurately the result in advance after making decisions, in other words, the uncertainty appears as long as there exists more than one possible results of a decision, because of which economic agents can never be sure of the distributed range and the condition of the economy in the future and furthermore which limits our observation and predictions owing to its randomness [4]. When it comes to making judgment, economic agents need to adjust their decisions and objectives in virtue of the past inflation situation. However, the expectation is often inconsistent with what actually turns out, from which inflation uncertainty stems. At present, the conclusion that the inflation expectation is uncertain has been generally accepted in the economic field. This uncertainty can be easily perceived by the public; it is more likely to cause social problems as well. There are mainly two kinds of means to measure this uncertainty at home and abroad: One is to investigate the inflation expectation by questionnaires and measure the dispersion using sample variances. This method has a high demand for samples since the deviation of these samples will affect the reference of data directly; the other is to choose the condition variance of the actual inflation rate as an instrumental variable of the uncertainty of inflation expectation, the estimate of condition variance of actual inflation rate is the sample variance of residual error. The latter method is more widely applied in the economic researches. We use the estimate of the condition variance of actual inflation rate computed by GARCH (1, 1) model as the index to measure the uncertainty of inflation expectation.

3 Model Processing and Policy Effect Analysis

The sample data of this article included CPI, the quarterly growth rate of GDP and M2 from the first quarter of 1996 to the third quarter of 2011. The inflation rate π_t which used CPI quarter link ratio as proxy was calculated by the CPI monthly year-on-year data and CPI month-on-month data announced monthly. The actual GDP quarter data was deduced from the GDP data which was adjusted by CPI relative ratio with fixed base and removed the inflation factor. To eliminate the seasonal variation influence, X-12 model was used to adjust this influence. We obtained `gdp_sa` sequence without season factor, the `ngdp_sa_v`, the actual quarterly growth rate of GDP could be deduced. The quarterly growth rate of money supply was denoted by variable `m2_v`. π_t will be used to quantize the inflation uncertainty and do the empirical test.

Variable π_t was chosen to describe the inflation uncertainty. Through the study of many literatures, it was discovered that the exterior shock caused by the system change and the financial crisis was regarded as the exogenous variable because there was certain lag period when people response to these factors. Regarding the former inflation rate as the expected inflation rate, π_t included the impact caused by exterior shocks [5].

3.1 Determine the Mean Equation and the Variance Equation

Since the variables in GARCH models required stationary sequence to measure the inflation uncertainty, $D\pi_t = \pi_t - \pi_{t-1}$ has passed the ADF test.

Before applying the ARCH model, the form of the mean equation should be determined by the autocorrelation and partial autocorrelation coefficients. Based on the partial autocorrelation coefficients of sequences lagged 10 orders of $D\pi_t$, we know a model of the AR (4) could be established by sequence $D\pi_t$:

$$D\pi_t = -0.385680D\pi_{t-1} - 0.458065D\pi_{t-2} - 0.304475D\pi_{t-3} + 0.422344D\pi_{t-4} + \varepsilon_t$$

Then GARCH (1, 1) model was used to estimate the sequence $D\pi_t$. In the result, all the indexes are significant. Through the model, σ_t^2 , the conditional variances sequence is obtained as a proxy for inflation uncertainty. So the relationship between inflation rate and uncertainty is generally positive correlated with a lag. It shows that a comparatively high inflation rate will give people a strong signal that the uncertainty is also relatively high, and the expectation of uncertainty, in turn, will have an effect on people's decisions. Inflation, monetary policy and economic growth would be affected too.

3.2 Policy Effect Analysis

Conditional variance (σ_t^2) is used as an indicator of inflation uncertainty in order to do the later research. Before getting the impulse response function, VAR model estimation is required first of all. The three variances, σ_t^2 (the uncertainty index of CPI), gdp_sa_v (quarterly growth rate of GDP), and $m2_v$ (the growth rate of M2), constitute the VAR model. This can be explained as follows in terms of matrix:

$$\begin{bmatrix} \sigma_t^2 \\ gdp_sa_v \\ m2_v \end{bmatrix}_t = \begin{bmatrix} 1.31E-05 \\ 0.003249 \\ 0.038859 \end{bmatrix} + \begin{bmatrix} 0.583153 & -1.65E-05 & -0.000172 \\ -43.6731 & 0.377418 & 0.325861 \\ 68.9393 & -0.1738 & 0.089068 \end{bmatrix} \begin{bmatrix} \sigma_t^2 \\ gdp_sa_v \\ m2_v \end{bmatrix}_{t-1} \\ + \begin{bmatrix} 0.2421 & 0.000536 & -0.000222 \\ -15.9227 & 0.223985 & 0.042264 \\ 56.0565 & -0.036601 & -0.119607 \end{bmatrix} \begin{bmatrix} \sigma_t^2 \\ gdp_sa_v \\ m2_v \end{bmatrix}_{t-2}$$

The model fitting degree is relatively high and the inflation uncertainty has significant influence on GDP growth, that is to say, the instability of the price level hinders the economic growth significantly. In order to further analyze the growth of money supply and endogenous influence of price volatility and economic growth, impulse response analysis is applied for the VAR model. It can be indicated that the uncertainty index of CPI, quarterly growth rate of GDP and the growth rate of M2 adjust promptly to its own shocks and these variables decrease slowly.

The uncertainty index of CPI causes negative shock to the growth rate of GDP and decreases to 0 phase by phase, which means that the uncertainty of CPI will cause transaction costs for manufacturers and workers when they are going to sign a contract. As manufacturers and workers acknowledge the uncertainty of CPI, the negative impact will decrease gradually. The uncertainty of CPI's growth first increases M2, then decreases it: The growth rate of M2 forms an adjustment mechanism to increases, as the uncertainty are acknowledged by the laborer, impact on growth rate of M2 disappears. It can be concluded that the uncertainty of CPI has no effect on broad money growth in the long run, but has a negative impact in the short run, which shows that aggressive monetary policy is effective in the short run, but not in the long run.

Next is the discussion of how the quarterly growth rate of GDP affects the CPI uncertainty and broad money M2. The shock of GDP growth rate has no current influence on the CPI uncertainty. This influence appears in the next quarter and gradually rises, and peaks after 1 year, then gradually decreases. The influence on broad money M2 caused by the quarterly GDP growth rate is more complex. From the graph, it can be seen that the quarterly GDP growth rates gives M2 a negative shock in next quarter then it disappears in next year. However, this shock reverts to be weakly positive, then declines to 0 at last. This shows that there is a feedback regulation mechanism for the quarterly GDP growth rate to broad money. Monetary authorities consciously adjust money supply to control the excessive growth of GDP [6].

Finally we will research the impact caused by the shock of M2 on the CPI uncertainty, the quarterly GDP growth rate of the broad money M2. M2 gives a negative shock to the CPI uncertainty; the shock turns out to be positive after one year and declines gradually to zero. This reflects the dependence between the broad money M2 and the CPI uncertainty: consumers begin to expect prices rising since M2 increases. The uncertainty of CPI decreases. The GDP quarterly growth first increases and then decreases with the increase of M2, and peaks in next quarter, suggesting that China's monetary policy is effective in the short term, but the effect will decay in the long term.

4 Conclusion

This article selects data of CPI, money supply and the quarterly GDP, inflation uncertainty is expressed by the conditional heteroscedasticity quantitatively. based on the VAR model and impulse response function, this paper tests the mutual relationships of the inflation uncertainty, money supply and the economic growth and makes policy analysis. From the data analysis of the results, the rapid growth of the money supply has certain impact on inflation, but not significantly. In the process of economic integration and monetization, the relatively-fast growth of M2 will not necessarily lead to serious inflation compared to GDP. In the short term, there is certain relevance between China's output change and the money supply change, which means changes in the money supply, will affect output in the short term. In summary, money is not neutral in the short run. However, in the long term, the change of money supply will not have a permanent effect on output since money is neutral in the long run, which is consistent with international research conclusions.

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Part IV
Others

Tax Informatization Administration for Non-residential Enterprise from the International Perspective

Yijun Li

Abstract Tax informatization administration of non-residential enterprise is an essential work of international tax administration. This study made a deep analysis on the current problems existed. This analysis indicated that consciousness, role of current administration information resources, construction of basic data and construction level difference are the main factors impacting the tax informatization administration of non-residential enterprise. With regards to the reference to the international experience, feasible measures are brought forward on the tax informatization administration for non-residential enterprise.

Keywords Non-residential enterprise • Tax informatization administration • Computer network

1 Introduction

Tax revenue for the non-resident reached 118 billion, increased by 6.3 % (the absolute value is 9 billion) compared to the last year. Under the background of worldwide economic depression and low demand, the tax revenue of non-resident has been increasing continuously. A deep analysis on the current problems existed in the second part in this study. With regards to the reference to the international experience, feasible measures are brought forward on the tax informatization administration of non-residential enterprise in the third part.

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2 Analysis

2.1 Consciousness Needs to Be Deepened Further

Tax officials engaged in non-resident tax administration have not yet recognized that the work of tax informatization construction for non-resident not only include computer network application in the process of non-resident tax administration, but also the deepening concept of modernization tax informationization for non-resident and the optimizing of tax management.

2.2 Role of Current Administration Information Resources Has Not Been Effectively Played

The function of the computer equipment and the computer network still stayed in the low, transferring of tax revenue. The function of the computer equipment and the computer network has not come to the higher level of tax resource supervision, sharing information internally and externally, upgrading of tax collection and administration, collection of tax data, feedback on tax complaint, arrangement of tax files, analysis and prediction of tax revenue [1].

2.3 Construction of Basic Data to Be Strengthened

Tax informatization construction requires a lot of basic data and scientific data analysis method. However the basic data construction in the field of tax is relatively weak, especially in the field of non-resident tax administration. Such as the data of industry profit margins, return on investment, return on revenue, the operation mode of the multinational companies in tax havens, and so on. It makes officers in tax administration can not face up to the challenge from international multinational company.

2.4 Construction Level Difference

Construction level of tax informatization of economy-developed region is higher than the less economy-developed regions. Eastern coast area is higher than central area and western area. Capital city is higher than non-capital city. Within the tax authorities, the diversification of tax information platform and the regional difference of the requirement of tax issues lead to low correlation level of information application system,

3 Experience from Foreign Countries

3.1 Widely Used Withholding Tax System

Withholding tax system is widely used in the tax administration of non-residence. Under this system, the country of the United States, Australia, Britain, Japan, Canada, Belgium, Italy, the Netherlands, New Zealand, Norway, Sweden and other countries in the non-resident withheld by source existing in the tax management system, and it is worthwhile for us to refer to. Under the withholding tax system source withhold system, the expatriated income such as interest, dividend, property transfer, service income and other income generated within the country is paid to abroad, withhold tax has to be imposed before it is expatriated aboard. It is a very effective way of tax administration for non-resident enterprise [2].

3.2 Advanced Management Method

Since 1960s a unified computer network was established connecting all the regions of US with two national data processing centers and ten regional service centers and widely used tax collection and administration for non-resident enterprises. All the information about the Tax administration for non-resident enterprises is handled with the unified computer network. The procedure is as followed: first, all the data related to tax administration for non-resident enterprises are put into the computer by scanning machine or manually. Then, make an analysis of the relevant data by the database system. After that, have an automatic detect of the error in tax declaration data. Finally, the system automatically generated a written notice to non-resident enterprises to declare again. In addition to information management, tax matters such as tax registration, tax returns, tax collection, tax source monitoring, tax audit, data analysis, tax audit are also handled with computer network. It not only greatly improves the of the tax source monitoring management quality and management efficiency for tax source supervision for non-resident enterprise, but also brings convenience for taxpayers and achieved good social benefits.

3.3 Close Collaboration with Other Organizations

As long as tax authorities have a close collaboration with other organizations and share information can the information data system be established. IRS established advanced tax information system in data processing center. Other than that, in US the law specified the liability of providing information on tax administration of other organization to ensure the improvement of tax administration for non-resident enterprises. When bank issue the list of interest for the customers, it will send a copy of the list to IRS for files as well. Since most of the transactions are through

the bank transfer, IRS can have an effective supervision of the tax source. As we can see, effective supervision of the tax source benefits from the corporation from other departments and the scientific, effective and convenient information system as well [3].

3.4 Stress Construction of Database

Tax administration for non-resident enterprise is a highly technical and professional work. What the tax officials face up with are not ordinary taxpayers but professional accountants, certified public accountants, lawyers and tax agent with specially trained. Therefore database with complete lax law and transaction record is in great need for the tax administration for non-resident enterprise. IRS attaches great importance to the construction of database. IRS invests a lot of manpower, financial resources and material resources on the construction of database. Macro-economic data, micro-economic data, industrial data, profit rate of various products and services annul data for outbound direct investment of US enterprises and individuals, operation model and capital turnover model, solid database construction and research make IRS officials are well prepared when facing up to the CPA from international company. And they are powerful in non-resident tax administration for non-resident enterprise.

4 Conclusions

4.1 Enhance Consciousness of Tax Informationization Management for Tax Administration for Non-resident Enterprise

Tax officials in the collection and administration department for non-resident enterprise should closely rely on high-tech technology such as computer and computer network for tax professional administration for a non-resident enterprise. Improve and deepen the understanding of tax informationization management for tax administration for non-resident enterprise in tax practice. Make them know that tax informationization management is the requirement of tax specialized management. It is essential component of e-government as well. Meanwhile, it is also the showcase of the practice of “three representatives” and concept of scientific development. Let them know that tax informatization construction not only refers to extensive and intensive application of the high technology such as computer and computer network in tax administration for non-president enterprise. It is also the improvement of the contentiousness of tax informatization and the process optimism of tax administration for non-president enterprise and tax administration resource relocation.

4.2 Establish Scientific Withholding System

First, conscientiously implement the filing system of the non-resident enterprise within the jurisdiction. Second, implement the withholding obligations with the overseas payment organization and timely feedback relevant information to the competent tax authorities. Finally, in order to arouse the enthusiasm of withholding units, tax officials should carry out the specifications of the tax laws and pay commissions to the withholding agent according to the withholding tax law and specifications.

4.3 Realize Deep integration of Informationization Method and of Tax Management Non-resident Enterprise

Improve the informationization level in the construction of informatization by referring to the experience of US. Take the tax administration activity for non-president enterprise into the informatization management and realize the deep integration of informatization method and tax informatization management. Tax administration activities such as files record, tax collection, tax certificate printing, tax planning, tax complain feedback and tax analysis, information sharing, data collection, tax source supervision are handled with computers and computer network system.

4.4 Strengthen Tax Informationization Construction

Under the unified leadership of the State Administration of Taxation, informatization level between different regions should be moderately balanced. Configuration of hardware equipment, development of software and construction of computer network should be carried out under the overall planning of the State Administration of Taxation. Different links of tax administration such as tax registration, tax collection, tax source supervision, income tax analysis, revenue analysis and prediction, evaluation, implementation of tax treaty between different countries and liquidation of tax collection should also be taken into automatic supervision of the computer. Training and extension of the application of the information technology should also be under the regulation of the State Administration of Taxation. At the same time, the activity of the tax authority gets strong support from the local government agencies of various levels. Under the model of tax administration with computer as the strong support, reinforce tax authority's ties with administration bureau of foreign experts affairs, education bureau, public security bureau, sectors, industry and commerce bureau, technical supervision bureau, property management bureau and hold regular meeting with these

departments for the construction information network. Realize the information sharing, information exchange and information communication with different internal tax agencies and external organizations. Provide information with high quality with the assistance and support for the tax administration for non-residential enterprises.

4.5 Strengthening Construction of Tax Database

Wang Li, deputy director of the State Administration of Taxation indicated that, the construction and research of database is very important for strengthening tax administration for non-resident enterprise and enhancing the quality and efficiency of the tax administration for non-resident enterprise. According to the statistics, profit after tax, interest, royalties, labor remuneration, commission fees remitted to foreign countries by multinational companies every year reached ¥100 billion yuan and the tax loss from it reached ¥40 billion yuan. At present database of the foreign countries is still used in tax administration for non-resident enterprise. There is still long way to go for the construction and research of the database for tax administration for non-resident enterprise in China.

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Analysis and Suggestions of Tax Policy About Chinese Automobile Consumption

Jing Xue and Meiqing Zhang

Abstract At present, with the rapid development of auto industry in China, auto consumption not only becomes the driving force to economic growth, but also brings the externalities that can not be ignored. Traffic congestion, environmental pollution, energy consumption, crash cost and other problems are becoming increasingly prominent. In this paper, through the analysis of the problems about tax policies of auto consumption and the current tax policies in China, it is found out that current tax policies of automobile consumption are not sustainable. Countermeasures and suggestions for automobile consumption tax policies are put forward.

Keywords Automobile consumption • Policy of automobile consumption • Tax policy

1 Introduction

The tax policies of automobile consumption refer to the policies which are imposed by government to regulate the automobile consumption by tax measures during three phases, namely automobile purchasing, keeping and using. Influence of these policies on the automobile consumption cannot be ignored. From the international perspective, these policies drew wide attention from the developed countries. Because the auto industry not only has great advantages for driving the development of relevant industries, but also is a strong impetus for speeding up the economic growth and stimulating domestic demand, tax policies of automobile consumption in our country have insisted on the orientation of incentivizing consumption. During this period, Liu Ji, Li Lei [1] and Zhan Zhenghua [2] believe that, with increasing proportion of private car, the influence of the policies of automobile consumption that is one of the main factors is growing and there is no doubt that taxes on purchasing and using private cars are heavy in China. However, as automobile consumption rapidly increases, plenty of problems emerge out, such as urban traffic congestion, environmental pollution, energy consumption and so

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on. At present, some of scholars, such as Xu Wei, argue that government should stick to previous policies [3]. On the contrary, other scholars, such as Yang Zhiyun, believe that our country should pay enough attention to the enormous social costs brought by the rapid growth of the automobile consumption [4]. So far, academia has not come to the conclusions to solve the conflict. In this paper, characteristics and problems of tax policies of automobile consumption in China are found out. Then whether current tax policies of automobile consumption are sustainable is identified. Suggestions are put forward in the end.

2 Changes of Tax Policies of Automobile Consumption in China

Automobile Industrial Policy was introduced by Chinese government in 1994 which pointed out that the state encouraged individuals to buy cars. However the practical conditions of policy implementation are negative. Furthermore, there existed some policies which were inter-constraint and in conflict with each other. Auto market in China before 2003 has been called Starting without Moving by most scholars. Scholars believed that the main reason of Starting without Moving was tax policies of automobile consumption. See Table 1.

In 2004, NDRC in our country promulgated Automobile Industrial Development Policy which created good consumption environment for privately purchasing and using cars, and Automobile Industrial Policy was suspended at the same time. Since then, China has issued Administrative Rules Governing the Auto, Defective Vehicle Recall Control Regulation, Administration of Automotive Loans Procedures and other relevant supporting documents. All of these formed a new policy system.

In 2006 April and 2008 September, Chinese government increased the rate of consumption tax on high-emission vehicles and reduced the rate of consumption tax on low-emission vehicles. China formally began to levy tax on fuel on January 1st 2009 and stipulated to improve unit tax amount of consuming tax levied on gasoline, diesel oil, and other refined oil. In 2009, China issued continuously Auto Industry Restructuring and Revitalization Plan and other corresponding policies in which taxes breaks were clearly put forward to promote fuel-efficient cars and new energy vehicles. In 2010, the rate of vehicle purchasing tax rose from 5 to 7.5 % which was suspended and up to 10 % on January 1st 2011. Positive policies made a significant achievement. See Fig. 1.

3 Current Tax Policies of Automobile Consumption

Current tax policies of auto consumption are levied on three phases and have following characteristics. See Table 2.

Table 1 Overview about Chinese taxes of automobile in the stage of starting without moving

Purchasing phase	Value-added tax	17 %	National tax
	Consumption tax	3–8 %	National tax
	Purchase tax	10 %	Transportation fee
Keeping phase	Vehicle and vessel use tax	3 %	Local tax
	Road toll	20 %	Transportation fee
Using phase	Gasoline consuming tax	2 %	National tax
	Diesel consuming tax	2 %	National tax

Data source: Zhong [5]

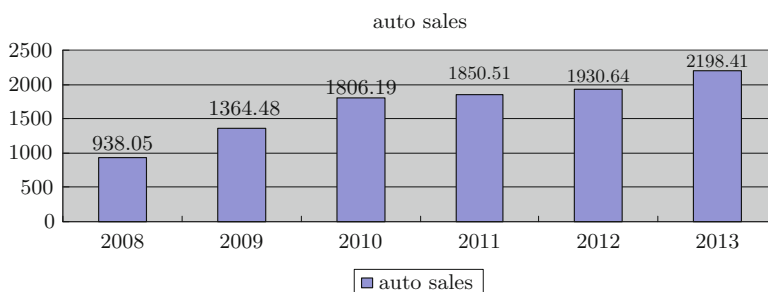


Fig. 1 Change of Chinese auto sales yearly in 2008–2013 (ten thousand) (Data sources: Information conference of Chinese Association of Automobile Manufacturers)

Table 2 Current tax types of auto consumption in china

Purchasing phase	Keeping phase	Using phase
Goods and services tax and additional, including: value-added tax (17 %), consumption tax (1–40 %), city maintenance and construction tax and educational expenses, tariff	Vehicle and vessel use tax	Fuel tax
Purchase tax		

Data sources: Information conference of Chinese Association of Automobile Manufacturers

3.1 Incentivize Purchasing and Using Cars at the Same Time

Targets of current tax policies of automobile consumption in China include stimulating short-term car consumption, domestic demand and economic growth. They not only incentivize car purchasing but also using. Based on the effect of implementation of past policies, they are not sustainable.

3.2 *Unreasonable Structure*

High tax on automobile purchasing leads to atrophy of the automobile consumption; high fuel tax restrains using of automobile and reduces using frequency. Taxes levied on phases of purchasing account for a rather small proportion even no proportion in the whole taxes of automobile consumption in some developed countries. Taxes levied on phase of purchasing account for about 30 % of the new energy tax of automobile consumption, taxes on phase of keeping and using automobile account for 70 % in developed countries. Rate of fuel tax in Germany, Britain and France is as high as 260 %, 240 % and 260 % respectively. However, taxes on stage of purchasing, on stage of keeping and on phase of using car account for 66 %, 13 % and 21 % respectively of current taxes of automobile consumption and current rate of fuel tax is only about 20 % in China [6].

3.3 *Indistinctive Discrimination*

Difference between tax rates imposed on automobiles with different USES and different kinds of energy in China is not obvious. Hence, new-energy vehicles are not attractive enough for consumers and the control to the general cars is not enough. At the same time, policies of new-energy vehicle in China only encourage people to use new-energy cars without mandatory promotion.

4 Countermeasures and Suggestions

4.1 *Incentivize Purchasing and Limit Driving at the Same Time*

Incentivizing the purchase is mainly about new-energy cars or energy-saving cars, which is divided into direct and indirect encouragement.

Directly Incentivize Purchasing Cut the rate of registration tax of buying a new vehicle, especially for low-emission vehicles and environmental friendly new-energy vehicles. Reduce the tax of purchase vehicles especially environmental friendly vehicles to stimulate domestic consumption of low-income people. Meanwhile, policy maker should guide consumers to buy energy-saving cars to reduce the external costs.

Indirectly Incentivize Purchasing Promote technology innovation and reform of new-energy vehicles fundamentally so as to continuously reduce the cost of new-energy vehicles and improve the performance of new-energy vehicles. Distorting tax and energy price are not supposed to change the cost of one car to

attract consumers. To stimulate the development of auto industry, policy support to the business which invests in the development of new-energy vehicles is necessary, such as tax incentives and tax breaks or exemptions and so on.

Restrict Using Cars Improve the rate of fuel tax and implement the fuel tax system to guide the users to consciously reduce energy consumption of vehicles and using frequency. High fuel tax will also cut unnecessary travel by car.

4.2 Optimize the Automobile Consumption Tax Structure

Reduce the tax rate of automobile purchasing and keeping, which will reduce the proportion of vehicle purchase tax in total tax, while increase the rate of tax in the phase of automobile using, especially fuel tax. According to the cars with different purposes, different energy sources used and technologies, tax rate should be developed differently in order to form different level obviously.

4.3 Discriminatory Taxation

Based on different emissions, purposes and types of energy used, set differentiated tax rates to clear the rate gradient. Discriminatory taxation should be taken not only in the purchasing phase but also in the using phase. What's more, offer tax breaks and convenience for development of new-energy vehicles in the using phase.

5 Conclusions

To sum up, there exist three major problems about tax policies of automobile consumption in China. These problems not only affect the social justice and allocation of resources in our country, also bring external costs that can not be ignored. The past policies are not sustainable. To drive the domestic demand and maintain the industrial development, China should not pursue one-sided growth of automobile consumption. Detailed tax policy of automobile consumption, differential treatment and optimizing the structure should be put into practice.

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China's OFDI Industry Layout Adjustment from the Perspective of Industrial Structure Optimization

Ying Wang, Qi Liu, and Xianglian Zhao

Abstract Combined with the targets of China's industrial structure upgrade, an index system for measuring the comprehensive level of industrial structure optimization is built up, and the comprehensive level is then calculated using improved entropy method. On this basis, the grey relative incidence model is constructed to analyze the correlation between China's OFDI industry layout and its industrial structure optimization from 2008 to 2012. Finally and accordingly, countermeasures are put forward to adjust China's OFDI industry layout under the goal of its industrial structure optimization.

Keywords OFDI industry layout • Industrial structure optimization • Grey relative incidence model • Improved entropy method

1 Introduction

Under the “bringing in and going global” strategy, Chinese outward foreign direct investment (OFDI) has speedily risen since “Eleven Five”. Especially after the Financial Crisis in 2008, when OFDI in the whole world and developed countries subsided, China's outward foreign direct investment is still growing. In 2012, Chinese OFDI flow hit a record of \$87.8, increasing 17.6 % annually to become the world's third largest outward investor. The raising of OFDI flow and China's position in the world's OFDI are indeed important but it is even more important for Chinese OFDI to bring positive consequences to its economic development, especially the industrial structure optimization, which is the focus of our study.

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2 Literature Review

Foreign scholars researched on OFDI industry layout and investing country's industrial structure optimization quite early. The impacts of OFDI industry layout on industrial structure optimization were analyzed both theoretically and empirically.

Although Chinese scholars researched on OFDI later but they have realized that Chinese OFDI is a kind of non-capital-surplus investment, which is different from the developed countries. Since China does not possess the advantage or pre-conditions of industrial structure supererogation, it is necessary to boost the industrial structure upgrade through OFDI [1], or to carry out outward investment under the target of industrial structure upgrade [2]. They analyzed the mechanisms of OFDI promoting China's industrial structure optimization and pointed out the priority areas of OFDI industry selection [3]. With the continuous development of Chinese OFDI, Chinese scholars have also begun to empirically analyze the effect of OFDI on industrial structure optimization, but most researches started from the perspective of total OFDI [4], while the researches carried out from the perspective of OFDI industry layout are limited [5]. Also, they tested the effects according to the data before 2008; the role of Chinese OFDI industry layout after the financial crisis has not been fully discussed.

In this paper, we will select the indicators of industrial structure optimization according to the special target of China's industrial structure adjustment, so as to build a comprehensive evaluation index system, then make use of data of OFDI by industries from 2008 to 2012 to analyze the impact of OFDI industry layout on its industrial structure optimization, and get suggestions accordingly. This analysis may be more targeted and practically significant.

3 Models

Since we want to analyze the effects after financial crisis, the limited amount of data might not be supportive for using typical mathematical methods which is based on statistical analysis of large samples but appropriate for using grey system theory.

Grey incidence analysis is an important content of grey system theory, in which the fundamental idea is that the closeness of a relation is judged based on similarity level of the geometrical patterns of sequence curves. The more similar the curves are, the larger degree of incidence between sequences; the smaller the contrary [6]. The key to grey incidence analysis is the calculation of incidence degree. Since the sequences have different dimensions, grey relative incidence model is more appropriated to be constructed here. The calculating steps are as follows:

Step 1: Establish original data sequences, including reference sequence and comparison sequences.

Set V_0 as reference sequence, its observation datum in the time order k is $v_0(k), k = 1, 2, \dots, m$, which is described by the comprehensive evaluation level of industrial structure optimization, then $V_0 = (v_0(1), v_0(2), \dots, v_0(m))$.

Set V_j as comparison sequences, their observation data in the time order k is $v_j(k), k = 1, 2, \dots, m$, which are described by OFDI value in each industry, then $V_j = (v_j(1), v_j(2), \dots, v_j(m)), j = 1, 2, \dots, n$.

Step 2: Calculate initial images of the original data.

$$\begin{aligned} V'_0 &= (y'_0(1), y'_0(2), \dots, y'_0(m)) = \left(\frac{v_0(1)}{v_0(1)}, \frac{v_0(2)}{v_0(1)}, \dots, \frac{v_0(m)}{v_0(1)} \right) \\ V'_j &= (y'_j(1), y'_j(2), \dots, y'_j(m)) = \left(\frac{v_j(1)}{v_j(1)}, \frac{v_j(2)}{v_j(1)}, \dots, \frac{v_j(m)}{v_j(1)} \right) \end{aligned} \tag{1}$$

Step 3: Calculate zero images from the starting points of sequences V'_0 and V'_j .

$$\begin{aligned} Z_0 &= (z_0(1), z_0(2), \dots, z_0(m)) = (y'_0(1) - y'_0(1), y'_0(2) - y'_0(1), \dots, y'_0(m) - y'_0(1)) \\ Z_j &= (z_j(1), z_j(2), \dots, z_j(m)) = (y'_j(1) - y'_j(1), y'_j(2) - y'_j(1), \dots, y'_j(m) - y'_j(1)) \end{aligned} \tag{2}$$

Step 4: Calculate the grey relative incidence degree ϵ_{0j} .

$$\begin{aligned} \epsilon_{0j} &= \frac{1 + |s_0| + |s_j|}{1 + |s_0| + |s_j| + |s_j - s_0|}, \text{ where } |s_0| = \left| \sum_{k=2}^{m-1} z_0(k) + \frac{1}{2}z_0(m) \right|, |s_j| \\ &= \left| \sum_{k=2}^{m-1} z_j(k) + \frac{1}{2}z_j(m) \right|, \\ |s_j - s_0| &= \left| \sum_{k=2}^{m-1} (z_j(k) - z_0(k)) + \frac{1}{2}(z_j(m) - z_0(m)) \right|, j = 1, \dots, n \end{aligned} \tag{3}$$

According to the grey relative incidence degree, we can get the grey incidence order, then determine the extent of OFDI role in different industries on China's industrial structure optimization.

4 Empirical Analysis

4.1 OFDI Data Declaration

OFDI data in different industries can be taken from “Statistical Bulletin of China’s Outward Foreign Direct Investment”. According to [7], OFDI stock holds a more important role for long-term industrial structure upgrade, therefore, OFDI stock is selected in this paper rather than OFDI flow. From the OFDI stock data from 2008 to 2012, we found that Chinese OFDI is widely distributed in each industry, but is clearly concentrated in five industries, i.e. leasing and business services, mining, wholesale and retail trade, manufacturing, transport, storage and post. In 2012, these five industries’ OFDI stocks were \$308.261 billion, accounting for 87.70 % of Chinese total non-financial OFDI stock. Therefore, we only research on the OFDI of these five industries mentioned above; all data are derived from annual “Statistical Bulletin of China’s Outward Foreign Direct Investment”.

4.2 Calculating Industrial Structure Optimization Level

Industrial structure optimization contains deep connotations [8], therefore it can be measured using different indicators. Since high-tech industry and services are the focus of China’s industrial development, also the targets of China’s industrial structure optimization, therefore, setting the high-tech industry and services development as evaluation criteria, output value structure, employment structure, trade structure and efficiency structure are used to establish China’s industrial structure optimization evaluation system (Fig. 1).

Improved entropy method is applied here to calculate the comprehensive level of industrial structure optimization. Suppose the raw data matrix of evaluation is

$$X = (x_{ij})_{m \times n}, \text{ then the formula for comprehensive level is } z_i = \sum_{j=1}^n z_{ij} \times w_j.$$

Where $z_{ij} = x'_{ij} + d, x'_{ij} = (x_{ij} - \bar{x}_j) / s_j, d = -\text{int}(\min(x'_{ij}))$, $w_j = d_j / \sum_{j=1}^n d_j$,

$$d_j = 1 - e_j, e_j = -\frac{1}{\ln m} \sum_{i=1}^m p_{ij} \ln p_{ij}, p_{ij} = z_{ij} / \sum_{i=1}^m z_{ij}.$$

With the original data from Chinese High-tech Industry Statistical Yearbook and China Statistical Yearbook and the formula above, we can calculate the comprehensive level of the industrial structure optimization in each year, which is served as the reference sequence V_0 in the grey relative incidence model.

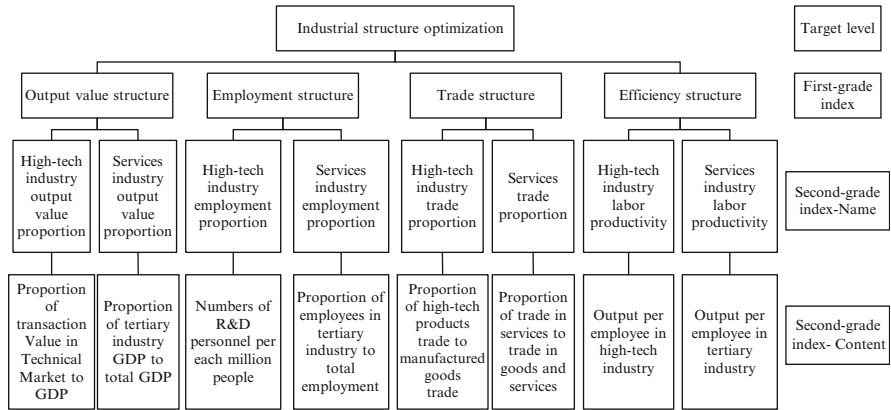


Fig. 1 Industrial structure optimization evaluation system

Table 1 Grey relative incidence degree and order

Industry	Leasing and business services	Mining	Wholesale and retail trade	Manufacturing	Transport, storage and post
Grey incidence degree	0.9963	0.9125	0.7735	0.9715	0.7984
Grey incidence order	1	3	5	2	4

4.3 Figuring Out Grey Relative Incidence Degree

Setting comprehensive level of industrial structure optimization as reference sequence V_0 , each industry's OFDI stocks comparison sequence $V_j, j = 1, 2, \dots, 5$, and applying formulas (1), (2) and (3), the grey relative incidence degree between OFDI industry layout and industrial structure optimization from 2008 to 2012 is then calculated, which is shown in Table 1.

5 Conclusions

According to Table 1, three conclusions could be acquired as to the effects of China's OFDI industry layout on its industrial structure optimization.

First, market-seeking OFDI in manufacturing and business service industries is the main force in promoting industrial structure optimization, since on one hand it can help to shift the resources from marginal industries to competitively

advantageous industries, on the other hand bypass the trade barriers which results in export scale and structure effect, thereby plays a catalytic role in industrial structure optimization.

Second, resource-acquiring OFDI in mining industry is important for industrial structure optimization, since it can obtain a stable supply of critical resources which is helpful to eliminate resource bottlenecks of China's industrial structure adjustment.

Third, the role of OFDI in traditional service industries should be improved, since investments in such industries are focused more on the purpose of profit.

Therefore, making use of external markets and resources is the key for Chinese OFDI layout. Firstly, China needs to promote OFDI in marginal industries continuously so as to cultivate the role of market-seeking OFDI to the max. Secondly, China should consolidate OFDI in mining industry to achieve key resources for industry restructuring. Finally, China should elevate the level and quality of its OFDI, especially improving the level of OFDI in services, increasing OFDI in technology-intensive and knowledge-intensive services.

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An Analytical Framework for China's Cultural Industrial Security

Haitao Gao, Yi Liu, and Xiao Li

Abstract Currently the development of cultural industry is in full swing, but the security issue is not taken seriously. The cultural industry security is related to both national economic security and national cultural security. Based on the definition of China's cultural industry and China's cultural industry security, the article proposed an analytical framework on China's cultural industry security from property right perspective.

Keywords Cultural security • Cultural industrial security • Property right

1 Introduction

Economic globalization has not only a profound impact on the world's economy, but also on the change of world's cultural order. As a direct consequence of economic globalization, "cultural globalization" becomes a new form of capital plunder, which threatens the survival and development of the cultural industry of other ethnic nation. Due to historical and practical reasons, the development of China's cultural industry has lagged behind; its industrial patterns, industrial structure, industrial organization and industrial policy have not yet fully developed its infinite richness.

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As the cultural industry has both economic and ideological attributes, cultural industrial security is different with cultural security and industrial security on the general sense. Actually, it is a kind of industrial security based on cultural security [1]. In this paper, we proposed an analytical framework for China's industrial security based on property right, which is a new perspective on the current industrial security research and can be extended to the research of other industrial security. Our research has built a basis for analyzing China's cultural industrial security.

2 China's Cultural Industrial Security from the Perspective of Property Rights

The security of China's cultural industry not only relates to China's cultural sovereignty, but also relates to China's economic sovereignty. Therefore, we believe that the cultural industrial security should be summarized in two aspects, on one hand, the growth of cultural industry market and the improvement of cultural market structure are not eroded, controlled, or blockaded by the external factors and are not limited or influenced by internal factors to keep a stable, balanced and sustainable development in an open economy. On the other hand, a country's cultural industry can provide colorful and adaptive original content in the international competition, and resist the impact of foreign cultural value and ideology, thereby maintaining its independence of leading public opinion orientation to maintain the legitimacy and stability of national mainstream ideology and value. The former can be called economic security of cultural industry; the later can be called economic security of culture industry.

There are three perspectives in the study of security issues: the view of state, the view of ability and the view of interest [2]. Although there are disagreements over the definition of national security, the academic circle has reached a consensus that security is closely connected with the damage of state interest, actual or potential. The issue of property rights is an old topic in economics. There are two basic functions of property right generally: one is dominant right, the other is earnings rights ([3], p. 68). Though great effort has been paid on property rights research, there are limitations in currently research, such as narrow scope, paying more attention on microscopic property rights, while ignoring the broader scope of property rights [4–7]. Wang Cheng [8] first proposed the idea of a generalized property which should be broadly understood, any kind of resource which people rely on can called a property. Chang proposed theory of generalized property rights, which is a system property rights with the value form [9, 10], the carrier of rights can be built both on the possession of tangible assets and intangible assets [11]. The essence of which is that the subject of property right owned independently all the property rights so that he or others can benefit from the angle of value. For the production of cultural products, its production factors include the value of

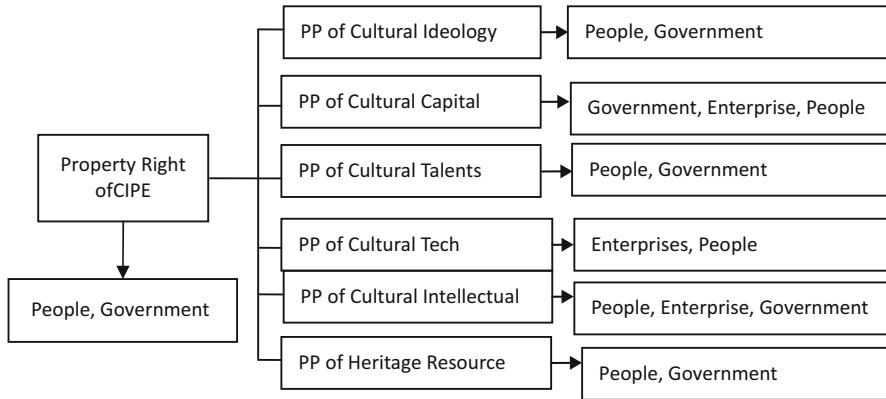


Fig. 1 Composition of cultural industrial production elements (CIPE)

cultural products, cultural resources, cultural capital, cultural technology, cultural knowledge and cultural heritage resources, these production factors have their own subjects, see Fig. 1.

3 The Dimension of Cultural Industrial Security

As to the property right, we agree with the view of “ownership” in “Oxford Law Dictionary”. Property rights, also known as property ownership rights, are the completely right existed in or on any object. As to the classification of property rights, we followed the view generally accepted and classified cultural industry security as: elements of cultural production possession right security, elements of cultural production operation right security, elements of cultural production disposition right security, and elements of cultural production proceeds right security. The general merchandise usually only consider economic benefit, while the cultural merchandise concerns both social benefit and economic benefit, and the social benefit is more important than economic benefit. See Fig. 2.

3.1 *The Possession Right Security of Cultural Industry Production Elements*

The possession right of the production Cultural industry production elements is that a sovereign state has exclusive right on the cultural resource built on its sovereign territory. These resources have economic value; they can produce economic benefits on the market, therefore people have the possession right of these

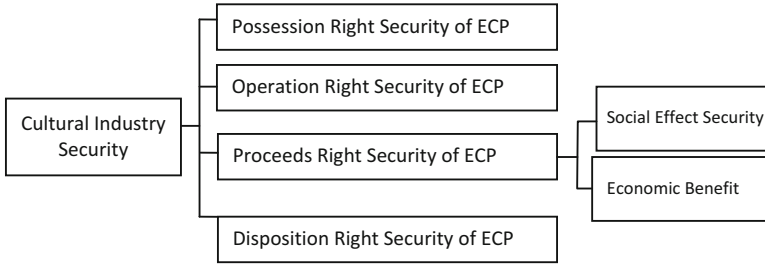


Fig. 2 Content of cultural industrial security

production elements legally and factually. Without the approval and the consent of the people, other countries and their enterprises cannot occupy these resources legally and actually.

3.2 The Use Right Security of Cultural Industrial Production Elements

The use right of cultural industry production elements is that a country nationals and the government authorize the operation right of cultural resources to enterprises, with whom they have contractual relationship, by formulating a series of rule on the premise of possession right. In the domestic market the government established regulations and norms to regulate and adjust the market structure. The enterprises can enter, operate and exit on the basis of these regulations and norms. In the international competitive environment, the enterprises of other countries can get the operation right in host country's culture market by getting the entrance permission of host country and follow strict compliance with the rules of the host country's cultural market.

3.3 The Disposition Right Security of Cultural Industrial Production Elements

The disposition right is the core of property rights, and it is basic right of property owners. The disposition right refers that the people and government have the final say to their cultural industry production elements within the limits of law. After joining the WTO, China has allowed foreign investors to enter the field of culture with strictly limitation in the operation field, the most important thing in which are foreign investors cannot enter the core content areas of China's cultural industry, cannot undermine the rights of content censor, and cannot influence China's dominance in the important field of culture.

3.4 *The Proceeds Right Security of Cultural Production Elements*

The proceeds right is the implementation form of possession right in economy. In a market economy, the subjects of all elements have the rights to participate distribution according to their respective contribution. The government obtains its budget income by establishing industrial market system, constructing industrial market, and managing the operation of market in the form of national taxes, customs duties etc. As for the cultural industry, its revenue not just shows on economic benefits, but also on performance of social benefits. It was pointed out in the report of the 18th national congress of the communist party that cultural industry should give primacy to the social effects, and combine the social effects with the economic benefits. Economic benefit is reflected in the economic indicators and statistics, while social effect is reflected mainly in the public and social evaluation system.

4 Conclusion

As China has a unique national condition, the security of China's cultural industry is different from the security of other economic industries. Thus we proposed a new model based on generalized property rights theory, analyzing the security of China's cultural industry from possession right security, use right security, disposition right security and proceeds right security. In the future, we can develop indexes to evaluate the security condition of China's cultural Industry on the whole and each subsector separately, establish an early warning system for China's cultural Industry.

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Research of Education and Training of Chinese Domestic Service Personnel

Mingxiu Cao

Abstract In 2012, for the first time domestic specialty entered undergraduate colleges and universities as a new directory, which indicates that home economics profession in our country has entered a formalized development track. Actively developing home economics profession is to adapt to the special needs of domestic service personnel inevitable requirement. Author analyses abroad Home Economics Education, from multiple dimensions of training objectives, curriculum, teaching staff and improve job skills assessment system, improve our basic ideas and specific suggestions to promote the development of domestic service personnel training.

Keywords Home economics education system • Teachers construction • Financial subsidy • Evaluation index system of education

1 Introduction

In recent years, China's higher education began to open up family service programs. Comprehensive universities have opened household management, housekeeping and community services, home banking, domestic service, foreign domestic, and other majors and family ethics, early childhood education, nutrition, health, family relationships, adaptation, cooking and other apparel as well as short-term training implementation of academic certificates and certificates of technology combined to pave the way for student employment.

But to some extent, there still are many pressing problems [1], such as blindness large professional setting, professional name highly irregular, non-vocational training objectives characteristics, course structure and curriculum unreasonable,

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improper selection and inadequate teaching materials development, home economics curriculum is blank basic theory, these problems seriously hampered the domestic professional development of vocational colleges.

2 Home Economics Education of Typical Countries

2.1 Home Economics Education History in the United States

In the United States, the implementations of home economics education are mainly in two ways: formal and non-formal education. Formal education is from pre-school, primary, secondary, technical and community colleges, until college, university, graduate and doctoral education formed the “development ladder.” For example: The purpose of the U.S. junior home economics course is to introduce students to the field of home economics education for future homemakers, job work or further education lay the foundation and the period of the course focuses on primary household cooking, food preservation and sewing; while domestic side rather academic courses for adults focus is on home decor, furniture selection or children maintenance.

U.S. domestic service-oriented education and training system has been formed a mature, standardized curriculum and management system, more than half of the university has the Department of Home Economics, and some also granted master and doctorate; the number of students who participate in home economics education programs of vocational education is about 25 % of the total number of registered courses [2]. U.S. government supports for domestic service training, mainly in the legislative, financial and administrative aspects. According to the Federal Parliament on strengthening vocational education in 1917, “Smith Hughes Act,” federal government provides annual funding support to set up domestic vocational education school under the college degree, the federal government is also working with the states, offering teacher training in subjects such as home economics, funding for this type of teacher training educational institutions. The relevant Vocational Education Act passed after the 1960s, also put forward a new concept: vocational education should not only meet the needs of the community, but also to adapt to changes in society, in order to promote personal development goals.

American Home Economics curriculum in college stage involves theory and practical application. Some research focuses on consumer food and nutrition, and some focus on family life and art. These programs involve the natural sciences, social and behavioral sciences, arts and humanities disciplines. The courses are mainly completed through classroom, seminars and laboratory study. The objects of the courses are adult students who have completed high school education and the ones who have the appropriate work experience and have the ability to master the learning content. The ones who completed the course and passed the examination

would be granted BA, BS or equivalent proof. Non-formal education is through evening classes and a variety of correspondence courses, internships and seminars spot, through a variety of media (such as radio and television, all kinds of educational equipments, books and magazines, correspondence booklet small books, billboards and public education exhibitions) to populate home economics education.

2.2 Home Economics Education in Japan

Home Economics Education is compulsory basic education for boys and girls of ordinary subjects in Japan. High school home economics education courses are from the “home base”, “living technology”, “life in general” three subjects. Home base’s training goal is to run from the family perspective, life technology is from the perspective of rational management of life, and life in general is set by the family members from the management point of healthy living. The overall objective of Japanese home economics education is to enable students to master family life basic knowledge and techniques in all areas, and with understanding the significance of family life, to develop the necessary life skills and proactive attitude towards practice at the same time. All students must select one from these three subjects. Three subjects divide into specific diet, clothing, residence, childcare and technical etc. University education in Japan open home economics course in general, teaching content relates to almost all areas of social, economic, and cultural. Home Economics Education can make known to every family.

2.3 Home Economics Education in Philippines

The modern service industry higher education especially domestic in Philippines is a globally recognized. First of all, home economics education in the Philippines runs through a person’s entire life, almost all universities have a domestic professional, and most domestic students after graduation, also enter into a follow-up training institutions to accept pre-job training before appointment or employment abroad. Secondly, the domestic service staff has a high cultural quality in Philippines. lot of people who engaged in domestic service have college or university diplomas, they generally speak English, so the language is no barrier; they also have good savvy so are easily to communicate with. Thirdly, the home economics education curriculum set in Philippines are covering areas of philosophy of life, home management, family ethics, family education, family health, humanities and arts, food management, production of cooking, handmade crafts, food and bar management etc. Thus, the “Filipino” not only have the highly cultural quality, the professionalism and expertises are also very strong, and therefore most of the practitioners have the correct employment outlook and a good attitude.

3 Housekeeping Personnel Training Policy Recommendations

3.1 Establishing a National Home Economics Education System

Development of home economics education cannot be separated from the support of administrative departments of education, Firstly, China should also put the domestic education compulsory into the compulsory education, start the necessary housekeeping courses at the stage of compulsory education. At the stage of professional vocational education and higher education, home economics education should be set up systematically [3]. On the one hand improve the overall quality of housekeeping staff and management; on the other hand improve the social status of the family services in the public eye. Secondly, domestic workers should receive specialized induction training and be evaluated by examination certificates.

3.2 Establish a System of Home Economics Curriculum Materials

As we all know, the overall quality of China's domestic service personnel is too low, even housekeeping services in people's minds has not become a true professional, Because China has little home economics curriculum materials, and of course it is impossible to offer home economics education courses in compulsory education, vocational education and higher education. It's a drop in the bucket to be compared with nearly 20 million domestic service of occupational demand in China now. Therefore, we must make great efforts to pass legislation, from the education system and financial system to ensure the opening of domestic institutional programs. We should now proceed to study the development of home economics education curriculum goals, develop curriculum materials housekeeping, in addition, to improve the overall quality of our domestic service personnel, is currently not realistic.

3.3 Strengthen the Home Economics Teachers Training

Firstly, promote the establishment of "family services personnel training base" in the university, and guide training base contact with social family services industry and related government employment sector, to train outstanding housekeeping training personnel.

Secondly, construct “double teachers”. “Double Teachers” must not only have a solid theoretical knowledge base, but also have some practical experience and professional ability. Schools should establish a strict “double teachers” certification, evaluation and incentive systems, require only the teachers who have a domestic professional or vocational qualification certificate or front-line experience not less than certain number of years to enter the classroom. Teacher’s introduction needs to pay attention those who are not only related to domestic work background, but also has a vocational qualification certificates.

Thirdly, encourage and guide young professional teachers actively participate in various professional skills training [4], colleges and enterprises carried out jointly research to update their professional knowledge, enhance their research capacity, finally to improve their overall quality.

3.4 Make Good Use of Domestic Service Personnel Training Subsidies

The country should establish special funds from the central finance poverty alleviation and local governments jointly, to add subsidies for personnel training for family services. Family Services employees, mostly from rural areas, and more from relatively poor families in rural areas, should be able to enjoy the relevant national poverty reduction policies, such as “rain training program” that the government introduced in 2004 to improve the poor’s quality by supporting guidance and training elements to enhance their employability and entrepreneurial ability. By 2012, the country has accumulated to invest financial funds to “rain training program” nearly 30 billion Yuan, has trained and transferred more than 300 million poor labors [5], their labor income increase had contributed more than 50 % to the poor per capita income increase. The program also benefited domestic service; various regions took advantage of “rain training program” to train and transfer of a large number of domestic workers into employment.

3.5 Establish a Good Domestic Evaluation Index System of Education

Firstly, in accordance with the domestic service development requirement, improve occupational classification system to speed up drawing up (revising) the national occupational standards. Currently, the country and various regions have some service standards documents, such as the national standard “Community Service Guide Part 8: domestic service” revised in 2006, some of them cannot meet domestic service development needs, and urgent to be amended. National standards should be drew up and revised.

Secondly, explore the identification patterns of family services in line with professional features. Employees are encouraged to participate in vocational skills identification or special ability assessment, which passed the examination, would obtain a certificate of identification and get a one-time subsidy. Thirdly, it is mandatory for family service agencies to insist on training before induction and the service staff must have certificates system. Encourage families to choose the vocational qualification certificate holders or special certificate of professional competence as Family Services employees to provide services.

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Structure and Layout of Economic Industries Adjusting in a Financial Centre

Quanyong Bai

Abstract This issue focused on a deep analysis of a financial center's industrial economics structure and layout via research method of the flows network spatial economy, especially the method of economic scale model, based on the "new economics geography" environment that the financial center is located. It also proposed various structural adjusted solutions in details, applied with the general constraint relation measure, economy driven force, economic scale degree and so on.

Keywords Flows network space • Industrial economics • Structure adjusting

1 Introduction

"Financial Street" is an agglomerating economics center which contains a brand concept of financial industry and financial-related city service function, which is based both on geography location and crucial position in regional economic flows [1] network core nodes. According to statistics, till end of last year, there were 173,000 employees in Financial Street, accounted for 70.1 % of whole financial professionals in the city. Its district-level revenues came up to US\$870 million stranded on an annual average growth of 29.5 %.

Insisting on supporting Financial Street as a local economic development core area, the regional government offers optimal combination of policies guiding and organizational supporting, to form a virtuous cycle supporting chain that the financial sustains science & technology, culture, trade and business service industries, and then these supported industries promote the financial back. This situation will help to guarantee the synergetic and comprehensive development of integrating the whole regional economics and chain cluster, furthermore, to establish a regional economic flows network space related and supported by multiple agglomerating economics centers.

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1.1 Research Methods

Economy Driven Force Economy driven force of at point $x \in M$ (M differential manifold) is that, in unit time, the maximum of ratios that is the sum of in-outflow differences of non-regional economic factors utility function within the point's tiny neighborhood to its area.

Economy Force [2] Assuming that $\delta(x) \subset M$, M is a differential manifold, $\delta(x)$ is a small neighborhood of point $x \in M$, and $S(\delta)$ is area of the $\delta(x)$. We assume that, in local region $\delta(x)$, if $\|u_x\| = \lim_{\delta \rightarrow 0} \text{Max}_{\delta(x)} \left\| \frac{\nabla H_N}{S(\delta)} \right\|$, H_N is a economic utility function, then u_x is the economy driven force at the point $x \in M$ —simply referred to as the economy force (EF). As above we should define regional economy force, in unit time, is the ratio of total sum of economy force each point in this region to its area.

Regional Economy Force [2] Assuming that $x \in M$, M is a differential manifold,

we assume that in the region $m(x)$, and in the unit time, $u_{m(x)} = \frac{\sum u_x}{\iint m(x) dx}$, then

$u_{m(x)}$ is the regional economy driven force of $m(x)$ —simply referred to as the regional economy force (REF).

General Constraint Relation Measure Some scholars have given their initial introduction but not deep research and analysis on correlation, contribution or interdependent in general constraint relation [2]. Here it is the mathematical definition of general constraint relation measuring:

$$d(x, y|x, y \in X/R) = \sum_1^3 d_i(x, y|x, y \in X/R_i) \quad i = 1, 3 \quad (1)$$

It respectively is correlation, contribution or interdependent relationship measure. Here, at least $d_i(x, y) = |GDP(x) - GDP(y)|, x, y \in X/R_i, i = 1, 3$ is a measure.

Economic Scale Model [3] General relation network economic space \aleph_e , an economic flows network $G_e = (V, E) \subseteq \aleph_e$, in the defined unit time, an economic node $v \in V$ (as an abstract unit node) point right for the node unit regional economic utility (function) weight coefficient u_v (positive or negative, i.e., weight coefficient of f_e (GDP\$) increasing or decreasing); At the same unit time, this node as converge and its external as a source, their cut is $v_{\bar{v}} = f_e[(G_e - v), v]$, which the unit non-regional economic flow f_e (GDP\$) increases weight coefficient $v_{\bar{v}} = f_e[(G_e - v), v]$. The point $v \in V$ economic scale degree is as for $D = u_v + v_{\bar{v}}$. The economic flows network

$G_e = (V, E) \subseteq \aleph_e$ point right is $u_{G_e} = \frac{\sum_{v \in V} u_v + \sum_{e \in E} w_e}{|V|}$. (Here this G_e is converge and its external is source. $e = \langle u, v \rangle \in E, w_e = |f_e[u, v]|$ as for the weight coefficient of unit economic flow f_e through the edge e).

Economic flows network $G_e = (V, E) \subseteq \mathcal{N}_e$ point right is $u_{G_e} = \frac{\sum_{v \in V} u_v + \sum_{e \in E} w_e}{|V|}$ (Here the G_e as for converge and its external as for source, $e = \langle u, v \rangle \in E$, $W_e = |f_e[u, v]|$ as for the weight coefficient of unit economic flow f_e through the edge e); $V_{\bar{G}_e} = \frac{f_e[\bar{G}_e, G_e]}{|V|}$ ($V_{\bar{G}_e}$ is the average weight coefficient of the unit non-regional economic flow $f_e(\Delta\text{GDP}\$)$, in the same unit time, the cut of G_e is converge and its external as for source). The economic scale degree of this economic flows network is as for $D = u_{G_e} + \frac{f_e[\bar{G}_e, G_e]}{|V|}$. We deduced as below.

$$\begin{aligned}
 D &= u_{G_e} + \frac{f_e[\bar{G}_e, G_e]}{|V|} = \frac{\sum_{v \in V} u_v + \sum_{e \in E} w_e + f_e[\bar{G}_e, G_e]}{|V|} \\
 &= \frac{\sum_{v \in V} u_v + \sum_{e \in E^+} w_e}{|V|} \tag{2}
 \end{aligned}$$

Here in $\{e \in E^+ | e = \langle v, u \rangle, v \in V\}$. Among them, we found that the different attribute of economic elements in economic flows network, which the weight was very different. Such as the weight coefficient of high-tech economic factor flows network from New York port in United States to Shanghai port in China was far higher than general bulk cargos’ one on the versa. The weight of edge, its changes followed the economic flowing properties, and flowing time and economic location space. Here we agree to, paths of economic activity unit or goods along the flows network, which flowing cost is as for consumption in destination, namely “iceberg melting cost” [4].

2 Environment and Data Analysis

Regional industrial economics expansion has always been bottlenecked by narrow economic developing space within geography. On the basic analysis of economic scale model, driven force of economic development in unit square of regional land space is a real power. The statistics results showed that economic scale density of the Financial Street was about US\$757 million every economic power per square kilometers. It was not a high level of the scale density value compared with the other international financial centers.

Under the preliminary analysis, the Financial Street needs to be both adjusted and upgraded its industrial structure and layout more rational. It should be considered to strengthen organizational mechanism of economic agglomeration and chain cluster, guide and boost financial elements flowing among various industrial and economic nodes, lead a change of economic factors from non-regional to regional

by offering preferential policy, build up effective steps in financial, science and technology developing, and eventually set up a stage for financial and culture innovation. There was a typical strait in developing financial service on traditional livelihood service industries and Time-honored Brand enterprises, with slowly pushed adjustment and transformation situation based on low-end industries. This eager demand in partial area was caused by the unbalanced high grade public service distribution. It showed the “two-factor” differences of Financial Street in characteristics.

2.1 Historical Data Analysis

According to the contradistinctive analysis of the financial industrial revenues data curves between the Financial Street and the business street, geographically which was the east neighbor of the former, the business street earnings showed a low income level on its financial industry at the beginning, followed by a visible increasing trend after the Financial Street’s creation and its earnings grew steady. It directly resulted in the Financial Street radiated its financial industry to its neighbors and did its related services. The linear graphs of Financial Street showed its business development in significant economic core nodes of the financial industrial headquarters’ core area has influenced external service flows.

It was concluded by comparing the analysis of revenues change data on trade & commercial service industry between Financial Street and its east business street. The latter is a pillar of regional economic development and revenues was a slight concussion but steady overall, caused to the foundation that has been long-term gradually accumulated and constructed by regional economic factors and the growth development of regional economic dynamic power promoted. As the spatial environment and atmosphere of the former headquarters’ institution and enterprise intensely reconstructed by its regional government, it aimed to improve the central advantages of agglomeration economics of its financial and other industries’ headquarters, finally promoted to the revenues’ growth development on its trade & commercial service industry. Comparative analysis of these data curves’ changes in the Figs. 1 and 2, the former commodity revenues in retail had grown from 2009 to 2011, but in 2012, it experienced an obvious drop, which was approximate same figure in 2010. Legal, accounting and audit services fallen slightly in 2011. Travel & hotel industry, however, increased marginally at the same time. Concluded by comprehensive comparative analysis, it had rarely the ratio increasing on wholesale & retail in the Financial Street, leading to a little for its growth of trade & commercial service in 2011, and its general merchandise & retail business also in 2012. These 2 years, above all, they transmitted and radiated to its east business street, and then their influences were reached there, annual revenues in the whole-sale & retail also declined in succession in 2011–2012. As for the current period, it

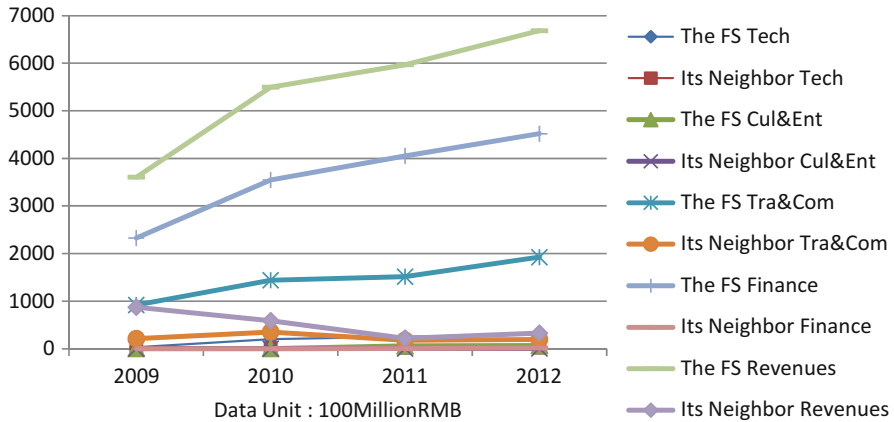


Fig. 1 Total and other kinds of revenues between the Financial Street and its east neighbor

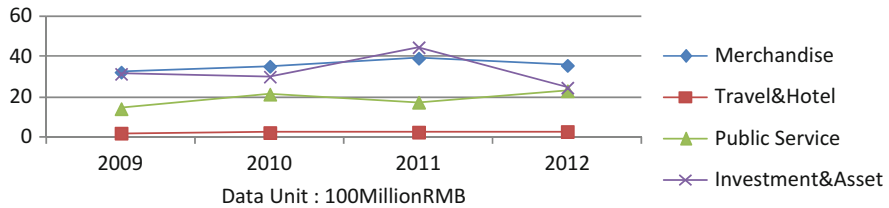


Fig. 2 Various correlative economic industrial revenues in the Financial Street

also could be judged that there were a number of flaws corresponding to its consumption market on high product quality and brand there, and no catching up in time changes of the consumers' primary demand trend where in the Financial Street and its surroundings. During the period, people might turn to other investment or consumption, which was caused by the influences that all they indirectly to reduce marginally revenues in the wholesale and retail there. Whereas in 2012 in the Financial Street, the products in wholesale and retail adjusted accurately to its consumption marketing orientation, it brought a huge and fierce growth on revenues of the trade & commercial services here. After that, it also led to a small increase from falling on same ones in its east neighbor. This means what there were some direct flows which out of significant economic core nodes area of its financial industrial headquarters where developed, which had great influences on the business enterprise area in its east neighbor. Therefore, the regional government should be harmonious and unified to its higher authorities' action together, directly connecting the Financial Street to significant economic financial core nodes area in its east side with public "tube". To accelerate its economic factors flowing between them, at the same time to focus on solving the problem of preferential policies and organizational mechanism for promoting economic elements flowing

and residing, it was reconstructing regional economy force to participate in regional economic activities.

With comparative analysis of revenues' data changes on cultural, educational, health and entertainment industries between the Financial Street and its east neighbor, it was that long-term regional economic factors producing the latter foundation which it took trade & commercial service industry as regional developing basic supporting, promoted economic force growth development in the latter area, otherwise, its weak in average income of employment which caused to a little of revenues in early these industries. As the accumulation of revenues, the number of employment and families increased continually in the financial industry of Financial Street. This led to the increasing of marketization demand on the cultural, educational, health and entertainment here. The effect flowing with diffuse and radiation on this demand, it indirectly promoted the revenues increased to those industries in its east neighbor. On the basic analysis of economy force in core nodes area of significant headquarters' economic industries in the Financial Street, its regional government should strengthen the same industrial economics nodes or insert new ones, and meet their industrial requirements with an reasonable support followed, otherwise promote revenues increasing of its financial industry. Taking up relevant preferential policies and organizational mechanism, she also should unchoke the "tubes" of public media, make economic elements flowing into the nodes and their formation residing, and balance mutual development of cultural, educational and entertainment industries in economic core area between the two sides.

Concluding comparative analysis of revenues' data changes in technology industry between the two sides, it was that the development situation of financial industry was good foundation in the Financial Street, which it rapidly pushed up each headquarters' economic industry developing within this area, but its headquarters' sci-technology revenues still was a priority to the technology industry here. Only individual enterprises did technology service supporting on them. Due to intense competition in industrial market, executing on high-technology tool was caused to continuously many enterprises in its headquarters', and their advocating on behalf of users with convenient industrial products and derivatives. For instance, in the financial industry, also it was that to advance their experiences of quality practicing service by high-tech means, and to achieve all services by mobile terminals for them. Producing a fair amount of demands in financial market about these, it embodied rapid developing of revenues growth in the sci-technology industry of Financial Street more than its east neighbor. For the latter traditional business industry is basic service, but in current time electronic commerce basically has self-formed a new industry divorced from traditional industry, for example JingDong, DangDang and New Eggs, none of them has such foundation supporting. It is necessary for the regional government to compare and analyze what about economic force in main locations of the Financial Street, their proper economic nodes inserted into the high sci-technology supporting on close-fitting service for

headquarters industry, or the area relied on compact supporting of two science parks between its south and north, and combed public media flowing in its south adjunction park. Government policy guidance, leading to organization alliance mechanism building, it is strong to support on financial sci-technology development. It is important advantage that its east business street is adjacent to the Financial Street, by the one, making the best service of e-commerce delivery advantages to the employment in the headquarters, unclogging circulation channels between the Financial Street and its east side, and promoting balanced development in the sci-technology industry between them.

2.2 Network Layout of Significant Economic Power Nodes in Financial Street Core Area

Throughout analyzing with economic scale model, nowadays regional space of the Financial Street headquarters that it is an economic flows network is mainly composed of financial, trade, sci-technology, communication, public service sectors and so on. Its structure embodies an economic flows network in general constraint relation, which it expresses comprehensive economic relation, but yet none is a network cluster of comprehensive industrial agglomeration centers. In Fig. 3, node 23, 24, and 27 for financial nodes supporting with IT technology service, meanwhile among them, 23 for communication nodes 29, 30 and 31 providing with the same one, 36 for financial node 35 performing to credit insurance service, 42 for these insurance nodes supporting with sale & marketing service, 38 for the other providing with reinsurance service, 9 for 30 with terminal service provided by one way, all they are in the contribution by one way. All nodes of unclosed circles in Fig. 3 referred to as the public service, they take double way in the contribution to the main business industry nodes. Node 29, 30 and 31 with node 22 respectively is the vertical correlation. Node 33, 34 and 39 with node 7, so does it. Node pair 2 and 3, 1 and 47, 8 and 37, respectively is also. Provided special services by node 23, node 4, 5, 6, 7, 10, 29, 30, and 31 are in interdependent relationship. Relative to node 22, node 29, 30, and 31 are in the dependence for each other. Provided by node 24 to special service, each other of node 5, 6, 7, and 10 is in the dependent. Node 42 to node 36, 38, and 39, are in the contribution, and node 38 to 36 and 39 are also. Node pair 1 and 8, 22 and 32 respectively is the same. Similar state's public service nodes of unclosed circles are in the dependence each other in Fig. 3, but so do different ones of them and so on. Deep analyzing 42 typical economic nodes within the center, it is concluded that some of them are in both contribution and dependent relation, or correlation, or interdependent. They are composed of complex economic flows network space in the general constraint relation.

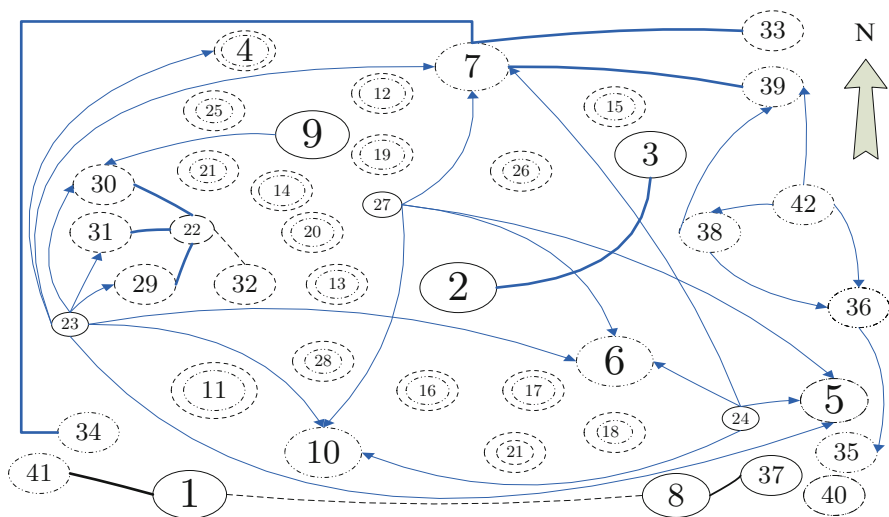


Fig. 3 Headquarters’ economic flows associated network layout diagram in Financial Street

Note 1: 1. Sinofert Holdings, 2. PetroChina International, 3. CPTDC, 4. China Life, 5. BOC, 6. ICBC, 7. CCB, 8. CNAMPGC Holding, 9. Surfing Telecommunication Terminal, 10. Beijing Branch of ICBC, 11. Parkson, 12. Zhongrui Yuehua Certified Public Accountants, 13. Grandway Law Offices, 14. DeHeng Law Offices, 15. TianYuan Law Firm, 16. China United Assets Appraisal, 17. JiaYuan Law Firm, 18. Jurisino Law Group, 19. Zhongxin Notary Public Office, 20. Beijing GuanTao Law Firm, 21. China United Accounting Firm, 22. China ComService, 23. AutoTech, 24. ZiJin Technology, 25. China Finance Online, 26. Equity Exchange Online, 27. Vision Sky, 28. Globe FinanceCom, 29. China Unicom, 30. China Telecom, 31. China Mobile, 32. China Cable Network, 33. China Jianyin Investment, 34. CCB Financial Leasing, 35. The Export-import BOC, 36. China Export & Credit Insurance, 37. CNADC, 38. China Life Reinsurance, 39. BOC Insurance, 40. COSCO, 41. SINOCEM, 42. DaTong Insurance

Note 2: Among them the *solid circle* edge of economic node represents the headquarters’ enterprise in the Financial Street rarely provides public service. *Single dashed circle* is refer to provide a certain public service, otherwise *double dashed circle* represents for provide professional public service in this area. *Thick and single solid line* connecting to two economic nodes shows they are vertical economic relationship in mutual stake investment, and *single solid arrow’s* connection is expressed to vertical relationship of up-down-stream in production or service. Here multiple economic nodes within vertical correlative relationship may be in the contribution. *Single dashed line* connecting two economic nodes represents the dependence in the same business

3 Research and Analytical Review on Economic Scale Model

For a long time, there was none of big economic crisis in China. It is related to a unique “market economy in administration” formed after China’s reform and opening up, and it is completely different from western free market economy.

Similar to Chinese overall economic structural contradiction, in the whole area that the financial center and its fringe node, mainly there is such contradiction that they are investment and consumption, capital flowing orientation, public income

and expenditure, central and local debt, industrial production, value quality, land and population, enterprise survival and employment. It is most important that it is social harmony and stability in this area.

It is necessary for the regional government that it continues taking up significant influence, which it holds administration and property power controlling on labor, land, capital and other basic production factors, namely making full use of still taking on administrative advantage and opportunity that permanent residence registered management, financial control, monopoly power in land market and so on. Its administration system and inherent economic factors advantage is strongly played a role by itself, to ensure that regional political and social stability. Also the optimal benefit of “quantity & quotas” and “water gate” mechanism controlled, tilting economic elements into major industries, projects and location area dominated by the government, and regional noble wisdom urban environment constructed, their high-end “identity” preferential policy granted, reasonable high-quality urban planning, economic power market correctly guided, headquarters absorbed, finally it promotes to do economic structure adjusting and high-end economics balanced, and overall industries upgraded in the region.

Analyzing its economic industrial data with research method of economic scale model, it is reasonable economic partition to location structure “pool”, combing research of different economic equivalence class, strengthened and added to the length and width of different structural chains in this area with the general constraint relation. Sufficiently taking good effects of Chinese characteristics economic structural “bulkhead” mechanism, and strengthened economic structural “tank” of regional integrated industries, it is a real operational way that the regional government to avoid economic crisis effectively. It is a key that natural efficient jobs for these eventually caused to improve regional and non-regional economic power in this center.

According to researching result of well-known scholars on the stability of cooperative nodes in complex combination network, it is more than five nodes of different comprehensive economic industries that it could construct an approximate closed circulating flows network space with the general constraint relation, in the regional headquarters’ economic core area, which it is able to defend against external various risk and crisis. Applied with researching methods of economic scale model, empirical analysis combined with specific data in Fig. 3, it is concluded that although this area is composed to complex network (blue line) in the general constraint relation, which financial and mobile headquarters, and supporting on each other between industrial chains, it is a basis to promote the regional development. However, not yet it has constructed a richer stable headquarters’ cluster in this network, namely agglomeration economics centers’ cluster.

As a developing country mainly producing manufactured goods for the global, it is a priority that its core power is economic elements into its external, so collaboratively computing regional economic power that it is producing power combined with its external importing consumption, more appropriate to fully embody the dynamic performance in this regional economic development. In Fig. 3, it is shown that complex economic flows network space, according to the financial,

communications, sci-technology, trade & business, public service, and so on, which these nodes are divided into different economic pools. The economic power data was shown in other papers, analyzing and calculating on the regional statistical data.

Empirical analyzing result, in the Financial Street that headquarters' economic area, it has shown that there is a lack this type of node to node supporting from education industry, especially international advanced high-end education park related to each of its industry, otherwise various seminars in international culture and education are in the same, especially on financial and economic investment, education management. On the health care, absence of personalized high-end service, especially a full consultancy of medical service on Internet & IT, and on the IT electronic commerce in headquarters' economic industry also, especially each of product selling or service chains for all headquarters, in brief a little of headquarters in sci-technology innovation, especially IT derived service supporting for them, so all they could promote to do main headquarters' economics and service development. Finally not yet what industrial category that has been fully integrated there, especially a lack of cultural education, health care, sci-technology, and IT headquarters economics. There still is little of strong professional public service park composed of vertical downstream production and service chains associated to headquarters' economics, which guided by its government, especially none of agglomeration center, or large chain-cluster on the professional service.

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Part V
Special Session on Cultural
Industry

Policies and Safety Concerning Cultural-Relic-Related Business

Lei Peng and Fei Meng

Abstract Cultural relics are important and unrenewable recourses in a certain country and they should be well-protected by the law and government policies. Part of the Cultural-relic-related undertaking for instance, cultural-relic commerce and reproductions of the cultural relics, can be industrialized. The protection of the safety of a nation's culture calls for the issuing some specially-designed policies. This paper does analysis of such policies concerning cultural-relic-related industry.

Keywords Cultural industry • Cultural-relic commerce • Cultural relic duplication • Publication of books on cultural relics

1 Introduction

Cultural relics are important and unrenewable cultural recourses in a certain country and are materialized culture and history. Cultural-relic-related industries include cultural relics commerce, cultural relics duplication and the publications of archaeology books and audio-visual products. In China, all of the mentioned business practices belong to cultural industry, as described in the document Categorization of Cultural and Other Related Industries 2012 issued by National Bureau of Statistics of China. The policy safety for related industries is introduced and analyzed in detail below.

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2 Cultural Relic Commerce

In China, cultural-relic-related commercial activities include auctions and purchase or sale of cultural relics. The operators of the two sorts of activities are respectively auction houses and cultural relics stores. These two business forms are currently recognized by Chinese law. In recent years, China's auction market for cultural relics develops rapidly and favorably. From 2007 to 2013, the overall turnover of auction market was generally increasing, reaching the top in 2011, although 2008 and 2012 saw a decline caused by the economic situation and investment climate. (See Fig. 1.) By contrast, due to career shift, the diversification of the market for cultural relics, conservative ideas and other factors, the number of the employees working in cultural relics stores and the turnover are decreasing year by year. However, some cultural relics stores, after years of marketization, have recently held their position and seen themselves through fierce competitions in the restructuring process and by taking the advantages of their professional staff. There has been remarkable improvement in terms of these entities' scale, brand reputation and potential for development. (See Fig. 2.) Taking Beijing as an example, the number of cultural relics stores legally established had grown up to 68 by December, 2012. Of these stores, 11 are state-run and the rest run by private sectors. The annual turnover of cultural relics stores reaches about RMB 500 million [1].

In China, foreign natural persons, legal persons and other organizations are not qualified as the operators of investments for cultural relic commerce according to the law. The purpose of this stipulation is to value the role of cultural relic commerce in the inheritance and protection of cultures. Presently, China's market for the transaction of cultural relics lacks supporting system and remains immature. Foreign investments, if permitted into the Chinese market, would put the less competitive and adaptable Chinese companies into an awkward situation. The mentioned stipulation aims at protecting the traditional culture of China and the cultural industry from negative impacts, safeguarding the domestic market from threats by foreign investments.

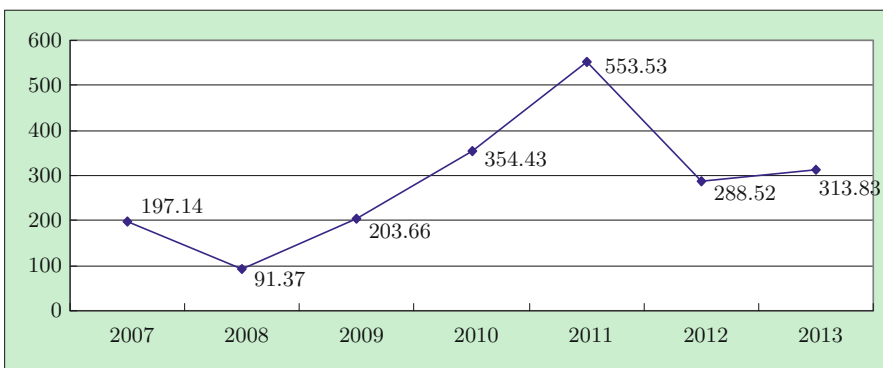


Fig. 1 2007–2013 China auction turnover of cultural relics & art works (Unit: hundred million)

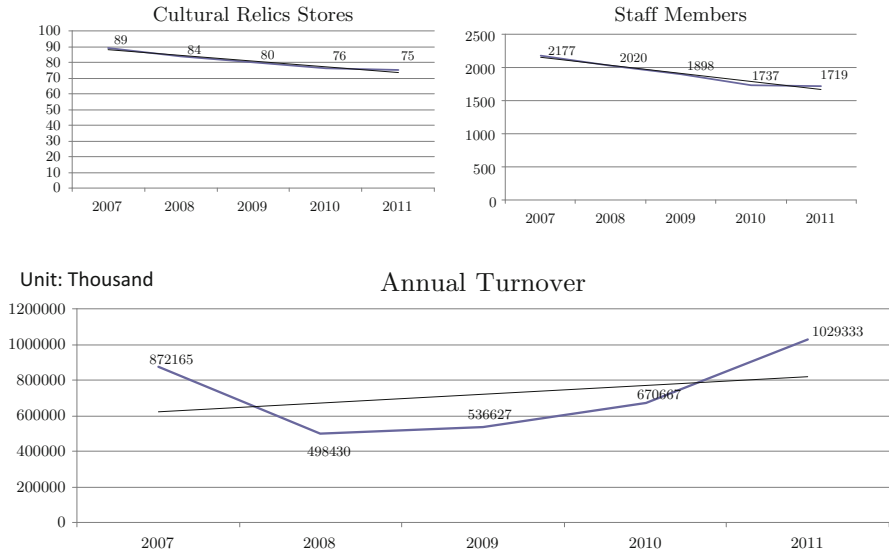


Fig. 2 2007–2010 Number of cultural relics stores, staff members and annual turnover

3 The Production of Duplications of Cultural Relics

The production of duplications of cultural relics should be considered part of the production and sales of art works. China has made explicit and strict regulations on reproductions articles and the act of copying. The Reproduction and Rubbing of Cultural Relics Regulation requires that, based on the original workmanship, the size, shape, texture, pattern and properties of the reproduction shall resemble that of the original. The identity of the reproduction shall be clearly marked. Cultural relics shall not be copied before its appraisal. The reproduction of cultural relics shall focus on the scarcity and quality of the replicas, and shall be conducted only after it obtains government approval. Also, the law has explicitly defined the persons or organizations that are qualified to produce such reproductions [2]. However, there are, no specific articles or regulations concerning the degree of similarity between the original and the imitation. This needs improvement.

The reproductions of cultural relics manufactured in strict production process can scientifically and precisely reflect the cultural and historical information shown by the original, which is beneficial to the transition, protection and spread of traditional culture, arts and technology. Also, these reproductions can stimulate the development of the industry of derivative products of cultural relics. By contrast, poorly made imitations and the act of random creation will ruin the original scientific, historic and artistic value. For instance, several years earlier, travelers could find vendors around the Mausoleum of the First Qin Emperor selling extremely low-quality imitations of the terracotta warriors which totally failed to

transit the original artworks' aesthetic connotation. To the buyers of such imitations, they had no value of collecting and appreciation at all. Also, these imitations misguided the consumers by damaging the image of the Chinese cultural relics.

Meanwhile, the Regulation demands the enlisting of the reproductions of cultural relics and the restriction of the number and circulation channels of such items. The Regulation ensures the reproductions' added value and value for collection. The laissez-faire attitude towards the growing number of reproductions would ruin the scarcity of cultural relics and violate consumers' interests, and some high-end replicas would even be mistaken for the original and thus disrupt market order.

4 The Publications of Archaeology Books and Audio-Visual Products

The publications of archaeology books and audio-visual products is an integrate part of the publishing industry and cultural industry. The Chinese government issues no explicit regulation or policy concerning the management and control of the publishing industry, as contrast to those concerning the two aspects mentioned above. Therefore, the Law of the Peoples Republic of China on Protection of Cultural Relics should be an essential yardstick for the protection of cultural relics when archaeology books and audio-visual products are made and especially when cultural relics are being filmed.

In other situations, the civil law can be referred to when the exercise and dispute of rights on cultural relics are concern. Generally speaking, the owner of the cultural relics, the institutions storing the relics and publishing house are mainly the parties involved in the disputes of interest. And the disputes over copy rights are most common. One of such cases is the one involving the Palace Museum and a publishing house over the copy rights of 790 colored pictures. The pictures, authorized by the Palace Museum, were authorized by the originally used in three books. The Palace Museum found that those pictures were plagiarized and published. All of the relics shown in the pictures were first and second grade cultural relics in the collection of the Museum. The Palace Museum argued that the pictures were filmed by the Museum staff as part of their job and thus the Museum shall possess the copy rights. Thus, the Museum believed that the publishing house's using of the 790 pictures without the permission of the Museum has severely violate the museum's rights of using the pictures and the rights of getting paid out of them.

Accordingly, the Palace Museum filed a lawsuit against the publishing house in the year 2001. Both Beijing intermediate People's Court and the Supreme People's Court hold that the defendant shall bear the liability to examine whether there was an violation of copy rights concerning the materials it planned to publish, and that

the defendant shall require the provider of the pictures to illustrate the proof of the source of the picture, knowing that the pictures were photographic works about the relics kept by the plaintiff. Considering that the defendant failed to live up to its responsibility to examine the pictures, as required by the law, the courts ruled in favor of the plaintiff.

In recent years, there is growing attention to the use of cultural relics. The museums' publication of the photos and videos of the cultural relics kept by their own has strengthened the influence of the museums and met people's need to learn about and study cultural relics. Meanwhile, the museum has made profits from the publications. However, the question lies in how the museums' rights shall be protected in the process. The case mentioned above may serve as a reference and example.

5 Conclusion

Cultural relics, being part of cultural resources, should not be "exploited" or "developed". These words are indecent for cultural context. Thus, the diction of developing "cultural-relic industry" may not be appropriate. However, it is acceptable to give full play to cultural relics' function while protecting them. In fact, part of the cultural relic undertaking can be commercialized, as mentioned at the beginning. And the non-renewability, scarcity and unique historic and cultural value has determined that the laws and policies in China make special regulations of cultural-relics-related undertaking, which is different from those on common business activities.

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Study on the Cultural Industrial Cluster in China

Xingxia Hou and Shaojun Luan

Abstract This dissertation proceeds from the nature of industry and defines the concepts and characteristics of cultural industrial cluster. Considering the reality of the operating mechanism of cultural industrial cluster in China, this dissertation puts forward the ideas and solutions for developing cultural industrial cluster: to cultivate and cluster cultural demand; to optimize the investment, work and cultural environment; to replace the unitary industrial policy with cluster policies; to create more profit scope for cultural industrial cluster; to optimize the external environment of industrial development and cultivate a good cultural market; to set up and improve the investment and financing policy system and to expand the financing channel for the development of cultural industry.

Keywords Cultural industry • Cultural industrial cluster • Operating mechanism

1 Introduction

In the past 30 years, with the popularization of the high technology and culture, the cultural industry has been confirmed by the international academia as an emerging industry. In many developed countries and regions, the consumption of the residents on cultural products has taken up more than 30 % of the total amount of consumption.

The cultural industry starts late in China but has achieved great progress in a short time. This dissertation puts forward the countermeasures to construct the cultural industry cluster in China based on the documentary analysis and logical deduction of the concept and features of industrial cluster, the operating principles of the cultural industry cluster and the actual conditions of China. This dissertation studies the operating principles of the cultural industry cluster and has referential significance in grasping the internal laws of the cultural industry in China.

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This dissertation tries to understand the development of the cultural industry cluster and find the ways to promote the development of the cultural industrial development in China by studying the working principles of the cultural industry cluster in China. The research on the current conditions of the cultural industry in China finds that the competition in the regional cultural industry expands comprehensively, the unbalanced development trend of the cultural industry in China is further highlighted, the overall planning and coordinative development of the central and regional cultural industry steps into a new stage, the competition in the media industry evolves and expands into the competitions in the whole cultural industry, the conflicts between the industry barriers and the market access expand fully, the achievements in the deep reform of the economic system have been widely applied to the cultural industrial industry, use the information industry to draw the strategic adjustment of the cultural industrial structure and the digital progress of the cultural industry shall become a main way to improve the comprehensive competitiveness of the cultural industry. Based on the actual conditions of the operating mechanism of the cultural industry cluster in China, China should find a suitable way to construct the cultural industry cluster from the perspectives of construction conditions, construction modes and construction channels. This dissertation works out that the countermeasure to develop the cultural industry cluster is to cultivate and gather the cultural demands, optimize the investment environment, the working environment, and the humanistic environment, replace the single industrial policy with the cluster policy, create more profits for the cultural industry cluster and optimize the external environment for the industrial development. Cultivate a sound cultural market, establish and improve the investment and financing policy system and widen the financial channels for the development of the cultural industry.

2 The Definition of Concepts

2.1 Cultural Industrial Cluster

Cultural industry is the general term for market-oriented activities of producing cultural products and providing cultural services aiming at meeting people's intellectual needs. It includes the film industry, the audio and video industry, the radio and television industry, the press industry, the Internet cultural industry and the entertainment cultural industry [1]. As an industry for meeting people's intellectual needs, it has industrial natures different from that of traditional industry. These natures form the characteristics of cultural industry and have a significant influence on the formation and development of cultural industrial cluster. They are also the mark of cultural industrial cluster which is distinctive from other industrial clusters [2].

3 Interpretation and Analysis of the Data

3.1 The Current Conditions of the Cultural Industry in China

Firstly, the competition in the regional cultural industry expands comprehensively, the unbalanced development trend of the cultural industry in China is further highlighted, and the overall planning and coordinative development of the central and regional cultural industry steps into a new stage.

Secondly, the competition in the media industry evolves and expands into the competitions in the whole cultural industry, the conflicts between the industry barriers and the market access expand fully, the achievements in the deep reform of the economic system have been widely applied to the cultural industrial industry, use the information industry to draw the strategic adjustment of the cultural industrial structure and the digital progress of the cultural industry shall become a main way to improve the comprehensive competitiveness of the cultural industry [3].

3.2 The Operating Mechanism of the Cultural Industry Cluster in China

Huge demands: necessary conditions for the development of the cultural industry cluster; radiation and sharing of cultural innovations: internal motivation for the cultural industry to develop towards clustering; cultural industrial chain: the main axle of the cultural industry cluster; relevant supporting agencies: the important base for the development of the cultural industry cluster; reasonable company structure: guarantee for the charm of the cultural industry cluster; foundation: the root of the cultural industry cluster [4].

3.3 The Internal Mechanism for the Formation of the Operating Mechanism of the Cultural Industry Cluster

Cost-saving effect, market competition effect, internet innovation driving effect, internet innovation dynamic mechanism [5].

3.4 The Idea and Countermeasures to Develop the Cultural Industry Cluster in China

Cultivate and gather the cultural demands; optimize the investment environment, the working environment, and the humanistic environment and replace the single industrial policy with the cluster policy; create more profits for the cultural industry cluster and optimize the external environment for the industrial development; cultivate a sound cultural market; vigorously foster the technological progress of the cultural industry; establish and improve the investment and financing policy system and widen the financial channels for the development of the cultural industry.

4 Recommendations

4.1 Adjust the Structure of the Cultural Industry and Take the Road to Intensive Scale Management

Based on the demands for the development of the cultural industry, start from the system and mechanism reform and form an industrial pattern centering on large industrial groups and supplemented by small and medium-sized enterprises. This is the strategic decision for the cultural industry to optimize the allocation of the whole resources and foster the internal sound cycling of the industrial system.

Firstly, accelerate the construction of the industrial group. The difficulties such as the small and complete pattern, insufficient funds, poor technologies and small enterprise scale make it impossible to compete with the developed countries. The purpose of the large group is to become larger and stronger and increase the market competitiveness. As for the cultural exposition industry and the entertainment industry, we should center on the leading enterprises and attract more units to join through the community of interests. In addition, form powerful and competitive cultural industrial groups by means of merger and acquisition. The cultural traveling industry is poor in foundation but has a prosperous future. We should make full use of the resource advantages, break the barriers, establish cross-sector and trans-industry large enterprise groups and improve the comprehensive competitiveness of the cultural traveling industry. The construction of the industrial group must follow the principles of separating governmental administrative from enterprises, adopting diversified properties and optimizing the allocation of resources, especially the principle of clarifying the strategic goals and the implementation planning. The optimal allocation of resources is not the final goal of the establishment of the group. The final performance of the intensive scale management should be embodied on the occupation of the market shares and the economic increment. Therefore, when the group is established, it should target at both the domestic and foreign markets, formulate strategic goals and implementation planning for

cross-sector, trans-regional and transnational management, highlight the scale benefits and cultivate famous regional cultural brands. Secondly, when establishing the industrial groups, we should vigorously develop the small and medium-sized distinctive “small and elaborate, small and professional” service companies, such as the souvenir manufacturing company, the audio supplies company, the dance and art company, the music company, the computer technology company and the Martial arts actor company so as to cooperate with the large industrial groups.

4.2 Reconstruction and Optimal Allocation of Cultural Resources

Firstly, break the limitations of vertical management and reconstruct the cultural resources by means of government promotion and under the guidance of the market. In the meantime, actively explore the way of resource reconstruction with governmental interference. Practices prove that the resource construction under the governmental interference is powerful and effective. But if the industrial planning by government excessively interferes with the industrial choices made by the enterprises, it may cause the industries to be congenitally deficient. Therefore, we should gradually increase the percentage of the market choices, such as the introduction of foreign investment, the construction of large themed parks or large entertainment facilities or the merger or reconstruction of the cultural enterprises.

Secondly, when speeding up the development and utilization of the local cultural resources, we should be bold enough to introduce the high-quality capital resources from foreign countries so as to match the unique cultural resources of Chongqing. Create new industrial advantages and improve the role of the cultural industry of Chongqing in the world cultural market, especially for the cultural traveling industry and the cultural entertainment industry. At the same time, we should introduce new cultural elements and styles to enrich our culture and prevent unfair competition. From the beginning we should emphasize fair competition under the legal system.

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Research on Industrial Restructuring Mode of Digital Publishing of Chinese Textbooks for Elementary Education

Yunzhao Li and Jia Geng

Abstract With the policy adjustments in Chinese elementary education as well as the development of educational information and digital publishing, industrial structure of digital publishing of textbooks for elementary education will surely face changes. In this context, this article contains the determination of development stage of China's digital publishing industry of textbooks for elementary education, and the industrial restructuring mode as well as the key points in industry development with respect to China's digital publishing introduction period of textbooks for elementary education.

Keywords Textbooks for elementary education • Digital publishing • Industry introducing period • Industrial restructuring mode

1 Identify Development Stage of China's Digital Publishing Industry of Textbooks for Elementary Education

The evolution stage of digital publishing industry of textbooks for elementary education is divided into introduction, growth and maturity stages. The driving force and characteristics in each stage are different, therefore, it is necessary to explore industrial restructuring mode suitable for China's digital publishing industry of textbooks for elementary education. At first, the development stage of China's digital publishing of textbooks for elementary education shall be identified.

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1.1 Characteristics of China's Digital Publishing Industry of Textbooks for Elementary Education in Introducing Period

In the introduction period of digital publishing of textbooks for elementary education, the driving force of digitalization of education information and demand of digital publishing play a major role. In addition, the government's policy guidance will also play a certain role. The main characteristics of this stage are as follows: the development environment of digital publishing of textbooks for elementary education is not perfect with weak support conditions; the of digital publishing industry agglomeration of textbooks for elementary education appears, but the industrial cluster has not formed; digital publishing industry of textbooks for elementary education has low degree of layout optimization; there is weak integration between the digital publishing industry of textbooks for elementary education and the domestic education information network; the innovative mechanisms for digital publishing industry of textbooks for elementary education has not been established; digital publishing industry of textbooks for elementary education does not play obvious role of economic development.

1.2 Development Stage of China's Digital Publishing Industry Economy of Textbooks for Elementary Education

Currently, in the field of publishing textbooks for elementary education, the new pattern of 82 publishing subjects achieving textbook resource allocation through market competition has come into being in China. More than 80 % publishing subjects in textbook market are engaged in digital development of textbooks for elementary education. In 2008, the People's Education Press (www.pep.com.cn) and Creative Knowledge (Beijing) Technology Co., Ltd. jointly launched the English (Go for it!) network textbooks. In December 2011, the "PEP Digital Campus" of People's Education Press was released and experimental promotion was carried out in nearly 200 pilot schools all over China. In 2013, the project of e-book standard has been officially set up by the International Standardization Organization (ISO) [1].

From product development, product marketing to industry standard, digitization process of Chinese textbooks for elementary education is constantly accelerated, but the product forms need to be improved and the industry agglomeration is not obvious. In addition, publishing main units of textbooks for elementary education has low industry directivity quantity and the industrial base is extremely weak. Industry layout of Chinese textbooks for elementary education is featured by

the “PEP dominance”, and the development of educational IT software, the manufacturer of education information learning terminal equipments and other high-tech industries, as well as network operators’ hardware and software services are in the initial stage, without the industrial cluster formed in terms of digital publishing of textbooks for elementary education [2]. Therefore, with comparison of the above characteristics of digital industrial economic of textbooks for elementary education in introduction period, it can be determined that the economic development of China’s digital publishing industry of textbooks for elementary education is in the introduction period.

2 Analysis on Characteristics of China’s Digital Publishing Industry Economy of Textbooks for Elementary Education in Introduction Period

The industry of textbook content featured by strong digital directivity and the some textbook-related industries start to gather around it in quantity, which is the industrial characteristic of China’s digital publishing industry economy of textbooks for elementary education in introduction period, such as information technology (IT) industry, electronic terminal hardware manufacturing industry, and network operation service industry, etc. that are of high degree of industry association. Furthermore, in the context that the knowledge content, manpower, capital and other resources around digital publishing industry of textbooks for elementary education all focus on digitization, the paper manufacturing industry and the printing and copying industry without relevance have scattered or transferred with the industry regulation of market and the conscious one of government.

3 Industrial Restructuring Mode of China’s Digital Publishing of Textbooks for Elementary Education

Knowledge innovation, technological innovation and technological progress are not only the main driving force of economic growth, but the impetus of industry structure change as well. According to supply structure optimization and demand structure optimization theory in industrial restructuring and combining the resource endowment and development basis of China’s digital publishing industry economy of textbooks for elementary education, it is recommended to adopt the industrial structure optimization and adjustment mode “with focus on the content of textbook and the supports of information technology, terminal hardware, and space docking mode of network service industry chain” [3].

3.1 *Focus on Content of Textbook*

The focus on content of textbook means using digital publishing upgrading and transformation of organizations publishing textbooks for elementary education, and strategic adjustment of publishing industry pattern to strengthen the boosting of educational information, and using the feature of the publishing organizations always undertake the major works, including initiation, organization, investment, promotion and training, etc. of textbook construction, to achieve development of content of textbook through the innovation of textbook digitalization contents. Global digital publishing trend has been accelerated and the pattern of Chinese news publishing industry has entered the strategic adjustment period, providing the external opportunities for content of textbook digitalization to serve as the leading mode; the resource endowment advantages of China's organizations publishing textbooks for elementary education provides with the internal impetus for content of textbook digitalization.

Global digital publishing trend has been accelerated and the pattern of Chinese news publishing industry has entered the strategic adjustment period. First, under the impact of the global digital wave, the publishing industry shifts to the digital age. Global digital publishing trend has been accelerated. These will provide the industrial restructuring of China's digital publishing of textbooks for elementary education as well as its upgrading and development with useful experience. Singapore launched the pilot e-schoolbag in 1999 [4]. France is the first country to implement e-schoolbag. Microsoft proposed the "e-schoolbag" project in 2003, and it is the most important elementary education textbook publishers in the US [5]. In 2010, The McGraw-Hill, one of the Fortune 500 companies, became the first Indian publisher that launched electronic textbook.

Second, as stressed in the "12th five-year" plan of press and publishing industry that China's industrial pattern has entered the strategic adjustment period, and it is necessary to vigorously promote the new industries mainly featured by the digital contents, production and transmission so that the digital publishing can keep pace with the international market. It has provided policy support and impetus for the industrial restructuring and development of China's digital publishing of textbooks for elementary education.

Textbook publishers have the resource endowment advantages. First, in the era of digital publishing, editing and publishing of textbooks for elementary education will still contain aggregation, processing and refining of knowledge contents, and their importance and necessity will be even more prominent.

Second, textbook publishers have extensive textbook content resources that allow deep processing and innovative development.

Third, the textbook publishing companies have strong financing capability and profitability by listing on the domestic stock market, which provides source for the innovation and development of digitized core content.

3.2 Supports of Technology, Hardware and Space Docking Mode of Service Industry Chain

The support of industry chain space docking mode of information technology (IT) industry, electronic terminal hardware manufacturing industry, and network operation service industry means achieving the knowledge service for learning community by relying on the core content creative industry of elementary textbook, presenting through IT industry software development, and using electronic terminal equipments and network operation services, and thus building a complete digital industry mode of textbook.

Demand for promoting the development of textbook digital publishing industry. Throughout the digital development history of the educational textbook digital publishing at home and abroad, digitalization of textbooks for elementary education is supported by technology, hardware and network services as the core content industries, and thus the industry chain comes into being. In the USA, though Microsoft proposed the “e-schoolbag” project in 2003, the current development subjects in textbook digital publishing industry are still Pearson Education Group, McGraw-Hill and other professional textbook publishing organizations. The development of information technology, manufacturing industry and network has promoted the development of U.S. textbook digitalization.

Textbook digital publishing industry has had certain foundation. With the advent of digital age, the major organizations publishing textbooks for elementary education in China are planning the digital publishing and attaching importance to the diversified development at different levels including technology research & development and applications, integration and development of content resource, network operation services, and capital cooperation, etc. Digital publishing has become a new economic growth point in China’s publishing industry. The 2012–2013 Annual Report of China’s Digital Publishing Industry shows that the total output of digital publishing in China reached RMB 193.549 billion in 2012, an overall growth of 40.47 % when compared with that in 2011. While maintaining rapid growth, China’s digital publishing has new changes in terms of product form, business mode, operating channel and industrial environment, etc.

In addition, industrial cluster is the new trend for China’s digital publishing industry to adapt to the economic globalization and the increasingly fierce competition, and a form of industrial space organization formed to create competitive advantages. According to industry demand, the ministries of Chinese government and the local governments have approved the establishment of a variety of types industry bases associated with digital publishing.

Concerted efforts of education digital publishing industry chain. The textbook publishers are in upstream of the industry chain, so they shall strengthen the content resource advantages. IT industry is in the midstream of the industrial chain, so it shall actively participate in digital publishing, provide technical supports, avoid repeated development of digital technology standards, and form unified digital publishing technology standard; network operation service providers and terminal hardware device manufacturers are in downstream of the industry chain, so they

shall make operators pay reasonable fees and hardware providers bring their technical and financial advantages into fully play through legal regulatory constraints. The concerted efforts of education digital publishing industry chain can promote healthy and efficient development of digitalization industry of China's textbooks for elementary education.

4 Development Direction of China's Digital Publishing Industry of Textbooks for Elementary Education

Based on the industrial restructuring mode of digitalization of Chinese textbooks for elementary education analyzed above, and through analysis on the status quo of resources and environment of education digital publishing industry, the author believes the China's digitalization industry economy of textbooks for elementary education in introduction period shall be the industry developed with focus, and the author analyzes key development and construction projects in various industries, clarifying the direction of industrial development.

4.1 Focus of Digital Development of Textbooks for Elementary Education On

Duan Xuejian believes that textbook digitalization is a method or model, which can provide digital content resource supports for the entire teaching process, and thus meet the requirements of modern education for the large-scale customization and the sharing in different times and spaces. The focus of textbook digitalization industry is the content industry, including the R&D industry that conducts research on textbook and curriculum, the R&D industry of textbook content preparation throughout the teaching process, the new media editing industry that satisfies the textbook digitalization, and the digital textbook training industry. The textbook digital content industry is dynamic and advancing with the times. The essential characteristics of digital content industry of textbooks for elementary education determine that the textbook digital content industry is the development focus of digital publishing economy of elementary education.

4.2 IT, Terminal Manufacturing and Network Operation Serve as Ancillary Supporting Industries

In the midstream and downstream of industry chain, IT industry, terminal manufacturing industry and network operation industry highly associated with textbook digital publishing industry are important supporting industries. IT industry

provides the textbook content digitalization with technical support, the textbook digitalization contains the entire set of teaching system that is coming into being and becoming mature gradually. Therefore, although information technology can fully demonstrate the advantages in technology development, it finally shows the advanced pattern of manifestation. Under the technical impetus of the terminal manufacturing industry, the capital advantages as well as more and better upgrading products are used to meet and convenient handholding requirement of education consumers. The network operation industry can provide network access and maintenance services in a better manner, and the development of improve service industry.

4.3 Profit Distribution Model of China's Digital Publishing Industry for Elementary Education

The author believes that in the introduction period of China's digital publishing of textbooks for elementary education, textbook digitalized content industry, IT industry, terminal manufacturing industry and network operation industry shall have the reasonable profit distribution model as follow: according to core and importance of the industrial structure model, the value distribution shall have the core of content industry; IT industry is closely related to the content industry with fuzzy bonding and there is a large ratio and proportion of the value chain distribution; and the network operation service and terminal manufacturing industries are in the peripheral position in the benefit distribution.

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The Effect Pattern of Portfolio of Private Equity (PE) to Industrial Security

Jianhua Huang, Cheng Li, and Mengying Chen

Abstract This paper discusses the effect pattern of portfolio of private equity to industrial security of China mainly from the foreign currency direct investment perspective. In terms of four dimensions, including currency, pattern of buyout, effect cycle and subject of buyout, the paper focuses on the effects which foreign currency buyouts exert on the cultural industry of China. The effects can be classified as two kinds: the horizontal ones, including short-term effect, middle-term effect and long-term effect; the vertical ones, including microscopic effect, meso effect and macroscopic effect.

Keywords Private equity • Cultural industry • Industrial security • Effect pattern

1 Introduction

China's cultural industry has witnessed a great development in recent years. As we can see in Fig. 1, the culture, sports and entertainment investment in fixed asset has been rising steadily from 53.12 billion RMB in 2004 to 509.92 billion RMB in 2013. Moreover, the family annual consumption expenditure of urban residents in education, culture and recreation services has also met a huge increase since 2004. Besides, we can see how fast the market in China has been growing from the growth rate of the family annual consumption expenditure.

In 2000, foreign PE started to enter the financial market of China. Since China's entering of the WTO in 2001, the cultural industry of China has been gradually open to foreign capital. Foreign capital has been interested in various fields of the specific area of China's cultural industry, such as movies, traveling, television and automation. As we can see in Fig. 2, the number of registered foreign-invested enterprises in culture, sports and entertainment has been rising firmly in the

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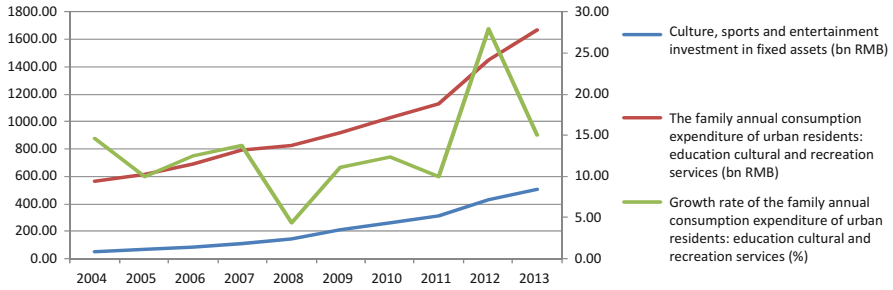


Fig. 1 Investment and consumption of cultural industry in China

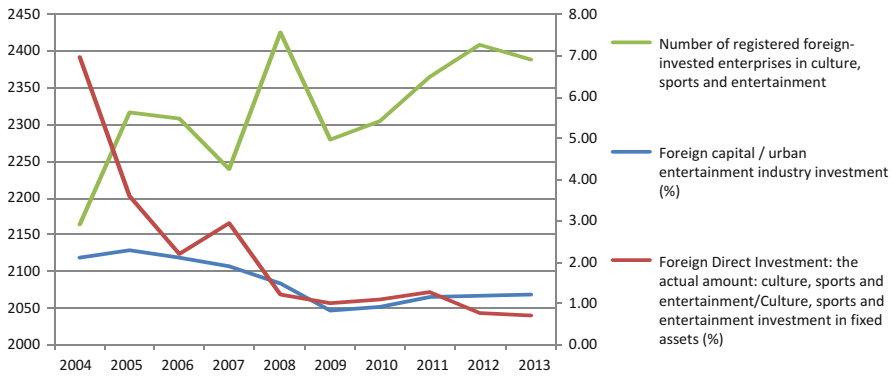


Fig. 2 Foreign investment in cultural industry in China

last 10 year. Additionally, the rate of foreign capital in urban entertainment industry investment has been above 1–2 % since 2004. And the share of the actual amount of Foreign Direct Investment in culture, sports and entertainment in culture, sports and entertainment investment in fixed assets remains high.

2 Literature Review

As to investment portfolios, Markowitz [1] pioneered the modern portfolio theory. A rational investor will achieve the expected utility maximization by selecting effective portfolio [1]. As for industrial security, List (1841) systematically expounded the idea of protecting and developing the infant industry of a country [2]. Theories about industrial security can be divided into four categories: the industrial control theory, the industrial competitiveness theory, the industrial development theory and the industrial interest theory. Jing Yuqin [3] summarized several typical concepts on the industrial security [3].

3 PE Portfolio

PE portfolio can be divided into two kinds according to the currency, including the RMB investment and the foreign direct investment.

3.1 RMB Investment

RMB investment refers to investments that use RMB as the currency, and the basic form is Greenfield investment. There are three modes of Greenfield investment: Sino-Foreign Joint Ventures, Sino-Foreign Contractual Joint Ventures and Wholly Foreign-Owned Enterprises [4].

3.2 Foreign Direct Investment

Foreign Direct Investment (FDI) includes investment in the financial market and foreign currency merger. And we will mainly discuss the former one here. There are three kinds of effects: short-term effect, mid-term effect and long-term effect.

There are two major differences between Greenfield investment and foreign currency merger. First of all, the currencies used in these two types of investment are totally different. The former is RMB, and the latter is foreign currency. In addition, the second major difference is the form of investment. For Greenfield investment, its basic form is joint-venture. And for the foreign currency merger, on the contrary, its basic form is to buy the share of Chinese companies.

3.3 Modes of Buyout: According to the Market Relationship

There are horizontal buyout, vertical buyout and mixed buyout. Horizontal buyout is the buyout that a PE acquires one company or several companies of the same industry. Vertical buyout refers to the buyout that focuses on the acquisitions of companies that have a strong supplying and selling business relationship with the buyers, just like the relationship between the raw material suppliers and the products sellers [5–7]. For example, the vertical buyouts of the traveling industry refer to acquisitions of resort developing companies, travel agencies and souvenirs sales companies. Mixed buyout is the buyout that focuses on the acquisitions of companies that are not related in production or service. For example, the buyout of resort developing companies initiated by film production companies [8–10].

3.4 Modes of Buyout: According to the Attitudes

There are friendly takeover and hostile takeover in terms of the attitude of buyers. Friendly takeover refers to buyout that has been agreed by the board of the target company. The two sides can negotiate about the purchase conditions and price.

Hostile takeover refers to buyout that does not get the permission of the board of the target company.

4 Analysis on the Effect Pattern of Portfolio

The effect pattern that the portfolio of PE produces on an industry differs when the mode of buyout is different. But this is limited to the microscopic stage, which refers to the point effect of the company. In fact, with the portfolio of PE getting deeper and deeper in buyouts, the meso effect and macroscopic effect will appear, and there will be linear effect and planar effect.

4.1 Microscopic Effect

The microscopic effect of foreign currency buyout can be seen within one company. The direct short-term effect of foreign currency buyout is that it enables a PE to control the share of the acquired company. The mid-term effect of a buyout will be shown in several years after the acquisition is completed. The long-term effect of foreign currency buyout will be reflected in the technology transfer, market structure and competitiveness.

4.2 Meso Effect

The meso effect is the industrial effect in the cultural industry. In the first place, the benign development of the cultural industry will be curbed with the entering of foreign capital, and thus will weaken the competitiveness of cultural industry of China. Besides, the entering of foreign capital is not good for the layout of industry of China.

4.3 *Macroscopic Effect*

The macroscopic effect of foreign buyout refers to the overall influence to the economy of China. An industry correlates with a number of other industries such as its upstream and downstream industries. Consequently, if the security of an industry is threatened under the disturbance of foreign capital, then the development of the upstream and downstream industries will be threatened as well. If this influence lasts, there will be a Domino effect, and an unexpected negative effect will be catalyzed to the economy of China.

5 Conclusion

With the analysis of the effect pattern of the portfolio of PE to the industrial security of China, we can find out that there are three kinds of measures that foreign PE takes in buyout: horizontal buyout, vertical buyout and mixed buyout. Foreign PEs will conduct the multi-point distribution by acquiring the share of several companies running the same business or the upstream and downstream companies. Therefore, there will be the short-term effect, mid-term effect and long-term effect, and from points to lines and then surfaces. In conclusion, we should pay close attention to the merger and acquisition activities of foreign PEs and protect the industrial security of China.

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Status and Strategies of Chinese Cultural Industry Organization Development

Guanglin Feng

Abstract Based on the industrial organization theory of SCP paradigm, this paper conducts a comprehensive analysis of cultural industry in China, and it reveals the common problems existing in the cultural industry in China, which has important theoretical and practical significance in perfecting the target and the approach of Chinese cultural industry organization. Meanwhile, the solutions towards the problems can regulate the competition behaviors between enterprises in the cultural industrial organization and enhance the market performance of the culture industrial organization.

Keywords Cultural industry organization • Market structure • Enterprise behavior • Market performance

1 Analysis of the Market Structure of Chinese Cultural Industry

Industrial organization refers to the sum of market relationships between enterprises under the social production conditions, including the market structure, enterprise behavior and market performance [1]. The heart of the orthodox industrial organization theory is the framework of SCP (Structure – Conduct – Performance) or SCP analysis paradigm based on the Neoclassical economic theory, which means market structure can decide enterprise behavior and then decide market performance [2].

Cultural market structure is essentially a relationship between cultural enterprises as market players on the quantity and scale and competition forms and its existing way formed by the relationship. Market structure's characteristics of Chinese cultural industry are as follows:

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1.1 The Small-Scale of Cultural Enterprises and the Low-Degree of Scale Economy Realization

Taking book publishing for example. German has 16,000 registered presses at present, but the basic market of the presses is controlled by 100 large publishing companies, the total number of sales accounts of which is about 92 % of total sales of all German publishing industry [3]. Chinese book publishing industry is one of the rapidly growing cultural industries. By 2008, Chinese biggest publishing group's annual sales revenue has been about 3.8 billion RMB, but the German Bertelsmann Group sales revenue is up to 16 billion euros [4]. Our large-scale cultural enterprises are small not only in size, but also in number.

1.2 The Low Market Concentration of the Cultural Industry and Decentralized Competitive Market Structure Dominating the Market

Taking the world tourism industry for example, only Germany's and Italy's market concentration exceeded 60 %. According to Bain's market structure classification, when the CR4 is 35–65 %, the market is the monopoly competition market structure. We believe that the ideal cultural industry market structure should have a CR4 of 50–60 % – the monopoly competitive type of high concentration [5].

1.3 Small Differentiation of Cultural Products and Widespread Product Homogeneity Competition

The common feature of the market structure of Chinese cultural industry is that the small differentiation of cultural products, and the strong substitutability between cultural products. Newspapers, for example, Chinese newspaper industry homogeneity phenomenon is very serious. It mainly shows in content homogeneity, the operation mode homogeneity and the lack of brand products. The quantity and circulation of newspapers and periodicals in China are large, but compared with developed countries, there's a huge difference in terms of brand effect.

2 Analysis on Market Behaviors of Chinese Cultural Enterprises

Market behaviors of cultural enterprises are affected by the cultural industry market structure and restriction. At the same time, market behaviors of cultural enterprises are also counter-reacted to cultural industry, which influences and changes the status and characteristics of market structure of the cultural industry. Chinese cultural industry mainly reflects in:

2.1 The Price Competition Behavior with Predatory Pricing in Cultural Enterprises

Cultural products price is a major means to adjust market supply and demand of the cultural industry. Taking newspaper market of the cultural industry for example, predatory pricing strategy is often used in the competition of newspaper distribution market by some newspapers or newspaper groups. The goal is to expel competitors from the newspaper market and deterred potential entrants. And then they raise prices again after the competitors disappeared, so that they can get high monopoly profits.

2.2 The Non-price Competition Behavior in the Lower Competition of Cultural Product Brand

The non-price competition behavior of the cultural enterprises is competition behavior for strengthening cultural enterprises' competitiveness by new products, new technology development and marketing activities in order to gain more market share. The brand awareness of Chinese cultural products and services is not fully set up, not to mention the brand advantage. In domestic market, the cultural enterprises which have the strong brand advantages are very scarce. It is harder to find those cultural enterprises which have a certain competitive advantage and high brand popularity in the international market.

3 The Analysis of Market's Performance of Chinese Cultural industry

Market's performance of cultural industry is the result of the price, circulation, cost, profit and social benefit and technology progress and so on, which are formed by specific cultural industry market structure and market competition behaviors.

3.1 The Increasing Output Value of the Cultural Industry Year by Year with Small Overall Size

According to statistics, in 2010, added value was 1105.2 billion RMB, 31.57 % more than that in 2009, which accounted for 2.75 % of GDP; in 2011 added value was 1347.9 billion RMB, 21.96 % more than that in 2010, which accounted for 2.85 % of GDP [6]. Although the added value of Chinese cultural industry increases every year, but the overall size is small, and is far behind the developed countries. For example, the average speed of British cultural industry development is twice than that of economic growth, with the average annual output value of nearly \$60 billion, which accounts for about 11 % of GDP, more than the output value created by any kind of traditional manufacturing industry. Culture creative industry has become the second largest industry of the British, having 1.95 million employment populations and ranking first in the country [3].

3.2 The Low Efficiency of Cultural Industry Resources Allocation and the Serious Waste of Cultural Resources

Currently, Chinese cultural management department is mainly composition of Ministry of Culture, General Administration of Press and Publication, Radio, Film and Television, Ministry of Industry and Information Technology and People's Republic of China National Tourism Administration. These four systems separately do their duties. The combination of unreasonable management pattern and the long-term government-run system monopolizes departments and business in the field of cultural industry and causes a serious regional blockage, the messy segmentation in the cultural market, and blocked distribution channels.

3.3 Few Original Technology Inventions in the Cultural Industry and the Slow Technology Progress of the Cultural Industry

Factors of technical progress of cultural industry are penetrated in many aspects of market structures and market behaviors of the cultural industry, and finally are reflected by the cultural industry growth. There are a few original technical inventions and technology innovation in Chinese cultural industry. For example, in the network game industry, foreign manufacturers with the advantage of technology and management occupied the leading position in domestic market for a long time. However, most domestic manufactures who act as sales agent and manage Chinese localization and outsourcing business lack independent research and development products.

4 Countermeasures for the Development of Culture Industrial Organization in China

4.1 Strengthen the Science and Technology Innovation of the Cultural Industry and Increase the Technological Content of Cultural Products

The cultural industry is the knowledge-intensive and technology-intensive industry. Only with the support of knowledge and technology can we provide better products and services for cultural consumers. The cultural industry in China has a widespread problem of low technological content and low level of application of science and technology in the cultural enterprises. In order to developing the cultural industry of China, we must attach great importance to the application of science and technology in the cultural industry, to strengthening science and technology innovation of the cultural enterprises and to perfecting the incentive mechanism of technology innovation.

4.2 Lower the Exit Barriers of the Cultural Industry to Create Conditions for the Market Concentration of the Cultural Industry

At present, there are excessive competition phenomena in some sectors of Chinese cultural industry such as press and publishing market. In order to lower the exit barriers of state-owned cultural enterprises, we need to further straighten out the relationship between the central and local government, governments and enterprises. We also need to establish a normal bankruptcy mechanism for cultural enterprises and give full play to the law of value in regulating and guiding resource flows. In this way, we can clear the system obstacles for prevailing cultural enterprises' merger and acquisition across regions, businesses and ownerships and we can create conditions for the market concentration of the cultural industry.

4.3 Promote the Market Concentration of the Cultural Industry to Break the Division and the Geographic Barrier of the Cultural Market

Confronted by the increasingly fierce competitive environment of the cultural industry, it is very important to cultivate the cultural market system and to give full play to the role of the mechanism of cultural market. Therefore, in order to achieve the optimization of culture industrial organization in China, we must give

full play to the policy guidance of the culture industrial organization, speed up the transformation of government functions, deepen the reform of cultural system, break the segmentation and regional blockade of the culture market, lower the administrative entry barriers of the cultural industry to, and eliminate the institutional barriers of the cultural industry to realize the rational flows of cultural resources.

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Study on Mechanism of Shared Resources Influencing Competitive Advantage of Creative Cluster Firms

Shouxian Liu

Abstract Creative industry has positive influences on adjustment of industrial structure, expansion of domestic demands and creating jobs. Based on resource-based view (RBV) of firm, this study suggests that in the context of industrial clusters, variation in performance between creative cluster firms and non-cluster firms is attributed to availability of share resources in creative industrial clusters. Synthesizing the literature on shared resource, this study examines the influence mechanism of shared resources on competitive advantage of creative cluster firms from three dimensions, including common reputations, exchange and combination of resources and participation and support of local institutions. Then, we propose some helpful measurements to achieve competitive advantages of creative cluster firms, to promote function of creative clusters, and to enhance the development of regionally creative economy.

Keywords Creative • Cluster • Shared resource • Competitive advantage

1 Introduction

According to Creative Industries Report in China 2012, growing rate of operational profit of creative industry in China increases from 49.51 % in 2006 to 79.23 % in 2012. Under the global financial crisis, a rapid growth of cultural and creative industries has been emerging, which promotes industrial reconstruction, expanded domestic demand and employment. Especially, creative industry plays important

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roles in growth of culture industries. However, there are some problems such as implicit property rights, weak core firms and shortage of innovative atmosphere in development of creative industry. Referring to the lessons of developing creative industries from developed country, it is a practicable mode to develop creative industry with agglomeration or cluster mode.

The theory of agglomeration explains why competitors often cluster in groups. Agglomeration is counterintuitive from a traditional economic perspective since competition is typically reduces performance. Porter [1] pointed out that agglomeration is not uncommon. For example, competitive clusters exist in entertainment (Hollywood), computer technology (Silicon Valley), and many other industries [1]. They are especially common in service industries such as printing, publishing, and retail, where they exist in many locations throughout the world. The characteristics of these competitive clusters vary. It is tempting to assume that agglomeration is primarily a result of natural advantages associated with particular geographic locations. Such advantages may include lower-cost factors of production or proximity to necessary resources such as arts, culture, or population centers. It is admitted that many other types of factors seemed important in a number of highly geographically concentrated industries, like support of governments, market operation of real estate and so on. Various types of creative industrial clusters has been formed or accomplished in many cities such as Beijing, Shanghai, Shenzhen, and Xian. These clusters aim to gather and cultivate creative talents and creative enterprises, and then sustainable competitive advantage of cluster firms can be achieved through sharing mass resources in cluster.

For Porter [1] clusters are “geographic concentrations of inter-connected companies, specialized suppliers and service providers, firms in related industries, and associated institutions (e.g. universities, standard agencies, and trade associations) in particular fields that compete but also cooperate” [1]. And clusters, as the focus of public policy and economic policy, play a critical role of flexible specification production and self-organizing in giving impetus to development of regional economy and national innovation.

Prior studies examine shared resources with economic geography and industrial cluster, but there are few studies about shared resources of creative industrial clusters, especially about influence the mechanism of shared resources on sustainable competitive advantage of cluster firms in the context of industrial clusters. To address this important research gap, we proposed a model of an interactive mechanism under which shared resources act on the competitive advantage of firms in clusters.

More specifically, the objectives of this paper are three-fold: to identify those cluster-specific resources and capabilities, to understand the impact of these interactions between shared resources of cluster on the cluster firm’s competitive advantage and to propose some measures to enhance competitive advantages of cluster firms in the context of creative industrial cluster.

2 Shared Resource, Creative Industrial Cluster and Competitive Advantage

Creative industrial cluster is formed through industry division and the process of extension and expansion of upstream or downstream of value chain in creative industry. And cluster firms lie in one or more fragments in value chain of industry. CIS comes into being mainly by two modes. The first mode characterizes spontaneously forming industrial chain among actors in CIS by the bonds of capital and profit in the case of enormous opportunities in creative industry. The second mode characterizes intervention from local governments or multinational enterprises. The mode comprises two-stage courses, respectively intervention by administrative orders and agglomeration effects diffusing. The entirely CIS consists of various actors: the leading creative firm, government and public institutions, suppliers (upstream firms), product sellers like derivatives (downstream firms), and enormous supporting institutions.

In recent years, there is a growing attempt to extend the resource-based view (RBV) of the firm to account for performance at the cluster level [2]. While RBV primarily sees a unique set of resources of the firm as a source of competitive advantage, the extended theory in the cluster context emphasizes the effect on firm performance of additional category of semipublic resources that is exclusively available to clustered firms. In the cluster context, there is another kind of resources, which is external to, but is shared by, firms in the cluster. The common propositions in the argument are that shared resources are those higher-order heterogeneous resources shared by clustered firms and that a cluster's unique set of shared resources leads to inter-cluster differences in performance. It is widely held that shared resources are responsible for variations in firm performance between clustered and non-clustered firms and between clusters [2].

Nevertheless, firms in the same cluster show significant differences in the nature and structure of internal, strategic resources. Thus, internalization of shared resources in clustered firms is the key to account for heterogeneity in competitive advantage as well as in performance. The lack of understanding of this internalization process is arguably the missing link between shared resources and firm performance in cluster research.

Specifically, some researches has examined the relationship between shared resources and firm performance. Hult and Ketchen [3] argue that four strategic capabilities, i.e. market orientation, entrepreneurship, innovativeness and organizational learning, play an important role in a firm's acquisition of competitive advantage [3]. Meanwhile, Molina and Martinez [4] empirically explore the notion of shared resources (i.e. common reputation, intensity of exchange and combination of resources and participation of local institutions) and their association with firm value creation [4]. And based on Molina and Martinez [4], Xiaobo Wu et al. [5] extended the concept of shared resources to include additional three elements, i.e. high trust among firms, collective learning and knowledge-sharing network and atmosphere of intensive inter-firm cooperation and competition [5].

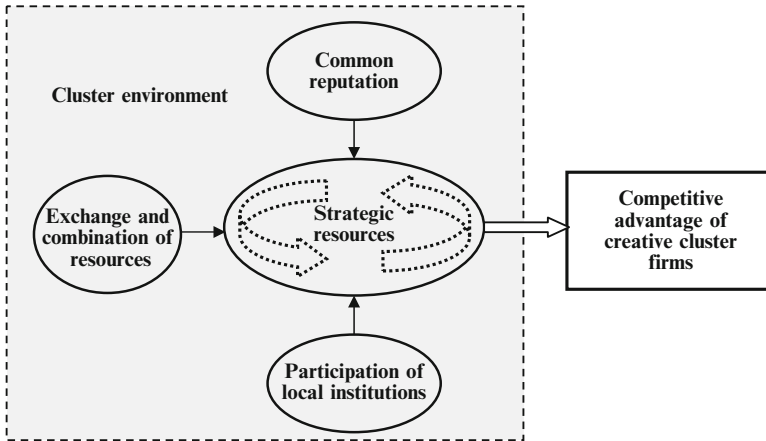


Fig. 1 Internalization of shared resources and competitive advantage of cluster firms

3 Shared Resources and Competitive Advantage of Cluster Firms

In fact, three components construct competitive advantage of creative cluster firms: cluster environment contingently or formed with intervention externally, shared resources arise from internal creative cluster characterizing embeddedness and heterogeneity, mechanism that competitive advantage of cluster firms is achieved by strengthening organization capacity such as learning, innovative and market orientation, influenced by shared resources. This study builds upon Molina and Martinez's [4] notion of shared resources to develop a conceptual model that depicts this interactive mechanism. Therefore, as shown in Fig. 1, we proposed a logical model that bridges the missing link between shared resources and firm performance.

3.1 *Common Reputation and Competitive Advantage of Creative Cluster Firms*

Clusters have identities, much like strategic groups and organizations. Clusters with stronger identities will have more positive reputations. At the cluster level, positive cluster reputation reflects what stakeholders think about firms in the cluster. Positive common reputation presents enhanced collective branding to customers. The geographical concentration of suppliers brings the advantage of convenience of procurement. Critical mass of customers allows cluster-based firms to possess more market intelligence to uncover the profile of their customers and changing needs of

the market. This positive information asymmetry on the part of cluster-based firms enhances their market orientation. Furthermore, positive common reputation will not only have a greater draw on skilled workers and other resources, but also pave a way for collaborations that are conducive for new product, process and organizational innovations. Additionally, positive common reputation will enhance innovative capacity for creative cluster firms with external cluster resources, then more possible to achieve sustainable competitive advantages [6].

3.2 Exchange and Combination of Resources and Competitive Advantage of Creative Cluster Firms

Exchange and combination of resources are the distinct features of a networked system, within which resources inside firms in CIC are exchanged and reorganized constantly. Networks help creative firms utilize both tangible resources, e.g. physical, financial and human capital, and intangible resources, e.g. knowledge, skills and talent, to boost up their innovation capability. Finally, channels of exchange and combination of resources facilitate transfer of tacit knowledge among firms through knowledge spillover in the cluster. Explicit knowledge transfers and shares in CIC, through transaction and display of creative products in the cluster and sharing of technology patents. The process of tacit knowledge transfer in CIC is compose of communicating and thinking collisions among individuals in the creative enterprise and sharing of opinions between staffs within the various units of research institutions, intermediaries, public sector.

3.3 Participation of Local Institutions and Competitive Advantage of Creative Cluster Firms

Local institutions in CIC have evidently positive influence on strategic resources. Especially in the cases in which creative firms are reluctant or unable to provide the public goods or services that have notable spillover effects, supply of public goods from local institutions is relatively of high efficiency and supplemental [4]. For example, generation and diffusion of market knowledge in CIC by local institutions have a significant effect of knowledge flow and enhance the market orientation of firms. Furthermore, institutions, such as research institutions, academies and universities can be instrumental in bringing creative firms together to cooperate for collective benefit.

4 Countermeasures to Achieve Competitive Advantage of Cluster Firms Embedded in Shared Resources

4.1 Effectively and Operable Spatial Planning Scheme

The identification of the effect interactions between shared resources and strategic resources will have on firm performance in clusters has important implications for spatial planning of CICs. On the regional policy level, it consolidates interpretation of CIC as an integrated local production system in which the genesis of competitive advantage in a geographically concentrated process occurs in a place as well as in a firm. Additionally, the effectiveness of government cluster initiatives is underscored by the availability of features of creative firm strategic resources. Therefore, spatial planning would be more effective if it would adopt an approach of multi-layers of political discourse, including businesses as a strategic player.

4.2 Cultivating Industrial Chain

Positive common reputation ought to be obtained through the unique value chain in CIC. There are some measures. Firstly, CIC should pay attention to the interaction effects among industrial fragments lying in different phases, and establish close contact among the culture creative product designers, manufacturers, distributors, dealers and other actors. Secondly, CIC should spread concentration and diffusion effect in CIC, and form specialized division of labor and cooperation. At last, CIC should extend the competitive segments of value chain of creative industry, and firmly grasp two high value-added sectors of culture creative product.

4.3 Forming Harmonious Environment and Atmosphere Within CIC

Firstly, by building many forms of different industry carrier such as CBD, creative street, industry base and professional park etc., government should provide the necessary working and living environment for knowledge exchanges between creative talents, enterprises and other institutions, to improve the infrastructure in CIC. Cultivating and creating CIC is the ideal way to promote new ideas and to create the shared resources. Secondly, government should strive to cultivate the free, open knowledge innovation atmosphere in CIC, and provide the conditions for creative formation and knowledge exchange in cluster through the methods such as knowledge BBS, exhibition, technology and property right exchange and other forms.

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Industrial Cluster, Roles of University and Development in Digital Publishing Industry

Shouxian Liu and Hao Liu

Abstract Cluster is the potential developing mode for digital publishing industry. In recent years, 12 national digital publishing bases are released to promote the integrative innovation of value chain of digital publishing industry successively. Some clusters are not clear of developing modes, so fluent knowledge flow, perfect diffusion effect and integrative innovation, emphasizing and paying attention to the role of universities adjacent to clusters, are all the feasible alternatives to improve innovative ability of actors. Based on congregation of digital publishing industry, this paper clarifies five roles of university and research institutions in digital publishing industrial clusters' system of innovation. At last, this paper brings up some countermeasures to promote diffusion effect of university.

Keywords University • Digital publishing • Industrial cluster • Innovation

1 Introduction

With advancing in information technology and digital publishing technology in recent years, digital publishing enterprises grow up quickly and digital publishing products become more popular in public. And digital publishing operation is bulging to a new level, that the total sale reached more than 250 billions RMB in 2013. In China, income of digital publishing industry achieves average growth rate more than 30 % for 3 years, and increases from 2010 (10.52 billions RMB) to 2012

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(19.35 billions RMB). Many units, such as press, publishing group and newspaper group, establish digital publishing departments, increase input and spend more for design and development of digital publishing products.

2 Development of Digital Publishing Industrial Clusters

Academic research upon the concept of industrial clustering is now well-established. The essential characteristics of a cluster centre upon the spatial concentration of networked firms and institutions within an industrial sector, wherein there is cooperation between production and service firms along the value chain, together with a balanced relationship in terms of cooperation and competition between firms. Conglomeration is characterized in the development of digital publishing industry in China. There are 12 national digital publishing bases (NDPB), including Zhangjiang in Shanghai, the first NDPB, and Chongqing, Hangzhou, middle-south in Changsha, Huazhong in Wuhan, Xi-an, Guangdong, Tianjin, Jiangsu, Anhui, Beijing and Fujian Valley. Based their conditions, these NDPBs' unique features appear, and so the effect of diffusing knowledge is advanced. For example, Zhangjiang NDPB in Shanghai congregates more than 400 digital publishing firms, sets up public service institution of technology and service centers for registration and trade of copyrights, and achieves annually 20 billions RMB. Otherwise, relying on their advantage in calculating technology, Chongqing national digital publishing base characterizes "cloud" technology.

Although these NDPBs make promotion in development of industry, comparing with international developed creative industrial clusters, there is much disparity in innovative network of cluster, cooperation and interaction among firms, diffusion of technology and knowledge, and capacity of integrative innovation. Some NDPBs are absent of clearly developing modes, fluency knowledge flow, perfectly diffusion effect, and integration and innovation. The cooperative mechanism of integrating production, learning and research is still not formed in digital publishing industrial cluster. Thus, due to the weak capacity of innovation, sustainable competitive advantage is harmed.

According to relevant research, emphasizing and paying attention to the role of universities adjacent to NDPBs is a feasible alternative to improve innovative ability of actors. Currently, 12 NDPBs are all located in economically developed areas, which enjoy abundant science and education resources. For example, Zhangjiang NDPB in Shanghai is adjacent to dozens of famous universities, such as Fudan University. Similarly to Xian NDPB in Shanxi near to many research institutes like Xi'an Jiao Tong University, Hangzhou NDPB is close to Zhejiang University, and so are Beijing and Tianjin. Thus, it is urgently to expatiate and clarify the role of university in industrial integrative and innovative network of actors in NDPBs, and to propose some feasible measures for university to improve effect of knowledge innovation and diffusion.

3 Roles of Universities in Digital Publishing Industrial Cluster's Systems of Innovation

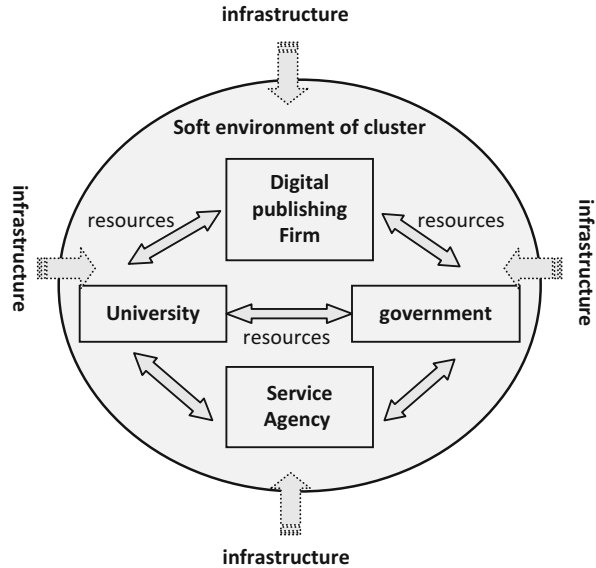
In recent years the traditional research and teaching missions of universities have been extended to direct interactions with cluster's stakeholders [1]. Universities and public research organizations have become important knowledge sources in industrial innovation processes. The essence of this process lies in the linkages that are being built between universities and industry. There are two models of university involvement in cluster's development. First, the generative function serves cluster's needs directly by providing boundary-spanning activities like incubators and science parks. Second, a developmental function consists of adjusting research and teaching activities to cluster's needs [2]. Universities can take over a broader developmental function at the cluster level since the academic and administrative transition of universities allows them to respond to the cluster's needs more efficiently through long-term relationships with local actors. University–industry linkages vary in their degree of institutionalization, which may range from the informal hiring of researchers, to long-term partnerships and joint research centers. In this study, we have defined five distinct roles that universities perform and define a set of performance measures for each role to measure their level of engagement in the industrial development through building and participating in clusters. In NDPB, the main actors and institutions comprise enterprises that located in upstream and down stream of digital publishing industrial value chain, specifically including content creative suppliers, traditional publishing, digital technology, digital printing, CD/DVD copier, internet operators, and communications. Additionally, other actors such as universities and research institutions, service agencies, government and public sector and financial institutions form network interactive relationship among them and constitute the overall cooperative mechanism of NDPB (as Fig. 1 shows).

Training: OECD has recommended that new universities are created with the explicit, central mandate to promote regional development through training people [3]. For example, in the case of the digital publishing industry, the increasing complexity of digital and internet processes implies the need to train people in sophisticated processes.

Research: The role of developing and transferring knowledge is the subject of intense ongoing research. The university's engagement in research should be considered in the context of the industry. For example, R&D processes in natural resource-based industries may follow two paths: R&D processes that occur inside large multinational corporations; or research institutes with close ties to industry that are established in regions where the natural resources are exploited.

Consulting/servicing: Faculty consulting, underemphasized by universities, is generally regarded by industry as significantly more important for knowledge transfer than patents. Laboratory services are examples of outsourcing functions strongly based on knowledge, which require investments that exceed the available resources of small businesses.

Fig. 1 Actors in digital publishing industrial cluster



Creating new firms: Entrepreneurship, it is argued, is an essential input to the growth of regions. In turn, dynamically functioning regions are conducive to the development of entrepreneurship [4]. Consequently, entrepreneurship education has grown greatly over the past 2 decades.

Facilitating linkages: Universities should consider building local innovation systems as central to their missions to promote the development of the region. Thus, the formation of linkages strongly depends on the fulfillment of the training and research roles of the universities [5]. In a digital publishing region, universities can support the development of communities of practice around specific issues like copyright protection.

4 Countermeasures to Promote Function of University in Digital Publishing Industrial Cluster

4.1 Transmit to the Entrepreneurial University

In two centuries, university undergoes two revolutions. The first revolution takes place through a shift from teaching-oriented attitude to trade-off between teaching and research. The second revolution makes another shift from the trade-off to integration among teaching, study and training [1]. The second revolution takes place both through a shift in attitude of faculty and students toward their research results and in the development of a series of organizational mechanisms to transfer

knowledge and technology, going well beyond publication. For this period, university transformed from depositing and transmitting knowledge to creating knowledge, and then to utilize and spread knowledge in various ways. Although there is much conflicts among so many roles for university, university still contains its commonly instinctive idiosyncrasies, because every new role can be integrated into old role.

Entrepreneurial universities are expected to play a leading role in innovation of NDPBs and to encourage start-ups. Similarly, digital publishing industry is expected to reorganize itself in a network mode to be more receptive to external inputs. Local government is expected to develop programs cooperatively with the other actors to support enhancement of the university, digital publishing industry and the links between them. The three spheres are expected to act as a common subject and cooperatively implement an economic growth strategy.

Entrepreneurial universities should be industry-oriented and accept the entrepreneurial notions. Firstly, entrepreneurial training about digital publishing operations should be contained in teaching, through introducing relevant courses to the class, inviting experts or entrepreneurs on digital publishing to give lectures, integrating practical courses, practices and entrepreneurship. The modes is proved to be efficiently in Sweden and Brazil, in which graduates carry out some research tasks and establish companies. Meanwhile, in Beijing, a series of policies was publicly released to encourage professors and undergraduates to star-up their business in 2014, which is regard as accelerators to commercialization of digital publishing researches and entrepreneurial university. Secondly, research of university should market-oriented in NDPB through two methods. For one thing, university can organize some projects targeting to solve practical problems of digital publishing firms. For another thing, university can take out funds from the government combining with digital publishing enterprises.

4.2 Connecting Research and Technology with Venture Capital

Venture capital intervenes into entrepreneurship and innovation in university and industry. And university plays the intermediary role in NDPBs, bridging capital suppliers and demand of capital. Demanders of venture capital are composed of digital publishing enterprises, research teams from university and so on. As well as government, large companies, university and various funds constitute main suppliers of venture capital.

The different funds have different characters. Public venture capital from government support entrepreneurship that is focusing on new technology, new industry and work opportunities, and is mainly put into start-ups. Venture capital from large company favors the firms or projects that have founded several years, which can reduce the time of returning investment. Similarly, venture capitalists

from university pay close attention to entrepreneurs and star-ups, but venture capital cannot meet the need of originally industrial innovation independently, and is obliged to combine with government venture capital. Lastly, venture capital from funds, which is purely legally protected, can independently allocate and arrange funds, focusing on potential entrepreneur and projects. Thus, venture capital from government and university remain bullish about long-period projects.

The integration between technology and finance in NDPBs depends on university. There are some reasons. The first is that university can provide advanced technology and knowledge, including digital, visual reality, printing, internet and information technology. The second is that university can invest and operate these incubating enterprises, acting as stockholders and investors. The third is that both university-owned firms and network of innovation can make commitment for venture capital outside. For example, in Beijing NDPB adjacent to aggregation of universities, many agencies of venture capital gather here, such as Innovation Work, Garage Coffee and 3 W coffee.

4.3 Constructing Interaction and Cooperation Mechanism of University, Digital Publishing Industry and Government

With digital and internet technology advancing, innovation of digital publishing is extremely accelerated. Simultaneously, there is transition in the field of technological innovation, that is, technological innovation modes changes from closed innovation to open innovation [6]. Digital publishing enterprises innovating openly with external actors, like university, government, agency and other firms, more emphasizes the cooperation and symbiosis of technological innovation. Furthermore, it is particularly critical for digital publishing enterprises in NDPBs to continuously make achievements through integrating new notions from universities and feedbacks of market. Additionally, cooperative innovation in NDPBs can be achieved by strategy alliances, joint venture and so on.

In NDPBs, cooperative innovation institutions such as research center should be established to construct interaction and cooperation mechanism of university, digital publishing industry and government. These cooperative innovation institutions gathering numerous resources and intelligent talents from universities, digital publishing enterprises and local government, promote interaction among different branches of learning, connect teaching and research with demand of market, and reconcile horizontally strategic alliance and vertically bureaucratic mess.

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Part VI
Special Session on National Economy

Analysis of China's Rare Earth Industry Security and Countermeasures

Gang Han

Abstract The rare earth metal is an important strategic resource. This paper analyzed the issues affecting rare earth industry security. Based on combing the related literature with rare earth industry security, it gave the definition of rare earth industry security. Then the paper analyzed the Status of the rare earth industry security from three aspects which are Development environment, International competitiveness and industry control. Finally it found measures to ensure the rare earth industry security.

Keywords Rare earth • Industry security • Status • Countermeasures

1 Introduction

Rare earth is founded to be composed of oxides which are 17 chemically similar elements in the periodic table. Because it's difficult to smelting and purification, rare earth is named. Rare Earth has excellent performance. They are now being widely used in the field of military, metallurgy, petrochemical, glass, ceramics, new materials, agriculture, permanent magnet materials industries. Rare earth resources are important strategic resource, they are also non-renewable resources. China's rare earth resources are unique, widely distributed and all the whole variety of features. The development of scale of rare earth industry is also growing. China is the largest rare earth producer, consumer and exporter country in the world. But there are still bottlenecks in rare earth industry. Industrial security issues can't be ignored. Voice heard and pricing power is not commensurate with the first producer of China's rare earth industry in the international market. Rare earth industry has poor international competitiveness. There also exist many problems, such as the development of rare earth industry is not balanced, resources are serious waste, industry concentration is low, and technological innovation is not in high level in the domestic market. These problems affect the security of China's rare earth industry seriously, hindering the rapid and sustainable development of rare earth

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industry. This paper gives the definition of rare earth industry security and analyzes the status quo of problems China's rare earth industry safety, based on the industry security theory.

2 Definition of Rare Earth Industry Security

Combing the existing literature related with the rare earth industry, research in the economic management of the rare earth industry of domestic scholars focus on the development of status quo, problems and countermeasures of rare earth industry. For example, Chunyan He [1] studied the export trade of rare earth, built a game model of export trade and designed the export trade policies. Zhijun Wu [2] argued the problems existing in China's rare earth industry, such as low industry concentration, the extensive mode of exploitation, lack of technological innovation, export disorder and other issues. Yu Shang [3] studied on the international competitiveness of the rare earth industry. Maolin Guo [4] introduced the reserve volume and distribution of rare earth resources in China, analyzed the problems existing in the development and utilization of rare earth resources in China, and put forward some suggestions on strengthening the strategic security of China's rare earth industry.

Specifically, the research relates to the following aspects: First, the pricing and voice heard of rare earth industry; Secondly, the international competitiveness and market competitiveness of the rare earth industry; Third, the rare earth industrial organization and industrial structure optimization; Fourth, the rare earth industry cluster. Current research has made some achievements; it provides good suggestion and future development strategy for the development of rare earth industry. However, the current study has yet to rise to industry security level from the aspects of theory and practice. Research related to rare earth industry Security is limited. The current research focused on phenomenon, but did not discover the origin of the theory of phenomenon. They don't keep with the frontier academic research. The research is fragmented and there is no research system.

Drawing lessons from professor Menggang Li [5] about the general definition of industrial security, rare earth industry security refers that survival of and development is far from the threaten state. Understanding this definition as follows: First, the behavior subjects of rare earth industry security include rare earth enterprises, the rare earth industry, and national security.

Because of the special physical properties, rare earth combination with other materials can be formed new materials and can greatly improve the technical performance by using manufacture of tanks, planes, missiles, steel and alloys. When used in the manufacture of military equipment, they can significantly enhance the level of military technology. So rare earth industry security has been elevated to national security height. Second, rare earth industry security includes survival and development security. Rare earth industry should have a certain market share. The industry should be internationally competitive and has a place in the international market under the opening conditions.

3 Status of the Rare Earth Industry Security

3.1 Development Environment of Rare Earth Industry

The world's rare earth resources are mainly distributed in China, CIS, USA, Australia, India, Brazil and other countries. According to the U.S. "Mineral Commodity Summaries 2012" report, China's rare earth reserves have ranked first in the world [6]. Total production is 55 million tons, accounting for 50 % of the world's total reserves. CIS has ranked the second. The reserves are 19 million tons, accounting for 17 % of the world's total reserves. Followed by the United States, the reserves are 13 million tons, accounting for about 11 % of the world's total reserves. India and Australia's reserves have ranked the fourth and fifth, accounting for 2.82 % and 1.5 % respectively. Brazil and Malaysia have fewer reserves. The share of other countries is about 20 % of the world's total reserves. However, according to the White Paper "China's rare earth conditions and policies" published by China's State Council Information Office, China's rare earth reserves are about 23 % of the world's total reserves. It is far below the actual data released by the United States. Forming a sharp contrast with the data, the U.S. production is zero. Australian production is zero. Russian output is also zero. After half a century of disorder, super strength exploitation, rare earth reserves are declining. Mining resources accelerate decay. The situation is not optimistic.

In recent years, many large countries control their rare earth mining and exports strictly. Many countries stopped their rare earth mining. In order to protect rare earth resources, Mountain Pass was closed for about 8 years in United States. Japan hoarded a lot of rare earth in the sea to prepare for future needs. Besides, Japan also imports large rare earth from China by low prices. After 2007, China began to implement mandatory plan for rare earth production and began to reduce exports of rare earths. Countries led by the United States and Japan take this as an excuse to keep pressure on China. They sued China to the WTO, accusing China's restricting exports of rare earths, controlling rare earth resources, triggering rare earth prices, impacting of the global production chain. Unreasonable pressure from western countries is not conducive to the development of China's rare earth industry. There are some challenges in the international environment for development of rare earth industry. Rare earth is an important strategic resource. Rare earth industry security has risen to the height of national security. China's rare earth industry must improve the irrational developmental styles, in order to protect the rare earth resources and achieve sustainable development (Table 1).

3.2 International Competitiveness of Rare Earth Industry

From technical perspective, our separation of smelting technology has reached the advanced world levels. We have a unique technology of rare earth mining and

Table 1 World mine production and reserves (ton)

Country	Production 2010	Production 2011	Reserves
U.S.	–	–	13,000,000
Australia	–	–	1,600,000
Brazil	550	550	48,000
China	130,000	130,000	55,000,000
Commonwealth of Independent States	NA	NA	19,000,000
India	2,800	3,000	3,100,000
Malaysia	30	30	30,000
Other countries	NA	NA	22,000,000
World total (rounded)	133,000	130,000	110,000,000

mineral processing with independent intellectual property rights in the mining, processing, smelting, and other aspects. The United States and other western countries are unable to compete with. However, in aspects of processing and application technology, we still have a big gap with the western countries. Technical threshold is high in the processing field of rare earth industry chain. Backward technology makes us lack of high-end rare earth products. All we focus on improving manufacturing capacity of rare earth materials. But we ignore the problems of lag-end application development, lower resource utilization is not high, and low levels of industrial scale applications. Especially the technical level in the field of new materials of rare earth can't compete with the developed countries. We also lack of innovation capacity and core technology.

From industry concentration perspective, China's rare earth enterprises were small, scattered and chaotic. There are 126 enterprises having original production capacity of about 320,000 tons. It is greater than the world's total annual demand about 12 million tones. Hence it needs for industry consolidation in order to increasing industrial concentration.

On May 2011, the State Council issued the "Opinions on Promoting the sustainable and healthy development of rare earth industry", and required to carry out special rectification to accelerate rare earth industry consolidation. Every province began to speed up the integration of rare earth resources and corporate mergers and acquisitions. They integrated the mining rights and mining, beneficiation, smelting enterprises in rare earth industry in order to promote the effective integration of central enterprises and local enterprises. Formation of large enterprise groups are benefit for the concentration of rare earth industry. They can enhance and improve the international competitiveness of China's rare earth industry.

3.3 Foreign Investment of Rare Earth Industry

Industry control is to investigate the ability of their capital to control their own industry. It is the game between the control ability of domestic and foreign capital.

Su Bo, vice minister of the Ministry of Industry, said that by 2012 the number of foreign-owned and joint rare earth enterprises are 38. The Ministry of Industry encouraged foreign capital to invest rare earth environmental governance, waste products recycling, high-end applications and equipment manufacturing fields of rare earth industry. With the implementation of the policy to protect rare earth resources, tightening the export of raw materials of rare earth, foreign funded enterprises start to buying rare earth through other means, and investing deep processing field. Many industries inside are worry about it. They firmly believe that the main purpose is to circumvent foreign investment quotas and access to rare earth materials. Domestic enterprises who have export quota can sale index, which gives these foreign companies to "opportunity", they can buy quotas for export by domestic agents. In addition, some large-scale foreign companies invest to build factories in China. They process rare earths simply and export them. They disguised rare earth exports to their home countries in order to avoid the export quotas. From the perspective of industry control, although foreign capital entering China's rare earth industry are clearly defined, the current share in the proportion of the rare earth industry is not large, it must be wary of foreign implicit aims. That is to get more rare earth resources in the long run. This has an adverse effect on the development of China's rare earth industry, and even national security.

4 Measures to Ensure the Rare Earth Industry Security

Rare earth resources are strategic resources which are very important for all the countries in the world. Rare earth resources are related to national economic security and military security. Government and companies must attach great importance to the rare earth industry security problems and take appropriate measures to ensure the sustainable development of rare earth industry.

First, we should establish a strategic resource reserve system of rare earth. Rare earth is precious non-renewable resources. Because of the rare earth resources exploitation widely, illegal disordered mining, excessive reliance on exports in the past, leading to China's rare earth resources waste seriously and reserves decreased. Rare earth resources have not been effectively protected. Therefore, we should strengthen the protection awareness of rare earth resources, strengthen the government's macro-control of rare earth resources, establish strategic reserve system, attention to purchasing and storage of rare earth. We should adjust the supply according to the needs to keep balance and stabilize market prices, and strive for international voice and pricing of rare earths right.

Second, increasing scientific and technological research in order to enhance the level of technological innovation. The technical level is short board for high-end rare earth products. Technology innovation can increase the added value of rare earth products and make it occupy a space in the high-end market. At the same time, we should increase R & D investment in rare earth technology, and promote joint

development among rare earth enterprises, universities and research institutions to achieve as soon as possible.

Third, integrating of rare earth resources and developing large enterprise groups. It should be strengthening the management of rare earth industry, strengthening mergers and acquisitions of the rare earth industry, formatting of large rare earth enterprise groups. Large enterprises play a leading role in the entire industry to improve industry concentration and enhance industrial competitiveness.

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National Energy Security Strategies of China

Hongyan Zang

Abstract The energy supply for China's economy and population grows increasingly faster than its own capacity. As the second largest economic power in the world with a quarter of the world's population and one tenth of the GDP, China has an increasing demand not only in energy consumption but also in many other aspects. China's energy consumption has already surpassed that of other countries except for America. Meanwhile, more than half of hydrocarbons required by China should be imported from abroad. Out of concern about China's energy safety, since 2006, the government of China has started to study the energy safety strategies and gradually established an energy political and economic system in the modern China.

Keywords China's economy • Energy safety • Energy strategy

1 Introduction

In recent years, with the development of economy, China has increasingly become a major energy importing country. At present, China is the second largest oil consumption country in the world only second to America and is far short of strategic petroleum reserve. The government of China attaches much importance to strategic policies of energy safety and has established energy safety strategies. China's energy safety strategies mainly consist of six projects with the priority target being establishing a national energy safety system in China.

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2 Developing China's Petroleum and Natural Gas Industries

Due to the rapid growth of China's economy and a sharp increase in the amount of energy consumption resulted by deepening of industrialization, China passes a policy aiming to increase the domestic hydrocarbon reserve and production of petroleum and natural gas.

China's petroleum and natural gas are mainly produced in those eastern provinces. However, these areas have been exploited for many years and most of the resources have been consumed, so the quantity of production is now on the decline. For example, the petroleum reserve of the Daqing oilfield decreases rapidly. In 1994, its yield was around 0.56 million tons while it has been lower than 40 million tons since 2007.

Therefore, the government of China has decided to accelerate its pace in seeking a new production place in the western region while at the same time makes use of latest technologies to accelerate the exploitation progress. However, exploiting offshore oil and gas fields, oil and gas exploitation and production in a large scale require an increase of capital investment and import of advanced foreign technologies and optimal management practices. Relevant Chinese departments predict that China will need a total sum of 22 billion yuan in building infrastructures and natural gas production areas ranging from now to 2020.

3 Fuel Balance and Energy Rationalization

China's fuel imbalance is mainly manifested as a larger share of coal consumption. Too much reliance on energy may not only threaten the energy safety but also pose great threat to the environmental protection. Pollutions such as sulfur dioxide and carbon monoxide naturally emitted while burning coals would be extremely harmful to the neighboring countries or even the global environment. At present, China ranks second in both the amount of greenhouse gas emission (carbon dioxide) and sulfur compound emission. Among those 20 most polluted cities in the world, 16 of them belong to China.

China's leadership has decided to gradually reduce the proportion of coal from 65–69 to 54 %, increase the share of natural gas from 3 to 7–10 % and that of nuclear energy and hydroelectricity to 9 % by 2020. Currently, China pays special attention to alternative and renewable energies and plans to increase the share of renewable energies to 15 % by 2020. In order to realize this goal, in 2005, China issued the law of renewable energies and formulated a middle and long term development plan of renewable energies with a total investment sum of 2,000 billion yuan.

In the next several years, those renewable resources developed in China would mainly be exploitation of hydro energy, wind energy, solar energy and biological

energy. China is going to accelerate its pace in realizing the use of renewable energies in power stations. By 2020, China plans to build a hydroelectric power station with a total capacity of 3 million kilowatt, a 30 million kilowatt wind power station and a 0.3 million kilowatt solar power station with a production capacity of 1.8 million kilowatt. Therefore, China plans to optimize the syntheses of fuel and energy by transforming towards the consumption modal of natural gas.

4 Domestic Measures on Resources and Energy Conservation

At present, China is a country characterized by high gross domestic product per capita energy consumption and high energy density. China's thermal power stations usually consume 27.4 % coals to produce 1,000 kW h of electricity which exceeds that of some countries possessing advanced technologies. The consumption of one dollar GDP is three times higher than the global average level and it results in a financial loss of about 120 billion dollars in just 1 year.

In the future, the problem of population energy consumption will become even more prominent. According to the normal mode, the energy consumption per capita is 4.5 times higher in the urban area than in the rural area. It is predicted that the urbanization rate of China will reach 55–60 % by 2020 which symbolizes that those villages with small energy consumption would increase their energy spending by several times.

In order to restrain the increase of energy consumption, in recent years, the government of China has always implemented a policy of energy conservation in both industries and people's life. It takes the following actions to realize these goals. It enacted the Chinese renewable energy law to change China's coal law standard code. The principle of energy conservation is included in the Chinese law mandatory standard. Besides, it is also reflected in energy conservation of buildings, replacing gasoline engine for car diesel engines, promotion of the gas technology, establishing a new vehicle energy efficiency standard and shutting off those plants and equipments characterized by excessive energy consumption.

In order to further strengthen the goal of energy consumption and controlling the total energy consumption, China aims to control its energy consumption within the limit of 4 billion tons by 2015, the proportion of coal consumption under 65 % by 2017 and the total amount of energy consumption within the limit of 4.5 billion tons by 2020. Meanwhile, China also widely implements advanced domestic and foreign technologies concerning energy consumption. However, the current economic growth of China mainly relies on industrial development in which heavy industries and chemical industries take up a high proportion in high energy consumption. The industrial energy consumption of China accounts for around 75 % of China's total electricity consumption, so utilization of industrial energy conservation constitutes an important part of the total energy conservation.

At the same time, China also achieved a better result within the range of residential energies compared with industries owing to the large scale of publicity and training in terms of China's energy policies.

However, China's energy saving policies are mainly targeted at transforming the industrial structure characterized by less energy consumption. In addition, China implements policies that are oriented towards energy consumption which would partially rather than completely solve the problem of insufficient energies required in the process of economic development.

5 Developing Alternative Energies

It is quite appealing to lay excessive emphasis on renewable energies and a lot of people don't know why the government still hasn't done this. With a sharp increase in the oil price and the price of other traditional energies, both politicians and businessmen are thinking about how to reduce or even give up its use so as to develop alternative energies. As an alternative plan, renewable energies such as nuclear power and clean energies, including solar energy, wind energy, hydro energy and biological energy, are taken into consideration. China attaches much importance to exploitation of renewable energies and considers it to be one of those most important measures for social and economic development.

5.1 Rapid Development of Biological Energies in China

Biological energies as an extremely important renewable energy is acknowledged internationally as one of those effective ways to relieve the energy crisis since its energy equivalent ranks forth only next to coal, oil and natural gas. In 2006, China adopted Denmark's advanced technology to build the first biomass power station and used a fuel made from the stem of plants which emits no carbon dioxide. By the end of 2007, China had built 10 biological power stations. During the period of the 12th Five-Year Plan ranging from 2011 to 2015, development of China's forestry biological energy will be targeted at ecological security and energy security and oriented towards the national demand. It will also focus on the development of the forestry biological energy industry represented by solid molding fuels, biodiesel, biomass power generation and fuel ethanol.

5.2 Emphasizing the Biofuel Production of Ethanol

At present, China produces about 1 million tons of fuel ethanol and biological fuel ethanol on a basis of 0.102 million tons. The share of biological ethanol fuel has

already reached 20 % of the total fuel consumption in terms of Chinese market's production and consumption of biological fuel just next to Brazil and America. However, against the background of global food crisis, the development prospect for biological fuel is not quite positive.

5.3 Emphasizing Development of the Solar Energy

According to statistics drawn by experts of the Chinese academy of sciences, China has the geographical advantage of developing solar energy industries, that is, two thirds of the international area has sunshine for more than 2,000 h each year.

5.4 Facilitating Development of New Nuclear Power Technologies Citations

The principle of "strategic, secure, steady and effective" is taken as nuclear power development strategies of China so as to ensure a steady development of nuclear power in scale. The capacity of operation and installing will reach 58 million kilowatts by 2020 and 0.15 billion to 0.2 billion kilowatts by 2030 which accounts for more than 10 % of the gross generation. The fast reactor technology will gradually be promoted commercially and a closed cycle of nuclear fuel will be established. It will reach 0.35 billion to 0.4 billion kilowatts by 2050 with a proportion of 20 % of the gross generation.

6 Establishing Strategic Reserve

In response to threats of oil supply, at the beginning of 2000, China decided to establish its national strategic petroleum reserve which can ensure the energy supply in case of any sudden disruption in external supply.

The first strategic petroleum reserve pool was established in Dalian of Liaoning Province, Qingdao of Shandong Province, Ningbo of Zhejiang Province and Zhoushan in 2004 [1]. At present, the accumulated amount of reserve is estimated to be 2–3 million tons. According to the plan, the import volume of China's strategic petroleum reserve should increase to 36 million tons each month by 2020.

Meanwhile, in 2008, China National Petroleum Corporation announced to build a petroleum reserve pool in Shanshan of the Xinjiang Uygur Autonomous Region whose commercial value was as high as 1 million cubic meters. It aimed to achieve a stable development of China's regional economy.

Nevertheless, experience of America suggests that the strategy of petroleum reserve is hardly of any use with its main purpose being a long term reserve. In the past decade, America had only benefited from its strategic petroleum reserve once while dealing with reconstruction matters after the hurricane Katrina. Moreover, building and maintaining a strategic petroleum reserve require a large amount of capital investment.

At present, the national petroleum reserve proceeds well. In 2010, the total output value of national petroleum and chemical industries reached 8,880 billion yuan which if calculated according to the exchange rate had exceeded 770 billion US dollars and surpassed America (734 billion dollars). The total volume of chemical economy had ranked top in the world. The total reserve capacity of 2012 reached 0.274 billion buckets [2].

7 The Policy of Diversified Flow of Imported Energy

With China's increasing reliance on imported petroleum and natural gas, the most important energy strategy is to adopt the policy of diversified flow of imported energy so as to ensure all sorts of reliable and steady alternative supply to satisfy needs of our country or even the world. In the period ranging from mid-1990 to 2000, the major source of China's energy came from the Middle East (the share was as high as 70–80 % of the national oil import) and was heavily dependent on oil of the Middle East.

China's energy security strategies symbolize the diversification of flow for those imported energies receiving priority. Under such circumstances, the most promising areas are Africa, Russia and Central Asian countries. Africa's oil helps to solve the primary problem of China's energy security, namely reliance on the Middle East's oil. Secondly, the government of China also tries to reduce the proportion of offshore oil supply by way of the Strait of Malacca to reduce insecurity factors. Central Asian as one of the regions with the largest amount of oil, natural gas and uranium reserve has become one important participant in the energy field of the Eurasian continent.

By the end of 2010, the length of China's crude oil pipeline had reached 20,000 km. Construction of the oil and gas pipeline between China and Burma started in September 2010, and in the same month the 1,000 km crude oil pipeline between China and Russia was completed. The strategic pattern of northwest China, northeast China, southwest China and offshore energy basically takes shape. In 2013, China made great progress in cooperation in the field of energy. In September 2013, president Xi Jinping went on a visit to central Asian countries and signed a contract with Turkmenistan to exploit and build new natural gas fields and increase supply to China. China also completed the shares of stock of Petro-China towards the Kashagan field together with Kazakhstan. Moreover, China also signed a long term contract with Russia concerning increasing the supply of crude oil and Rosneft Oil planned to provide China with about 46 million tons of crude oil

each year in the following 25 years. In addition, progress had also been achieved in cooperation of nuclear power and electric power.

On July 28, 2013, the natural gas pipeline (Burma) between China and Burma was formally put into operation. This oil and natural gas pipeline provides another channel to solve the energy demand of Yunnan and Guizhou in the southwest, reduce China's reliance on the Strait of Malacca and the cost of transportation.

8 Conclusion

China has currently found 171 kinds of minerals and the number of minerals found out is 159 (224 subspecies) among which there are 10 kinds of energy minerals, 54 kinds of metal minerals, 92 kinds of nonmetal minerals and 3 kinds of ground-water and gas minerals. China has found more than 0.2 million mineral deposits with the number of explored mineral deposits being over 20,000. The total amount of mineral resources ranks third in the world with a proportion of 12 % which makes China one of those major countries of mineral resources. However, the fact that the per capita resources rank 53rd with a proportion of 58 % of the average world level constitutes the root cause of China's shortage of resources.

The government of China attaches much importance to the energy security problem related to the national security. In terms of solutions towards threats of the national energy security, the government should establish a new energy security concept, including energy supply security, energy environment and ecological safety, energy science and technology safety and energy economic security, and strengthen energy security.

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The Decomposition of Regional Employment Growth Based on Shift-Share Analysis

Xiaojing Xu and Xianghui Tian

Abstract This paper analyzes the relative employment growth in regions of China in the periods of 1998–2002, 2002–2006 and 2006–2010. Using the Shift-Share analysis, the authors decompose the regional relative employment growth in the three periods mentioned above into department structural effect and competitive effect, based on panel data of the ownership sectors of rural and urban areas. It turns out that the largest part of variation in regional relative employment growth is explained by department structural effect. However, these two kinds of effects in the East and in the Midwest are greatly different: department structural effect is more significant in the East; there is a significant negative correlation between competitive effect and employment growth in the Midwest, which is not significant in the East.

Keywords Employment growth • Shift-Share analysis • Department structural effect • Competitive effect

1 Introduction

Since the late twentieth century, how to realize employment growth has become an urgent problem to be solved in economics, in the context of the state-owned economy structure's revolution which takes the state-owned economy's layout and its strategic adjustment as its main content. A large number of laid-off workers in state-owned and collective enterprises need to be reemployed. China's economic growth needs to create a 12 million – 15 million new jobs each year in order to satisfy a large number of labor force's employment transformed from agriculture [1]. While township enterprises, which were once the main departments to absorb the surplus agricultural labor force, appear a continuously weak trend to absorb labor force [2].

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However, meanwhile, the emerging economic sectors such as limited liability companies and joint stock co., LTD are gradually attracting more and more labor force. How will the rise and fall of the old and new ownership departments change employment growth? Especially under the background of the unbalanced economy development among regions, what effect will the adjustment for ownership structure at the regional level bring to the regional employment growth? This paper will answer the questions above.

2 Departments' and Regions' Classification and Data Sources

In this paper, the 15 urban and rural economic sectors include: state-owned units (1), the collective units (2), joint-stock cooperative units (3), joint management units (4), limited liability companies (5), joint stock company limited (6), private enterprise co., LTD. (7), Hong Kong, Macao and Taiwan investment units (8), the foreign investment units (9), individual units (10), town other departments (11), township enterprises (12), rural private enterprises (13), rural individuals (14) and the department of agriculture (15). Among them, the measure for town other departments is to use the subtotal number of town departments to subtract the 10 town departments' sum [3].

The division for the East and the Midwest in this paper is made according to the division method in China's regional economic statistical yearbook. And then, the authors merge the regions in the Northeast and those in the Midwest. Specifically to say, 10 provinces and cities in the East include Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan; 3 provinces in the Northeast include Liaoning, Jilin, Heilongjiang; 6 provinces in the middle region include Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan; 10 provinces (including autonomous regions and municipalities) in the western region include Inner Mongolia, Guangxi, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang. 19 areas respectively in the northeastern, middle and western regions merge for the Midwest region. In Sect. 4, the provinces in the horizontal axis of Figs. 1, 2, and 3 are arranged in the same order of those in the East, the Northeast, the Middle and the West. Due to data limitations, this study does not include Hong Kong, Macao, Taiwan and Tibet. In addition, the authors merge data of Chongqing city into Sichuan province. If no additional instructions, the data of urban and rural ownership departments are all from China statistical yearbook.

3 Shift-Share Analysis

With reference to the national employment growth, relative changes in regional employment growth can be divided into three components – Department structural effect, competitive effect, and residual effect. Based on 15 departments'

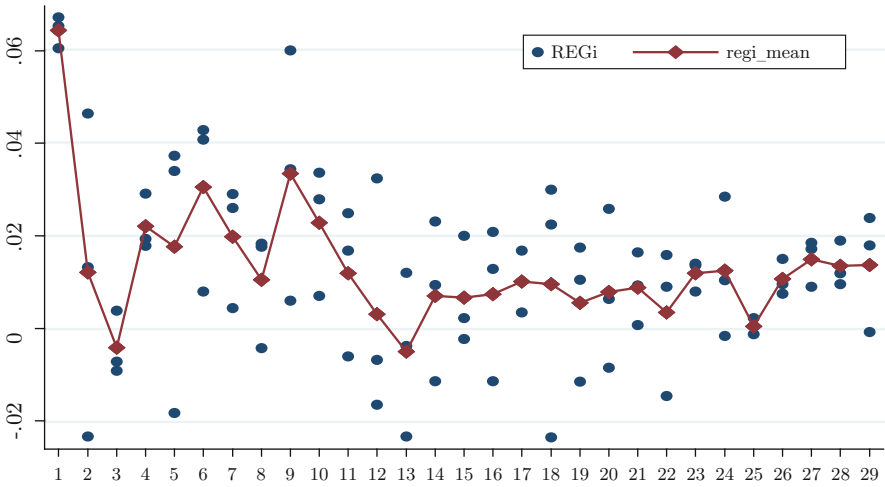


Fig. 1 The three periods of relative employment growth rate, REG_i and its mean value (The abscissa is explained in Sect. 2)

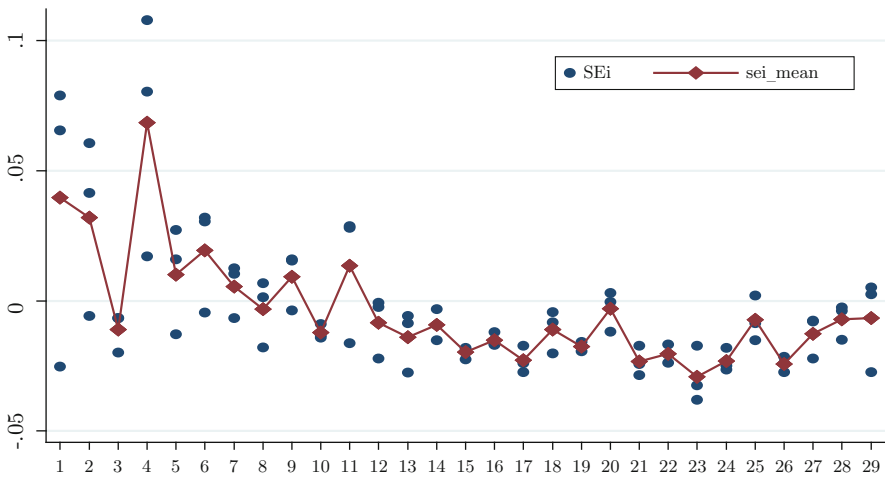


Fig. 2 SE_i in various areas in China for three periods (The abscissa is explained in Sect. 2)

employment data in urban and rural areas in China, the authors use the calculation methods of Bielik et al. [4], to measure the three kinds of effect mentioned above [4]. The variables involved are national annual employment growth rate \overline{EG} , national department j 's annual employment growth \overline{EG}_j , region i 's annual employment growth rate EG_i , department j 's annual employment growth rate EG_{ij} in region i , department j 's employment number N_{ij0} in region i at original period, the employment proportion W_{ij0} that department j accounts for region i at the initial

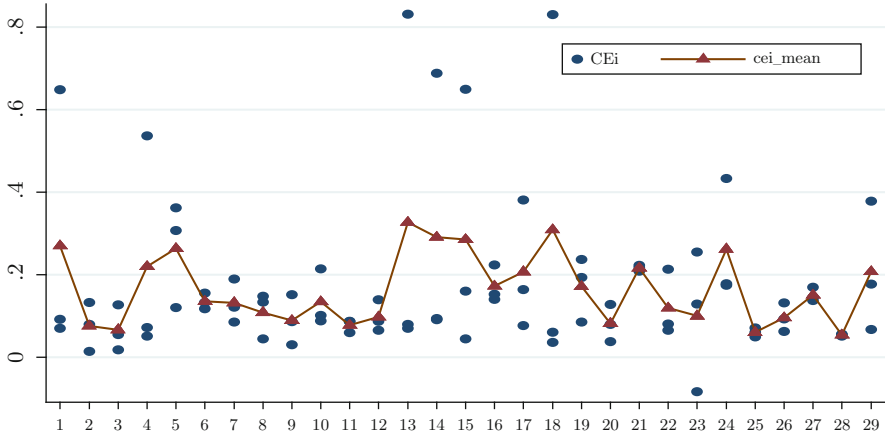


Fig. 3 CEI in various regions in China for three periods (The abscissa is explained in Sect. 2)

stage, the employment proportion W_{j0} that department j accounts for the whole nation at the initial stage, the employment growth rate CSG_i of region i based on the assumption that there is the same employment growth rate among regions, the employment growth rate CID_i based on the assumption that the initial distribution is the same for the departments in the same region. Among the above, $i \in (1, n), j \in (1, s)$.

Annual employment relative growth rate (REG_i) in region i :

$$REG_i = EG_i - \overline{EG} = SE_i + CE_i + R_i$$

Among them, SE_i is department structural effect, CE_i is competitive effect, and R_i is residual effect.

Department structural effect (SE_i): $SE_i = CSG_i - \overline{EG}$

$$CSG_i = \sum_{j=1}^s \overline{EG}_j * W_{ij0}, \quad W_{ij0} = N_{ij0} / \sum_{j=1}^s N_{ij0}$$

Competitive effect (CE_i): $CE_i = CID_i - \overline{EG}$

$$CID_i = \sum_{j=1}^s EG_{ij} * \overline{W}_{j0}, \quad \overline{W}_{j0} = \sum_{i=1}^n N_{ij0} / \sum_{i=1}^n \sum_{j=1}^s N_{ij0}$$

Residual effect (R_i): $R_i = REG_i - CE_i - SE_i$

In Sect. 4, the authors analyze the relative changes of employment growth from 1998 to 2010, in regions of China with the steps above. The measure is taken respectively in three periods 1998–2002, 2002–2006 and 2006–2010, and then the authors compare and analyze the results.

4 Empirical Results and Analysis

From regional point of view, the authors measure relative changes of employment growth in various areas in the whole nation in three periods, 1998–2002, 2002–2006 and 2006–2006. As shown in Fig. 1, Beijing and Guangdong have REG_i with the highest mean values, while Hebei and Heilongjiang have that with the lowest mean value, and both are less than zero. In addition to Hebei province, the mean values of REG_i in the eastern region are significantly higher than that in the Midwest. To be sure, the mean values of REG_i in the middle and western regions appear consistent compared to that in the eastern region.

According to the methodology of Sect. 3, using Shift-Share analysis (SSA), the authors decompose the relative employment growth rate in various regions in China, REG_i, into department structural effect, SE_i, and competitive effect CE_i. Figure 2 shows the three periods’ SE_i and their mean values in each region. It can be seen from the graph that in addition to Liaoning, the mean values of SE_i for all areas in the Midwest are less than 0. More specifically, in addition to some periods in Liaoning, Inner Mongolia, Shaanxi and Xinjiang, the Midwestern regions department structural effect for the three periods are less than 0. And for the eastern region, except Hebei, Shandong and Hainan, SE_i’s mean values in other areas are all more than zero. Figure 3 marks CE_i and its mean values in the three periods in the whole nation. Compared to department structural effect, SE_i, the biggest characteristics for competitive effect, CE_i is that its mean values in the whole nation for three periods is more than zero, and it performs on the average in the East and in the Midwest.

In Table 1, the authors make a correlation analysis between relative employment growth rate, REG_i, in various regions and its decompositions EG_i and CE_i. Nationally, REG_i has a significantly positive correlation with EG_i, but a negative correlation with CE_i, but not significantly. We can tell that department structural effect explains most of the relative changes of regional employment in the whole nation. However, these two kinds of effects in the East and in the Midwest are greatly different: department structural effect is more significant in the East; there is a significant negative correlation between competitive effect and the employment growth in the Midwest, which is not significant in the East. This shows that ownership structure adjustment promotes national regional employment growth, especially in the eastern region.

Table 1 Correlation coefficient analysis

Correlation coefficient	The whole nation	The East	The Midwest
REG _i &SE _i	0.5265* (0.0000)	0.4745* (0.0081)	0.2880 (0.0299)
REG _i &CE _i	-0.1108 (0.3068)	0.2250 (0.2320)	-0.3406* (0.0095)

Note: *indicates significance at 1 % significant level; P values are shown in brackets

5 Conclusion

Based on the regional data of urban and rural employment in ownership departments in 1998–2010, the authors divide the relative changes of employment growth in three periods, 1998–2002, 2002–2006 and 2006–2010, into department structural effect and competitive effect by using Shift-Share analysis. Correlation analysis shows that department structural effect explains most of relative changes for the national regional employment; however, these two kinds of effects in the East and in the Midwest are greatly different: department structural effect is more significant in the East; there is a significant negative correlation between competitive effect and the employment growth in the Midwest, which is not significant in the East.

Therefore, the ownership structure adjustment since the late twentieth century, has promoted the regional employment growth, and the promotion effect is more significant in the eastern region. In addition, based on the reality that various economic sectors of urban and rural areas in the same region or among regions distribute unequally, in the case of breaking local protection and market segmentation, the optimization for ownership sectors' regional layout is very important. Especially in carrying out the regional coordinated development strategy, which includes the implementation of promoting the development of the western part, revitalizing the northeastern part and other old industrial bases, and promoting the rise of the middle part etc., we should highlight the first position of employment and optimize ownership structure.

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The Quantization of Identity and Employee Utility

Yujie Pang

Abstract China's research area of corporate finance and industrial organization is still only focusing on the research of remuneration incentive, and the research of identity incentive has not been given enough attention. Based on the important factor of incentive and compensation mechanism, combining with the utility model established, this paper quantifies employee utility at their foundation and establishes identity and employee utility quantitative model. The model makes it possible to quantify identity and employee utility, which gives teams new ideas of measuring incentive effect in the construction.

Keywords Identity • Salary incentive mechanism • Identity quantitative model • Employee utility • Team construction • Staff utility assessment

1 Research Topic and Research Background

By far, the research issue of company manager's incentive has developed into focusing on combining external incentive (mainly compensation incentives) with internal incentive, other than only focusing on salary incentive in early phase. In the research of internal incentive, identity and a series of concepts that have close relationship with it, such as altruism and agent who has an incentive preference, have occupied a major position. Hence the synergy of identity incentive and remuneration has become one of the core issues of the incentive theory. However, China's research area of corporate finance and industrial organization is still only focusing on the research of remuneration incentive, and the research of identity incentive has not been given enough attention [1, 2].

According to some foreign research, Holmstrom and Milgrom [3] suggested that the incentive method under a multitasking situation is probably weak-compensation incentive. The further research of Akedof and Kranton [4] found that the incentive method for agent cannot be completely compensation incentive but the

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combination of identity and compensation incentives for those agents who have the similar preference with the mandatory. However, the above coordination mechanism is confined to the delegation of company managers, and it has not been applied in team construction [5].

As the current literatures which related to identity are rare, and the majority of domestic enterprises only emphasized the salary incentive but not pay attention to the identity mechanism; meanwhile they are lack of the consciousness of them both, this article puts forward the synergy of the both is essential to the role of team construction [6–7].

There is currently no specific method that can quantize identity and employee's utility, which is not only disadvantageous to the evaluation of incentive effect in team construction but also difficult adapt the optimal incentive mechanism. This article will establish a theoretical model that combines identity and compensation incentive mechanism and quantizes sense of identity and staff utility so that it can bring new ideas to the measure of incentive effect of prospective team construction [8].

2 The Emergence and Development of Identity Theory

In early phase Hurwicz [9] has set up the design framework of incentive mechanism which mainly emphasis on the role of salary incentive for managers. And before the twenty first century, the incentive for agent was still concentrated in the aspect of salary incentive. On the basis of sociology and psychology research, Akerlof and Kranton [4] put forward the concept of identity for the first time. They suggested that when people's attributes and behaviors match the required standard of their group, the individual will obtain the utility to a certain extent. The identity concept initially applied to the analysis of incentive problems of public sector. The research acrossed the public sector is conducted by Besley and Ghatak [10], which combined identity with company agent incentive problem. Since then, the identity research has come into sight of corporate governance field.

3 The Quantization of Identity and Employee Utility

3.1 The Employee Utility Model

From the perspective of identity, Akerlof and Kranton [4] discussed the key factor of incentive and compensation mechanism. They argued that monetary compensation mechanism existed obvious problems such as the imperfect index of the measuring degree of effort. Besides, under the real situation, the effort degree of staff is not easy to observe so that a fair award quantization is difficult to achieve. Consequently, it is necessary to introduce the identity concept in the incentives.

This is their modified utility formula:

$$U(y, e : c) = \ln y - e + I_c - tc|e * (c) - e| \tag{1}$$

The formula assumes employees only have two kinds of organizational identity, the insiders and the outsiders. U represents employee’s utility; y represents employee’s income; e represents employee’s real work effort; c represents employee’s identity; I_c represents organizational identity; c brings employee’s identity; and $tc|e * (c) - e|$ represents the disutility which led by the difference between the expected effort degree that match the organizational identity and real effort. And $e^*(c)$ is the expected effort degree that match the organizational identity. This is assuming the insiders agree with enterprise values and maximize utility in high levels of effort; but the outsiders can maximize utility with as little effort as possible.

3.2 The Quantized Model of Identity

Considering the quantitative indexes of identity, there has no ideal model in domestic study. This article considers variety of index such as the value of the enterprise, based on the employee evaluation of identity in order to build a general model which can measure identity. It set X_n as satisfaction status of demand that an employee achieves in the n th aspects of enterprise. Then the identity index I that the employee achieved in enterprise can be expressed as:

$$I = \sum_{k=1}^n a_n \cdot u(X_n) \tag{2}$$

$u(X)$ represents the employee utility function, and it sets the data rage of utility from -10 to $+10$ (includes -10 and $+10$) and the relevant n respects, through individual scoring method to evaluate utility. a_n represents the index factor of utility identity, which expresses the n th index’s contributions for identity index, and $0 < a_n < 1, \sum_{k=1}^n a_n = 1$.

Although the above formula abstracts the identity index into mathematical model, it has certain operability. Based on the model we can obtain the indexes that reflect identity through practical research method (such as the interview method, expert opinion, etc.), and determine through the simple scoring methods. The employee identification index size is affected by personal subjective feelings, which embodies the existing psychological preferences when evaluating index, and it accords with the individual difference characteristics of identity. Because of the difference between employee’s degree of attention of demand index n , the a_n in the formula varies from person to person. Hence the value of a_n is affected by cultural, social, personal and psychological factors. Hence when measuring employee’s

identification index, employee's overall level of demand should be well considered, and when necessary the differentiation measurement should consider employee's position and qualification so that provides different an value.

4 The Quantization of Employees Utility

We ensure formula (1) and formula (2) simultaneous here. Using the formula (2), together with the identity index evaluation form and coefficient of variation an, which are designed according to company situation, we can obtain the identity index of every employee. In the formula (1), the variables y is directly referenced data; I can be calculated through formula (2); e represents the employees' output per unit time; and $tc|e^*(c)-e|$ measures data as an integral whole which data range is between 0–10 (includes 0 and 10), rating according to personal psychological expectation similarly. If we put these data into formula (1), we will receive the utility level of each employee under the synergistic effect of identity and compensation incentive mechanism.

Through the above formula model and quantized method, we can construct the identity index and the quantized model of compensation for employee utility. Thus employee utility can be measured by an operation feasible and quantized method. Meanwhile, employee's identity and psychological expectation of the optimal workload for the identity should be considered. Consequently, the team can evaluate the effect on a regular basis after the implementation of incentive mechanism so that they can dynamically adjust the strength size of identity and salary incentive and seek the optimal incentive mechanism combination.

5 The Application Prospect of Identity and the Quantization of Employee Utility in Team Construction

With the reform of China's economic and political system, team building has become the direction of enterprise's organizational form method. Identity provides a reasonable direction to team construction, which is to motivate employee identity as a starting point of win-win situation. Therefore the main incentive way of strengthening employee utility in organization and motivating staff to increase work effort, are intercommunity problems of enterprises' interest and employee can be expounded specifically. The application of quantized models helps team to measure the effects of incentive, which is also beneficial for team adjusts the optimal incentive mechanism easily.

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Research into Methods of Valuation About Small and Medium-Sized Enterprises

Yanze Wang, Kai Zheng, and Wenlong Zhou

Abstract Enterprise valuation is of vital importance during business decisions. In China, small and medium-sized enterprises (SMEs) grow rapidly and decisions between them are very extensive. This paper tries to explore a more suitable valuation method. It stands on an example from garment factories. Taking the assets valuation study as the main theoretical basis, it values the factory using cost, method and market method in turn. And then, it reveals the deficiencies of each method. Finally, it puts forward the thought of “Enterprise Value Index”, and forecasts its application prospects.

Keywords Small and medium-sized enterprise • Value • Valuation • Value index

1 Introduction

The complete theory system of enterprise valuation isn't formed in China, while the method system is just at the beginning. Practices show that SMEs are the inevitable outcome and the importance of SMEs has become more prominent [1]. Due to the under-developed market economy, the organizational system of SMEs is imperfect [2, 3]. The authors have participated in garment factory acquisition for several times, only to find the nonstandard and inefficient process. This phenomenon should be attributed to the laggard valuation system and the lack of more applicable valuation methods [4–6].

In view of the above, this thesis will set a garment factory as an example and systematically analyze the valuation method for SMEs based on the reality and relevant theoretical knowledge.

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Table 1 Fixed assets

Project	Unit Price (yuan)	Quantity	Used years
High-speed flat sewing machine	1,800	40	5
		9	4
		7	3
Three-thread overlock	3,000	4	3
Four-thread overlock	3,000	5	5
Five-thread overlock	3,000	10	5
		3	4
Button hole machine	20,000	1	3
Twin-needles machine	6,000	8	3
Button attaching machine	2,000	1	3
Cutting bed	3,000	3	5
Straight knife machine	2,000	6	5
Ironing machine	15,000	2	5
	30,000	1	3
Ironing Table	1,500	4	5
		2	3
Crane	4,000	1	5

Notes: (1) Total useful life of every project is 10 years

(2) According to the base date market, the transportation of each equipment is 8 yuan

2 Description of Sample

Garment factory X is the sample enterprise and operating smoothly. For the need of acquisition, the overall assets of this factory should be valued. The valuation benchmark date is March 31, 2014.

Table 1 is the details of fixed assets:

3 Valuation Process

3.1 Cost Method

In general, the following formula is used:

$$V = Rc - Dp - De - Df \quad (1)$$

where V is valuation result, Rc is replacement cost, Dp is Physical depreciation, De is Economic depreciation. In this case, functional depreciation (Df) is almost zero. And,

Table 2 Asset utilization

Project	Cumulative rating service time		Cumulative actual service time	
	Days/year	Hours/day	Days/year	Hours/day
High-speed flat sewing machine	320	8	200	8
Twin-needles machine	320	8	160	8

Table 3 Replacement cost

Practical serviced life	Payment (yuan)	Traffic expense (yuan)	Replacement cost (yuan)
1.5	48,000	64	48,064
1.875	12,600	56	12,656
3	67,000	72	67,072
4	25,200	96	25,296
5	178,000	568	178,568

$$Rc = Vb + Te \tag{2}$$

with Vb representing book value and Te indicating traffic expense.

Physical depreciation is computed by the following formulas:

$$Dp = (Rc - Vr) \times (Lp/Lt) \tag{3}$$

$$Lp = Ln \times Ru \tag{4}$$

$$Ru = (Ta/Tr) \times 100\% \tag{5}$$

among them, Vr is estimated residual value, Lp is practical serviced life, Lt is total useful life, Ln is nominal serviced life, Ru is asset utilization ratio, Ta is Cumulative actual service time, Tr is Cumulative rating service time.

According to the operating status, the asset utilization of most machines is equal to 1, while it of 7 high-speed flat sewing machines and 8 double needle lockstitch sewing machines is less than 1. Details are shown in Table 2.

According to Table 2, the corresponding practical serviced life can be calculated by formula (4) and (5); Then the replacement cost can be calculated by formula (2) and classified as Table 3.

After calculation, estimated residual value can be classified in Table 4.

According to the data in Tables 3 and 4, physical depreciation can be calculated by formula (3) and shown in Table 5.

So, according to the data above, total physical depreciation is 105,245.61 yuan.

Economic depreciation is computed by the following formulas:

$$De = (Rc - Dp - Df) \times Rde \tag{6}$$

$$Rde = [1 - (Ce/Cd)^x] \times 100\% \tag{7}$$

Table 4 Estimated residual value

Practical serviced life	1.5	1.875	3	4	5
Estimated residual value (yuan)	1,120	980	1,260	1,680	9,380

Table 5 Physical depreciation

Practical serviced life	1.5	1.875	3	4	5
Physical depreciation (yuan)	7,041.6	2,189.25	1,974.36	9,446.4	84,594

among them, Rde is economic rate of depreciation, Ce is expected capacity, Cd is designed production capacity, x is the scale economic benefit index, and $0.4 \leq x \leq 0.9$.

Now we take $x=0.6$. According to the statistics, using formula (6) and (7): $De = 10,346.95$ (yuan). So, according to formula (1): $V = 216,063.44$ (yuan)

3.2 Income Method

Generally, the following model is used:

$$V = \sum_{i=1}^n \frac{A_i}{(1+r)^i} + \frac{V_n}{(1+r)^n} \tag{8}$$

where A_i is the expected profit value after i years, V_n is the present value of the assets after n years, r is discount rate.

It is estimated that $r = 8\%$. And according to Table 4, V_5 is about 15,000 yuan.

The data of net income from 2009 to 2013 is shown in Table 6.

According to the data in Table 6, the tendency chart of net income in the past 5 years of factory X can be made as Fig. 1.

After comprehensive analysis, the annual net income can be predicted as follows (Table 7).

According to the data above and formula (8): $V = 6,234,151$ (yuan).

3.3 Market Method

$$V = V_x + \mu \tag{9}$$

where V_x stands for the value of the referential enterprise, and μ indicates the differences caused by advantage and disadvantage between the two enterprises.

Table 6 Net income

Year	2009	2010	2011	2012	2013
Net income (yuan)	276,900	427,700	752,900	998,100	10,97,200

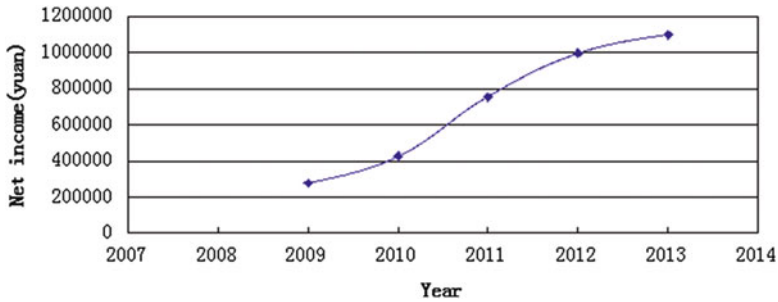


Fig. 1 Net income

Table 7 Predicted value of net income

Year	2014	2015	2016	2017	2018
Net income (yuan)	1,206,920	1,448,304	1,593,134	1,752,447	1,927,691

The authors found a similar enterprise that was sold on February 25th, 2014. The transaction value is 375,000 yuan. And differences caused by other factors can be approximately ignored. According to formula (9), $V \approx 375,000(\text{yuan})$.

4 Comparison of Valuate Method

Comparing the valuation results above, there is an intuitive feeling for the disparities between them. This could be due to the deficiencies of the methods:

Cost method: It is difficult to value overall profitability and usually overlook the value of the intangible assets.

Market method: Firstly, factors related to profitability among enterprises are complex. Otherwise, it is costly to find the ideal referential enterprise.

Income method: Various parameters needed are determined with a strong subjectivity, and also affected by many unforeseen factors which will inevitably bring uncertainty. That must result in deviation from the true value.

5 Putting Forward “Enterprise Value Index”

In order to reduce the impact of the deficiencies but adopt the advantages of the methods, the authors put forward the thought of “Enterprise Value Index (EVI)”. According to EVI, the valuation result is a “value index” of the corresponding

method. And each value index should be considered to calculate the enterprise value in a comprehensive way. The new result would be more realistic and acceptable.

Here just present two ideas about the application of EVI. One is to establish an econometric model based on the characteristics of industry on condition that the existing data is sufficient and available. Another one is to distribute an appropriate weight to each value index from the perspective of “opportunity”. For the details of practical application, it remains for further exploration and research.

6 Conclusions

This thesis reveals the deficiencies of the existing valuation methods, then puts forward EVI on this basis. EVI takes the reality into account and makes the results more reasonable. It is conducive to improving the efficient for decision.

With the rapid development of the market economy and regulating of the economic environment, valuation issues of SMEs will be inevitably paid more attention, and also more new methods will be raised.

Due to the limited level of the authors, there must be many shortcomings in this thesis. Those will be the areas for the further study.

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Grey Relational Analysis on the Influencing Factors of China's Comprehensive Grain Production Capacity

Xiufeng Tian, Fenfei Chen, and Yunlin Chen

Abstract A high level of the comprehensive grain production capacity is an important premise to ensure that the national food is security. With the further development of China's economic society, the problems about Cultivated land shortage, increasing uncertainty of natural disasters and depression of farmers' enthusiasm for planting, etc are becoming more and more intense, which severely restricts the further improvement of China's Comprehensive Grain Production Capacity. The main contribution of this paper is to include the natural factor, social economy and market factor into the influence factors' research of China's comprehensive grain production capacity, through which to determine the influencing factors' relational degree and order of China's Comprehensive Grain Production Capacity. Thus, this paper uses grey relational analysis method making an empirical test on the relevant data in recent decades about the main influencing factors of China's Comprehensive Grain Production Capacity. By the combination of qualitative analysis with quantitative analysis and dissection of test results, this paper puts forward the further practical policy Suggestions to enhance China's comprehensive grain production capacity.

Keywords Grain production • Influencing factors • Grey correlation analysis • Policy suggestion

1 Introduction

As the foundation of national economy, food plays a vital role in the development of the national economy. Grain yield decrease, stagnation and other abnormal conditions of the grain yield will not only threaten our national food security but

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also influence the income of the farmers, the price level and all aspects of people's production and living. Since grain production is a unity of natural and economic society factors so that its influencing factors are various [1]. And Chen et al. [2] proposed that grain sown area and less enthusiasm had negative effect on total grain production. Previous researches really have been of great significance, but most of the researches are limited to two or three kinds of factors, and also lack of the influence of the market factor to the total grain production. The main contribution of this paper is to include the natural factor, social economy and market factor into the influence factors' research of China's comprehensive grain production capacity. Therefore, this paper mainly uses the combination of quantitative and qualitative analysis to dissect Chinese grain yield and the change trend of each influencing factor, as well as using grey relational analysis to investigate the relational degree and order of each impacting factor of the comprehensive grain production capacity in China. Finally, the paper gives some practical policy recommendations on enhancing China's comprehensive grain production capacity.

2 Research Methods and Procedures

2.1 Data Sources and Selection

As the best indicator of the comprehensive grain production capacity index, grain production is a unity of natural and economic society factors, which are mainly subject to sown acreage, damage area, chemical fertilizer, total power of agricultural machinery, producer price index of agricultural products, etc. [3]. In order to study the impact levels that putted on China's comprehensive grain production capacity by the above factors, this paper mainly selects the relevant data of China's grain production and its influencing factors from 1978 to 2012, which are all come from China Statistical Yearbook.

2.2 Analysis Method

Grain production is the composites of two grey system which including natural factors system and economic social system. So in order to research the factors affecting the overall grain production capacity of China, the paper applies grey relational analysis method to analyze and calculate the relational degree between five principal factors and China's total grain yield, to determine the main influencing factors.

Dimensionless processing of data. Since every variable data has its own different measuring unit, the original data exits some difference between dimension and orders of magnitude and it is difficult to draw the right conclusion when comparing.

Thus, before calculating the relational degree, the paper applies average data processing method to the original data to make it dimensionless [4]. First, calculate the average number of each original sequence, then make the average number of the sequence divided by each data of the sequence. Here we can get the multiple sequence, it is the each data compared to its average number, namely average data processing.

Calculate the relational coefficient. Apply dimensionless method to the grain yield data and mark the result as $\{X_0(t)\}$, each influence factor data after dimensionless method as $\{X_i(t)\}$. Therefore, the moment $t = k$, relational coefficient $L_{0i}(k)$ of $\{X_0(t)\}$ and $\{X_i(t)\}$ can be calculated as:

$$L_{0i}(k) = (\Delta_{min} + \rho * \Delta_{max}) / (\Delta_{0i}(k) + \rho * \Delta_{max}) \tag{1}$$

Where, $\Delta_{0i}(k)$ represents the difference between absolute value of $\{X_i(t)\}$ and $\{X_0(t)\}$; Δ_{max} and Δ_{min} respectively denote the maximum and minimum of $\Delta_{0i}(k)$.

Calculate the relational degree. The relational degree between two sequences is the average of the two compared sequences at each time of the relational coefficient, i.e.:

$$r_{0i} = \frac{1}{N} \sum_{k=1}^N L_{0i}(k) \tag{2}$$

Where, r_{0i} is the relational degree between $\{X_i(t)\}$ and $\{X_0(t)\}$; N is the length of comparison sequences (ie, the number of data); the greater r_{0i} is, the greater the relational degree is.

Rank relational order Comparing grey relational degree of all the correlation sequence comparison on the same parent sequence, according to the size of the relevancy, and then constitute the correlation order.

3 Empirical Tests

According to China Statistical Yearbook's relevant data on 1978–2012, the original data sequence of China's grain production is recorded as $\{C_0(t)\}$, and other original data sequences such as the sown acreage, the damage area, the chemical fertilizers, the machinery power and the producer price index of agricultural products are recorded as $\{C_1(t)\}$, $\{C_2(t)\}$, $\{C_3(t)\}$, $\{C_4(t)\}$, $\{C_5(t)\}$. Then, we apply dimensionless method to the original data sequences:

$$X_i(t) = \frac{C_i(t)}{C_1(t)}, \quad i = 0, 1 \dots, 5. \tag{3}$$

Table 1 The grey relational analysis of China’s grain production capacity and its influencing factors

Number	Influencing factors	Grain yield	
		Relational degree	Relational order
1	Sown acreage	0.882635	1
2	Damage area	0.753941	3
3	Chemical fertilizers	0.673253	4
4	Machinery power	0.575991	5
5	Producer price index of agricultural products	0.770952	2

$$\overline{C_1(t)} = \frac{1}{k} \sum C_i(t) \quad t = 1, 2, \dots, k. \tag{4}$$

And then we use the $\{X_0(t)\}$ that has been evaluated as parent sequence, $\{X_1(t)\}$, $\{X_2(t)\}$, $\{X_3(t)\}$, $\{X_4(t)\}$, $\{X_5(t)\}$ are comparative sequence so that we can get the relational degree and the relational orders of the comparative sequence and the parent sequences. The results are shown in Table 1.

From the Table 1, it can be seen that the correlative series of sown acreage and the grain production capacity of China are ranked in first. Because sown acreage is the direct cause of grain production, it can be understood as endogenous force of grain production, so it has the biggest influence on grain production. Followed by the producer price index of agricultural products, the higher the agricultural products producer price index is, the higher the enthusiasm of farmer to growing grain, thereby to increasing grain production, it is the most close economic and social factors linked with the market. The size of the damage area has more greater uncertainty to lead to grain production’s decline. Once again, is the use of chemical fertilizers’ amount. Fertilizer through acting in the link of crop growth, supply the nutrition needed for growth of crops, leading to the increase of grain production. Finally, it is the total power of machinery, because the power of machinery essentially acting on the process of harvesting the crop growth, under other conditions established, the higher mechanical power did not bring significantly increase in grain production. Therefore, from the impact on grain production capacity, it ranks last.

4 Paper Recommendation

Overall, it’s a lot of pressure to increase food demand of China and grim to stabilize the food security situation. The central file of the Eighteenth Communist Party of China, once again, ensured the safety of Chinese food. Through analysis, the main

conclusions that drawn by this paper to make a contribution to the steady improvement in china's comprehensive grain production capacity are as follows:

1. We should strictly protect arable land in the situation that the red line of China's 18 million hectares of arable land has been broken and effectively preserve grain cultivated land resources on the basis of further improving in the agricultural economic structure. We also ought to have rigid apron string on the construction land and the phenomenon that violations of industrial land squeezed agriculture space. Moreover, the medium- and low-yield fields should be ongoing improved so that the quality of arable land can be further developed.
2. Improve food production and distribution system, promote the industrialization operation of agricultural production, and adopt a variety of channels to advance farmers' income. Meanwhile, we should explore new ways to progress the practicability of payment of food subsidies, bring market and government into play, as well as, mobilize the enthusiasm of peasants effectively for growing their food.
3. Establishing and improving the food production system of "disaster prevention, disaster reduction and disaster relief", improving the construction and maintenance of irrigation infrastructure, enlarging efforts to scientific and technological research and development efforts in disaster crop breeding, and then developing agriculture science and technology in order to reducing decline in grain output caused by natural disasters.
4. Increasing financial support to researches in organic fertilizers conducted by agricultural research institutes, the competent agricultural departments should provide scientific guidance to farmers' fertilization enthusiasm and fertilization method, as well as improving the institution of grain fertilizer subsidies, increasing fertilizer especially organic fertilizer using; Continue to intensifying agricultural machinery subsidies, promoting universal access to agricultural machinery in all the crop and rural area, and in rural areas, ensuring that food crops can effectively harvest in emergency situations.

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Research on the Economic Growth of Hebei Province Under the Perspective of SIP

Lian Lian

Abstract This article is based on “industrial Structure-Industry-Project” analysis framework, through the measurement to the industry influence coefficient and sense degree coefficient of Hebei province, analyze the development, composition and industrial connection of the industrial structure of Hebei province at present. Then aiming at the phenomenon of low correlation degree of the pillar industries in Hebei province, this article puts forward some proposal of the relevant policy to the government from three aspects.

Keywords Industrial structure • Regional economic growth • Correlation degree

1 Introduction

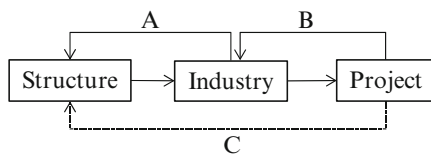
SIP analysis framework is based on the classic SCP analysis paradigm in industry economics, evolved from the analytical paradigm of the industrial structure of progressive evolution. Its main application background is backwardness area, and its industrial economy structure exist the basic theory of paradigm of “industrial structure-industry-industrial project” [1]. In particular, with regard to the region at the center of the industry to economic growth, industrial advance will bring the change of industrial structure, adjustment, optimization and upgrading of industrial structure will promote the new competitive industries to form, the advantage industry and with specific industrial projects as the carrier, there are three positive transfer effect, the relationship between its evolution path is shown in Fig. 1.

As shown in Fig. 1, if singly from the point of view of the evolution of industrial structure form, the ruler should be first determine the state S of the industrial structure in this area, and then select the leading industry conforming to the state of the industrial structure, and the finally make the decision how to choose a new industrial projects (P), this is the positive transfer effect that is mentioned above, that also the backwardness area makes the best use of the circumstances, according to the resource advantages to develop the competitive industries and through industry associations to form the decision thinking paradigm of industrial

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Fig. 1 Relation diagram of SIP path evolution



agglomeration. But in the implementation of specific project decisions, usually it is the first choice for industrial projects (P), then through project agglomeration formation advantage industry (I). Thus by quantitative change to qualitative change industry promotes the formation of the regional industrial structure (S). We call it reverse conduction effect. For backwardness area, the dynamic evolution of the industrial structure mainly is by reverse conduction effect. Seen from Fig. 1, the conduction effect is mainly made up of A and B, if there are matching relationship existing between the “project–industry”, which can optimize industrial association and the layout is reasonable, so “I” can grow up to be advantageous industries, B transfer process is efficient. Further, if more than one advantage industry (I) gathering, it can be reasonable layout, form linkage effect which brings the change of the region’s industrial structure (S), namely “I-S” conduction effect is effective, so A transfer process is established. If A and B are efficient, the evolution of the economic structure is in accordance with the optimal efficiency of P-I-S evolution path, the reverse transfer effect. On the other hand, if P-I-S path of any layout or structure is unreasonable, then from the perspective of the theory of completeness, it also exists a kind of industry evolution of conduction state C, namely through the investment decision-making and implementation of the project (P), directly change the industrial structure (S). This may occur in some of the smaller economies, such as through a large project construction in the county economy directly affects the industrial structure and the regional industrial structure. But it has a complete industrial system and supporting industrial area, such as countries or within the scope of a province, appear this kind of industry conduction path would have little chance, so here does not make the concrete discussion.

SIP paradigm is mainly used for the study of different regional industrial isomorphism. Shi Jun and Wang Yuyan [1] used SIP analysis framework to study western region industrial structure in the homogeneous degree, pointed out that industrial project, important industry and industrial structure, between the three levels of the conduction failure caused the western area industrial structure convergence, caused those which just had project but was no industry to be lack of industrial foundation and “structural embedded trap”.

Industrial agglomeration plays an important role in the cultivation of the regional competition, scale expansion, regional characteristic, so the regional industry cluster research has also become a research hotspot in recent years. Marshall, 100 years ago, had discussed the motivations of industrial agglomeration from the Angle of external economy and scale economy. Li Xiaojian [2] proposed the theory of industrial agglomeration was studied from the microscopic view, the company space expansion, space systems, corporate activities and the development

of the system [2]. Liu Dadao [3] proposed “one axis system”, which considered that the industry should be first in the optimal location of agglomeration formation, then gradually was growing and developing, but the excessive concentration would also produce the social environmental problems such as traffic congestion, environmental pollution, thereby limiting the sustained growth of economy [3]. Zhang Wenzhong [4] pointed out the economies of scale and increasing income benefit the industry to concentrate in large cities, however, when the industrial concentration reached a certain degree, would produce negative effects, it needed through regional policies to guide industry to promote a balanced layout [4]. In SIP paradigm, the three levels of macro-economic decision-making of the results of the industrial structure, meso-level decision analysis process industry, adjusting object industrial projects is placed in a theoretical analysis framework.

2 Measurement of Industry Characteristics Index

Input-output analysis is the modern econometric analysis method, it through in the economic system of linear equations to describe the correlation between departments. Its core content is to focus on the change of the input and output correlation analysis in production process; the commonly used indexes have industrial influence coefficient and industrial induction coefficient. Industry influence coefficient (IND_j) reflects the industry a department within the production degree of impact on the rest of the industry, reflects the extent to which to contact after. Industrial induction degree coefficient (ISD_j) reflects the other industry production changes on the influence of the industry, reflect the extent to which the forward contact.

The setting national economy can be divided into number of n department, the basic analysis formula of the input and output is:

$$X = (I - A)^{-1}Y. \tag{1}$$

X_i is the total output of i department, X is the listed vector quantity of the total gross; A is the direct consumption coefficient matrix. Y_i is the final products of all departments; Y is listed quality of the final product. $B = (I - A)^{-1}$ is Leontief inverse matrix, its elements is b_{ij} . Liu Qiyun [5] of improved influence coefficient and sense degree coefficient calculation method proposed for the structure analysis of input-output coefficient method is used in this article [5].

$$IND_j = \sum_i b_{ij} / \sum_j (N_j \sum_j b_{ij}). \quad (j = 1, 2, \dots, n) \tag{2}$$

$$N_j = y_j / \sum_j y_j \quad (j = 1, 2, \dots, n), \quad \sum_j N_j = 1 \tag{3}$$

In the formula, N_j is the proportion of the final products of j department accounting for the national products, that is the coefficient formed by the final product; y_j is the j department final product quantity.

$$ISD_j = \sum_j b_{ij} / \sum_i (M_i \sum_j b_{ij}). \quad (i = 1, 2, \dots, n) \quad (4)$$

$$M_i = k_i / \sum_i k_i \quad (i = 1, 2, \dots, n), \quad \sum_i M_i = 1 \quad (5)$$

M_i is the initial investment accounting for the proportion of total initial investment of the national economy and the initial investment department form coefficient; K_i is the initial inputs for the division I products.

After the improvement, the industrial influence coefficient shows the comparison of a certain sector of the final product influence and the ratio of the final product comprehensive influence national economy, the size of the order of influence to the department, which is not only determined by the size of influence of the department, but also depends on the physical structure of the end product; Industrial induction coefficients of initial investment expresses the size of the "I" department comprehensive relative to the average driving force, and then to size sorting, it presents the impellent ability of the initial inputs of the different departments to the national economy.

3 Empirical Analysis

Since 2000, in Hebei province, the gross domestic product (GDP) accounts for the proportion of stable at more than 5 %, ranked sixth in the country. Iron and steel, petrochemical, building materials, such as traditional industry for many years the production capacity and output value are located in the top, and gradually formed a SIP of progressive industry path.

3.1 Industry Correlation Degree Analysis

Based on the input-output table in 2007 in Hebei province, according to the formula 1 to formula 5 calculation methods, its industrial influence coefficient and sense degree coefficient is calculated. The results show in three points.

First, from the point of added value, except the agriculture, forestry and fishing as the first industry, wide covering range, in the other 41 of the industry, metal smelting and rolling processing industry accounted for 9.55 %, ranked first. Transportation and warehousing accounted for 8.36 %. General industry added value accounted for over 4 % of the economic value added, can be classified as a pillar industry. The industries which account for more than 4 % of the economic value added in Hebei province have metal smelting and rolling processing industry,

transportation and warehousing, wholesale and retail, construction and chemical industry five big industries. Seen from the three big industrial divisions, in five pillar industries, there are three belonging to the second industry. Transportation and warehousing logistics industry also has highly relevant with the heavy industry structure of Hebei province, belongs to a complete set of service industry of manufacturing industry.

Second, seen from the ranked of influence coefficient, the industry which is ranked the fifth of influence coefficient are respectively transportation equipment manufacturing, fabricated metal products, metal smelting and rolling processing industry, electrical machinery and equipment manufacturing, general and special equipment manufacturing.

Third, seen from the ranked of induction degree, the industry which induction degree coefficient is ranked fifth respectively is coal mining and washing industry, waste scrap, gas production and supply industry, instrumentation and cultural office machinery manufacturing, oil and gas industry. The analysis is conducted on the basis of above industrial influence coefficient. It indicates that seen from the point of industrial structure in Hebei province, the transportation equipment manufacturing, metal products, metal smelting and rolling processing industry, electrical machinery and equipment manufacturing, general and special equipment manufacturing industry's strong influence on other industries; And coal mining and washing industry waste, waste, and gas production and supply, instrumentation and cultural office machinery manufacturing, oil and gas industry is affected by other industries stronger. The above data and the analysis conclusion is in conformity with the current industry in Hebei province.

3.2 Analysis Method of Industry Association

If the industry influence coefficient is larger than 1, that means that the industry's influence degree on other department is more than the social average level of the effect degree, has strong impetus to the development of other industries. If the certain industry induction degree coefficient is larger than 1, the degree of the industry is affected by other departments. The industry which the Influence coefficient is larger than 1, the impact of the need to change the industrial chain of shelter-forest industry is strong. When the economic downturn, it effectively stimulates such industries to accelerate economic growth. When the economy is overheating, it can choose to reduce the demand for this type of industry.

Combining with the analysis of industrial structure in Hebei, as show in Fig. 2, it can be seen that only in the pillar industry in Hebei province is located in the first quadrant, chemical industry has strong effect, and shows its industrial competitiveness and the correlation is stronger, located right in the heart of the industrial chain, comply with the positioning of the leading industry of industry; Metal smelting and rolling processing industry, construction industry is located in the second quadrant, influence is stronger, but induction degree is low, which to a certain extent, shows

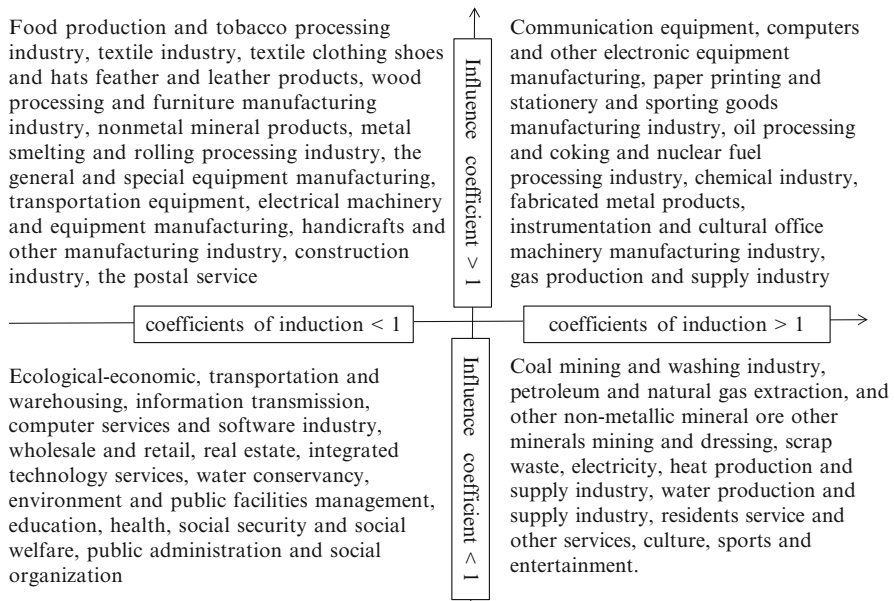


Fig. 2 Correlation degree analysis of Hebei industry

the two pillar industries in Hebei province has the incomparable role, but at the same time, also should see the two industry mostly do not belong to the industrial chain of core region industry status, the future development to a certain stage will encounter bottlenecks; Transportation and warehousing, wholesale and retail sales in the third quadrant, influence coefficient and induction coefficient is low, in the reality of industrial correlation is not strong, the industry fragmentation degree is higher, this kind of industries are often difficult to form a strong support to regional economy, the future development will be restricted due to the associated through low. While the concentration in the fourth quadrant for energy and infrastructure sectors, food circulation and service industry. This kind of industry mostly located in the industrial chain of the terminal, is as the basis for the survival of many industries. Food circulation and service industry is also the basis for the development of the third industry. So from the analysis on industrial properties, this kind of industry presents the influential to other industry, while under the influence of other industry.

According to the analysis of the proportion of the added value of such industry list of all into a pillar industry in Hebei province shows that the present Hebei province is in the middle industrialization during the second half, the heavy chemical industry gradually by the energy and basic materials to processing and manufacturing industry. And the development of modern service industry is relatively backward, and the third industry as a whole presents the proportion is too low, lack of vitality, less competitive industry.

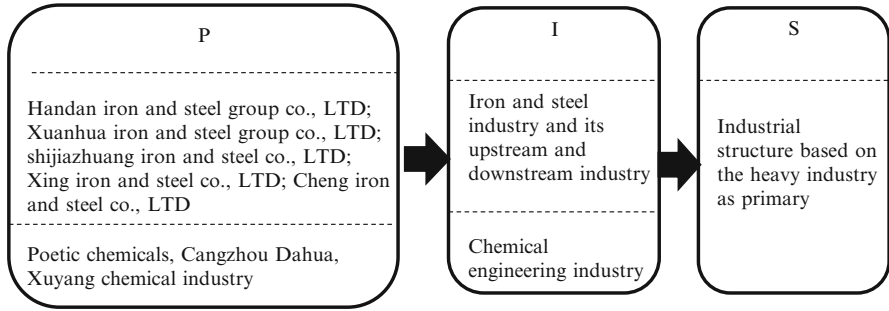


Fig. 3 P-I-S reverse evolution chart

3.3 Analysis of the Influence of SIP Path on Economic Development in Hebei Province

According to Fig. 3, it can be seen that in accordance with the provincial party committee, provincial government decision-making, Hebei province introduced a batch of steel, petrochemical projects (P), such as Handan iron and steel group co., LTD, Xuanhua iron and steel group co., LTD, and so on. The production of this kind of project has formed a powerful support and pushing effect, was driving the upstream and downstream investment of the project, and gradually formed the iron and steel, petrochemical two pillar industries (I), the proportion of the two r total value added respectively was ranked the first and the fifth in the province among the of the industrial added value. Rely on iron and steel, petrochemical industry agglomeration and superposition of economies of scale, it realized the economic great-leap-forward development in Hebei province, the province’s economic aggregate was increased from 89.6 billion Yuan in 1990 to 2.02 trillion Yuan in 2010, in 20 years, it has increased by 22.53 times, also was ranked from eighth in 1990 to the sixth in 2010 nationwide. Based on heavy industry as primarily industrial structure (S), it established and formed the objective economic scale.

4 Conclusions and Policy Recommendations

To sum up, compared with the 1980s, under the guide of the SIP growth Paradigm, Hebei industry presents the fast economic growth. Seen from the perspective of industrial structure, the pillar industries in Hebei province, correlation degree, and the large but not strong industry project problems shall be solved. The prominent problems existing in the industrial structure in Hebei province is that in the three industrial structure, the agriculture foundation is weak, the operation is too scattered, the equipment level and production efficiency is low; the Industry is big but not strong, and some industry is overcapacity, the added value of high-end

manufacturing and strategic emerging industries proportion is low. The service industry especially the development of modern service industry is slow. In Hebei province, based on this, in the future, it needs to be on the basis of economic development, to extend the existing pillar industry chain, to adjust the industrial structure, to promote industrial transformation and upgrading. I borrow the study to put forward the corresponding policy suggestions, and hope that it comes to the attention of economic administrators.

First, Hebei province should focus on extending industry chain, in the development of iron and steel industry, speed up the fine steel base construction, moderately increase the proportion of the plate of iron and steel industry, equipment of the ship to galvanized steel, stainless steel, steel and other high-end steel products production, and expend the research and development field, and based on the characteristics of its own industry development of high-end equipment manufacturing industry and resource advantage, extend industry chain.

Second, Hebei province is desiderate to be under the guidance of the SIP growth Paradigm to find new support project, and through the support projects, forms a new pillar industry, promotes to reverse the heavy industry primarily industrial structure, goes to a new road to industrialization.

Third, Hebei province in the future should focus on the transportation and warehousing, information transmission, computer services and software industry, wholesale and retail integrated technology services, finance, insurance and other modern high-end service industry development plan, to improve the added value of the third industry accounting for the proportion of GDP in the province, promote the overall economic structure transformation to modernization.

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Reinsurance, Securitization and Catastrophe Risks in China

Ning Zhu

Abstract This paper discusses reinsurance and securitization in managing catastrophe risks. Traditional reinsurance can effectively manage small risks of minor degree of correlation and can efficiently promote the information sharing between reinsurance cedants and reinsurers. However, with the increase of potential loss and risks correlation, the efficiency of reinsurance model will become very low, and cost of funds may become nonpaying. At this time, securitization can play its role, because it can transfer the risks to larger and more extensive capital market. Finally, this paper analyzes the feasibility of China's insurance industry to carry out catastrophe bonds.

Keywords Reinsurance • Securitization • Catastrophe risk • ILS

1 Introduction

Insurance-linked Securities (ILS) is the generic term for a kind of financial instruments which transfer the life insurance and non-life insurance risks between different financial markets. "ILS includes contingent capital, catastrophe bonds, catastrophe swaps, catastrophe options, sidecars and industry loss warranties [1]". Some scholars' weather (or climate) derivatives have been brought into ILS.

This paper introduces the strengths of reinsurance and risk securitization as risk management mechanisms. Should ILS be deemed as the substitute or supplement to traditional insurance and reinsurance? Why are some investors tend to invest ILS rather than to hunt a new reinsurance company or issue shares? In addition, in the Report on the Work of the Government of 2014 Premier Li Keqiang said "Actively develop agricultural insurance, explore and build catastrophe insurance systems", and we also discussed the feasibility of China's insurance industry to develop catastrophe bonds.

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2 Venture Financing Reinsurance

Risk warehouse method is the traditional model which is also widely used today to spread risks and transfer insurance industry risks; that is to say, insurance companies and reinsurance companies function as absorbing risks or risk warehouse in economics. Traditional reinsurers provide risk diversification and risk management products, but they usually hold these risks in balance sheet rather than transfer these financial instruments with inherent risks through capital markets. Traditional earlier insurers store most of the risks they assume, and issue different insurance policies through internal diversification; that is to say, to reduce their risks by a variety of business products and policy holders in different regions. However, diversification is not enough to eliminate all of their risks. Earlier insurers can buy reinsurance from the reinsurers to hedge against part of the residual risks of their insurance portfolios. Reinsurers internally hold the risks, and further spread risks through the ceded business in extensive and different areas. Reinsurance companies can also hedge against risks by retroceding risks to other reinsurance companies.

To understand the limitations of risk warehouse method for traditional reinsurance, we suppose that a reinsurance company (reinsurer) has issued N policies. The insurance coverage is single-period, and the amount of loss for each risk is represented by random variables X_1, X_2, \dots, X_N . Risks have limited mean μ_i and limited variance σ_i^2 . Supposing risks are identically distributed, the Law of Large Number still holds even they are not statistically independent. At this time,

$$\lim_{N \rightarrow \infty} \Pr[|\bar{X} - \bar{\mu}| < \omega] = 1 \quad (1)$$

Here, $\bar{X} = \frac{1}{N} \sum_{i=1}^N X_i$ is the sample mean based on the loss of N policies, $\bar{\mu} = \frac{1}{N} \sum_{i=1}^N \mu_i$ is overall theoretical mean, and ω is an arbitrarily small positive number. The Law of Large Number means: with the increase of sample size, sample mean can arbitrarily approach the overall theoretical mean. As a result, to a sufficiently large sample, we can roughly predict the expected loss values.

Because of corporate income tax, agency costs, regulatory costs, accounting standards and other factors, the capitals the insurance companies hold are expensive. Let's talk about the probability of ruin in mean-variance scenario. Central limit theorem points out: when sample size becomes larger, the following random variables approach standardized normal distribution, namely

$$z = \frac{\sum_{i=1}^N X_i - N\mu}{\sigma_N} \rightarrow N(0, 1) \quad (2)$$

Parameter σ_N^2 represents the variance of total loss for a reinsurance company, is defined as

$$\sigma_N^2 = \sum_{i=1}^N \sigma_i^2 + \sum_{j=2}^N \sum_{i=1}^{j-1} \sigma_{ij} \tag{3}$$

Where $\sigma_{ij} = \text{cov}(X_i, X_j)$. Because z approaches normal distribution, so

$$\text{Pr} \left[\frac{\sum_{i=1}^N X_i - N\bar{\mu}}{\sigma_N} < z_\epsilon \right] = 1 - \epsilon \tag{4}$$

z_ϵ represents quantile of standardized normal distribution, i.e. $\text{Pr}[z > z_\epsilon] = \epsilon$. As a result, to reach the target probability of ruin ϵ , the amount equity capital needs shall be $z_\epsilon \sigma_N$, assuming underwriting expected loss using policy premium.

The standardized normal distribution results of equity capital can be used to explain the effects of spreading risks by risk pool. Supposing that the N risks in portfolio are statistically independent, all covariances in Eq. (3) are zero. Thus, the equity capital of each policy shall be:

$$\frac{z_\epsilon \sigma_N}{N} = \frac{z_\epsilon \sqrt{\bar{\sigma}^2}}{\sqrt{N}} \tag{5}$$

Here $\bar{\sigma}^2 = \frac{\sum_{i=1}^N \sigma_i^2}{N}$ means average variance. As a result, when N approaches infinity, each policy's equity capital approaches 0, which means that the sum of all independent risks the large reinsurance companies underwrite has relatively small variance or fluctuation, while the premium collected can be very close to the expected loss. Furthermore, because the amount of equity capital each policy needs is very small, the cost of capital in premium will be very small, bringing an efficient insurance market.

Although risk warehouse can create important market efficiency, it also has weaknesses which lead to the development of capital market as solution. The contract of reinsurance tends to be opaque in stock market, so shareholders find it difficult to assess the enterprise value and also encounter information asymmetry when raising funds. Plus, cost of capital is relatively high, because risk warehouse (insurance/reinsurance companies) needs to pay business income taxes and the opacity and complexity can cause relatively high agency costs. Cost of capital and information asymmetry provides an explanation to reinsurance underwriting cycle, which is the main reason for low efficiency on reinsurance market. Finally, market will face very large and very high skewness of risks; once these risks occur in reality, the major shocks they cause can probably shake the capital base of the reinsurers and ruin the reinsurance market. To such risks or for some more conventional risks, we don't know if increasing issues in stocks to make access to the capital market is the best or only path. These ideas make people think about the methods for securitization.

3 Venture Financing: Securitization

Securitization has provided another mechanism by which the insurance companies and reinsurance companies can transfer their risks to capital market. This is realized by issuing insurance linked securities (ILS) (i.e. catastrophe bonds) to investors. Risk transfer is completed by establishing Special Purpose Vehicles (SPVs). The SPVs form funds by issuing securities (bonds and/or shares) to investors. These funds are held by trust institutions which put money into safe securities like national debts. These SPVs issue contract of reinsurance (call options) to earlier (outward) insurance companies or reinsurance companies, and pay them in case of special events like disasters. Investors shall disperse the potential loss risks by holding insurance linked securities as well as the diversification investment portfolio of all other sectors' bonds and shares. In other words, the insurance companies and reinsurance companies issuing these special risks don't expose all commercial risks to investors – which can be understood to transfer the relatively low cost of capital of insurable risks in the case of traditional equity capital.

As described previously, if the risks the reinsurers underwrite are correlative, and significant asymmetric risks exist in reinsurance companies, as well as underwriting risks is closely related to the equity capital of reinsurers, the traditional reinsurer models will lose efficacy. In addition, the cost of capital will rise due to the information asymmetry between reinsurance companies and capital markets as well as the agency cost and the cost of friction from other markets. Under these conditions, the reinsurance price shall be fantastically high and the scope of cover the reinsurers offer shall be also limited to a large degree.

Securitization can help solve the inefficiency of reinsurance market in many areas.

1. The relevant risks on insurance and reinsurance markets are likely to be irrelevant to other risk statistics in economy. Therefore, if these risks can pass to securities market directly, the covariance between risks of premium may be significantly reduced. Low covariance with other investment risks also makes contract of reinsurance more appealing, for the purpose of investors is to diversify the risks, thus allowing lower cost transfer risks compared with reinsurance mode.
2. In comparison to the securities trading volume on capital market, the equity capitals of insurance companies and reinsurance companies look very tiny. However, compared with the aggregate market value of insurance industry, the estimate of the largest insurance loss events is very huge. Thus, transferring such risks directly to securities market should work.
3. If structuring the securitized products in a proper way, the financial instruments of securitization can evidently reduce or even eliminate the inherent credit risk of policy (bankruptcy risk).

Catastrophe bonds can be criticized for their high price difference compared to reinsurance. However, because data accumulates in a relatively slow way, the

pricing analysis on catastrophe bonds is still in the initial stage and rather immature. Existing studies show that the spread will decrease as time goes on. “By analyzing the bonds issued between 1997 and 2000, we can find that the median of premiums, compared to the expected lost bonds, is 6.77 [2]”. However, bond premium started to decline substantially from 2001, and the average rate of decline was 2.3 % before Hurricane Katrina of 2005. Starting to rise after Hurricane Katrina though, the spread returned back to only about 3.0 % at the beginning of 2008. Based on the data from 1997 to 2008, Lane and Mahul [3] found that “the long-term bonds premium of unadjusted reinsurance market cycle, compared to the expected loss, is 2.69 %; this data becomes 2.33 % after an adjustment [3]”. Thus, the common view based on the studies is that the current spread is no more than 4 %, ranging from 2.0 to 3.0 %.

4 Substitute or Complements

Taken as a whole, we deem the two methods are usually complementary to each other, but they may become substitutional to each other to some kinds of risks like, such as catastrophe risk.

Once being away from the basic assumption – traditional risk pool, pressure starts to drive the development of securitization. As what we’ve seen the correlation between risks may largely increase the equity capital needed for supporting risk warehouse, and also boost the cost of capital that must be paid for supporting risk warehouse. The pricing model of Froot [4] shows – “the securitization effects are also evident to those correlative risks of high skewness [4]”. The risks with relatively large maximum probable loss can also put pressure on traditional insurance and capacity of reinsurance market. To such risks, securitization may be the most efficient solution. Due to the costs generated by covariance (covariability) and skewness as well as the increase of highly potential loss, securitization starts to substitute reinsurance, and reinsurance may not be economical to very high level of risks, so reinsurance and securitization are complementary. As a result, considering the efficiency of risk warehouse in handling many relatively small and independent risks, we don’t expect that securitization substitute reinsurance. However, to larger and more correlative risks, starting to compete against reinsurance may be the only solution for catastrophe risks.

Another aspect involved as to the complementarity between reinsurance and securities is credit risk. Insurance linked securities are usually fully collateralized, providing the risk hedgers with high class of protection about default risk. On the contrary, when it comes to hedging risks, reinsurance replaces mortgage using diversification. However, the diversification from reinsurance is effective only when a large number of reinsurance events do not occur at the same time. Rare to see the latter scenario though, reinsurance cedants cannot be overlooked, because what the reinsurance companies face is the problem of default. The assets of reinsurance companies shall be divided in proportion between reinsurance cedants

and claims payable. But there are no standards or efficiency for the preparation of proportion rules, because it will cause the different exposures of default risks of the cedants (that is to say, the cedants may default the contract when it is unfavorable to the cedants). In fact, compared to the cedants whose average risks (high-frequency/low-loss risks) are transferred, those cedants whose extreme risks are transferred are in unfavorable position. Such low efficiency is caused by the asset allocation rules between the claimants in default events of insurance companies or reinsurance companies. Securitization of low-frequency risks helps alleviate the asymmetry. For corresponding parts of risks, “a securitization hedge for default risks of reinsurance companies, because it is fully collateralized [5].” In other words, securitization calibrates the inefficiency of reinsurance market while reinsurance market links the heterogeneous cedants, and the cedants are linked by information imperfect reinsurance contract.

5 Feasibility of Implementing Insurance Linked Securities in China

It is hugely necessary for China’s insurance industry to develop catastrophe bonds, but the conditions for carrying out such financial innovations will need to be further gone into. After several major disasters, including Wenchuan Earthquake, and Yushu earthquake, the important role of preventing and eliminating catastrophe risks through insurance and other means has caused great concern from the Chinese government. Thus, establishing and improving catastrophe prevention and relief system have become the major considerations for local governments.

The major participants of catastrophe linked securities include insurance companies, reinsurance companies, businesses, governments and investors. In China, the number of such institutions is relatively huge with strong demand for risk diversification, thus meeting the major participants’ requirements to carry out catastrophe linked securities. China has developed the capital market for long time, and the market is gradually being mature.

In recent years, the laws and regulations of Chinese insurance industry have gradually been perfected for catastrophe risks, such as The Flood Control Law, The Law of the Peoples Republic of China on Precautions against Earthquake and Relief of Disaster, Code for Catastrophe Insurance Data Acquisition, etc. The governments have actively made many efforts to address the occurrence of catastrophic events. Chinese insurance industry’s experience accumulation on catastrophe risk management also laid foundation for implementing catastrophe linked securities. Compared with catastrophe futures, options and ILS in terms of many aspects including product design and transactions, catastrophe bonds are relatively simple, thus more facilitating the public in understanding as well as promotion and application. In addition, the related institutions also have had the technology in pricing and issuing catastrophe bonds.

Consequently, we think that Chinese insurance industry has already basically laid the foundation to develop catastrophe linked securities especially catastrophe bonds, market demand, participation bodies, legal environment or technical reserve. At the present stage in China, we can select special risks in special areas for issuing trials for catastrophe bonds, further summarizing experience and lessons to extend towards other areas and other catastrophe risks.

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Research on the Relationship Among Large Shareholders and Its Economic Consequences of Listed Companies in China

Tingli Liu, Songling Yang, and Qianqian Shi

Abstract This paper focuses on the impacts of the characteristic of relationship (GUANXI), which is from the Chinese social culture, on the system of the listed company in China. Based on the research and analysis of the top ten shareholders, research find that relationships exist in approximately 50 % of the listed companies. The paper further examines the economic consequences of such large shareholder relationship. It has been showed that the relationship among the large shareholders would increase the social capital of shareholders' network of the listed companies and the positive effect of the social capital has been brought about. Thereby the company's agency cost would be significantly lower, and the earning quality would be significantly higher.

Keywords Large shareholders • Relationship • Agency cost • Earnings quality

1 Introduction

The influences of the interest conflict and the coordination among shareholders have been a topic of concern; however, the conflict generated by the pure differences of the number is easier to be coordinated, while what is worse is that if the transaction varies greatly, it is difficult to figure out the simple standard of equilibrium point of shareholder interests [1]. Therefore, current status of the stakeholder structure is far from enough to support the financial research. The social culture of China refers to a typical “relationship” quality. The debate represented here is that “Does the special culture exist in the listed companies?” To find the answer, we collected data in the listed companies of China from 2008 to 2011 and found that large shareholders relationship exist in about 50 % listed companies. Apparently, excepting the proportion of the shareholding, some other economic or social relations among the shareholders do exist, such as the shareholding relationship, the concerted action relationship, and the kinship. Based on

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relationship among large shareholders the listed companies can be divided into two categories, one is relational shareholder listed companies (RSLC), which exists relationship among the top ten shareholders; another is independent shareholder listed companies (ISLC), whose shareholders are fully independent to each other. Are there any significant differences between them? What effect would the relationship among large shareholders bring to listed companies? These are exactly the research motivation of this paper.

2 The Classification of the Large Shareholders' Relationship

Based on statistics, we found that there are three major relationships: shareholding, contractual and kinship relationship. From the whole perspective, 40.39 % of the companies have block shareholders with shareholding relationship, and 57.74 % of them have contractual relationship. In addition, multiple shareholder relationships do exist in some companies. Table 1 shows the number distribution of shareholders relationships. In general, most large shareholders of listed companies have one type relationship; about 15 % companies contain two or three relationships. Chi-square test and T-test confirmed that the relational number of the state-owned company is significantly smaller than the number of private companies.

3 Literature Review and Theoretical Foundation

Literature of shareholders homogeneity primarily focus on the perspective of property rights, shareholding ratio, and ownership structure, but not refer to the various implicit association among the major shareholders [2]. Conflicts of interest would exist among the shareholders [3]. Within further study of the ownership structure, some scholars pay attention to heterogeneity of the major shareholder. The heterogeneity of major shareholder is partly due to interests conflicting of shareholders [4, 5]. For example, hedge funds are more likely to persuade to reform the companies because that the manager's remuneration is directly linked with fund performance [6–8]. Holderness examines U.S. listed company data and validates the existence of shareholder heterogeneity [9]. Large shareholders with more impact and influence has a strong effect on company policies and performance [4], and different types of the shareholders have different incentives and monitoring capabilities [10, 11]. A number of scholars verified that political relations can improve company value [12]. Company maintaining a good relationship by bringing in the investment banks or other financial institutions will offer less collateral assets to get the long-term loans [13, 14]. A feature of "Guanxi" is remarkable in China's commercial [15], it has been verified that the company with kinship

Table 1 Quantitative distribution of the relational shareholder in listed companies

Number	1	2	3	4	5	6-10	11-20	Above 21	Total
2008	313(46.17 %)	125(18.44 %)	92(13.57 %)	46(6.78 %)	24(3.54 %)	65(9.59 %)	10(1.47 %)	3(0.44 %)	678
2009	366(48.93 %)	118(15.78 %)	99(13.24 %)	51(6.82 %)	23(3.07 %)	71(9.49 %)	15(2.01 %)	5(0.67 %)	748
2010	473(46.56 %)	136(13.39 %)	148(14.57 %)	75(7.38 %)	31(3.05 %)	116(11.42 %)	25(2.46 %)	12(1.18 %)	1,016
2011	569(45.89 %)	178(14.35 %)	191(15.40 %)	68(5.48 %)	30(2.42 %)	148(11.94 %)	27(2.18 %)	29(2.34 %)	1,240
Total	1,721(46.74 %)	557(15.13 %)	530(14.39 %)	240(6.52 %)	108(2.93 %)	400(10.86 %)	77(2.09 %)	49(1.33 %)	3,682

shareholders could reduce agency cost [16]. Although researches have different opinions, this does not weaken the conjunction in organizational structure; on the contrary, as this paper has been verified that the relational company has a growing trend. Actually, the relationships among the shareholders have beyond kinship among family members.

Mutual trust between individuals in company networks can effectively reduce agency cost; eliminate speculative behavior; prompt the efficiency of resources utilization and operation [17]. Social organization is characterized by social capital that can improve the efficiency of society function by facilitating coordination and action [18]. Social capital contribute to group's values [19]. Thus, it can be inferred that with the existence of shareholding, contractual and kinship relationship among the large shareholders, large-shareholder alliance is formed. The networks of the alliance would increase the social capital and reduce coordination cost. Thereby, it can be inferred that the increase of the social capital of shareholders' network has positive impacts, so we put forward the two hypotheses:

H1: Companies with relationship among the large shareholders have a lower agency cost.

H2: Companies with relationship among the large shareholders have a higher earnings quality.

4 Experimental Research

Our sample is drawn from the CSMAR database. we excluded 122 financial companies, 320 special treatment companies and data lacking companies. Finally, we have 7,423 cases. Management expense rate (MER, ratio of operating expense to operating income) is the most appropriate indicator to observe and measure expense in-office. This paper chooses the ratio that widely used in previous studies as a proxy of agency cost. According to the number and type of relationships among large shareholders, we conducted Rank sum test and found type (P-value is 0.000) and number (P-value is 0.024) have a significant effect on agency cost. We employ the absolute value of discretionary accruals as earning quality (DAC), the higher DAC, the lower earnings quality. The single factor variance analysis showed that significant differences exist in earning quality of different groups of number of shareholders' relationships (P-value is 0.000).

State-owned company is an important component of China's listed companies, therefore, the sample is divided into two groups and we conducted T-test both for agency cost and earnings quality, as shown in Table 2.

In general, both agency cost and earnings quality of state-owned companies are significantly lower than that in private companies in 2008–2011, which is not consistent with previous findings. Furthermore, agency cost of RSLC is significantly lower than that of ISLC in all kinds companies, showing that relationships contribute to agency cost, which can be explained by the theory of social capital.

Table 2 T-test Results

Group		N	Agency cost	Earnings quality
State-owned and private	State-owned	3,784	t = -8.5563	t = 1.6841
	Private	3,622	Pr(T < t) = 0.0000	Pr(T < t) = 0.0922
State-owned RSLC & ISLC	State-owned RSLC	1,524	t = -2.6023	Non-significant
	State-owned ISLC	2,260	Pr(T < t) = 0.0093	
Private RSLC & ISLC	Private RSLC	1,986	t = -4.6381	t = -6.5837
	Private ISLC	1,636	Pr(T < t) = 0.0000	Pr(T < t) = 0.0000

Only for private companies, the earnings quality of RSLC is significantly higher than that of ISLC. A cross-examination of relationship is also conducted to confirm the conclusion.

Furthermore, we established regression model. As proxies for relationship among the large shareholders we use whether relational large shareholders exist and the number of relationship, which we call RE and RENUM respectively. As shown on Table 3, there is a negative relationship between the number of relationship and agency cost. We also confirmed that in both state-owned and private companies, agency cost of RSLC is significantly lower than that of ISLC. Earnings quality of RSLC is significantly higher than that of ISLC. What is more, with a large increase in the number of relationship, earnings quality show a significant positive trend, thus proving that the more relationship is, the more abundant social capital in company level is, and ultimately leading to higher earning quality.

The control variables are leverage, managerial ownership, growth, equity restriction ratio, the proportion of direct controlling shareholders, ownership proportion of actual controller, control proportion of actual controller, leverage, whether bearing a loss during 2 year, board size, the ratio of independent director, whether the CEO and the chairman being one person, the asset, industry and year.

5 Discussion and Conclusion

“GuanXi” culture has been deeply rooted in China, we verified that about 50 % of listed companies have relational block shareholders and found the company with relational large shareholders has a significantly lower agency cost and higher earnings quality. The implication of this study is that the social capital is a positive factor for stakeholders; and relationship among shareholders is one of the paths to build their social capital.

Table 3 Regression results

Variable	Agency cost (Regression coefficients/p-value)		Earnings quality (Regression coefficients/p-value)	
	Model 1	Model 2	Model 3	Model 4
RE	0.016 ^{***} (0.000)		-0.005 ^{***} (0.001)	
RENUM		-0.004 ^{***} (0.000)		-0.001 ^{***} (0.014)
Control-variable	Controlled	Controlled	Controlled	Controlled
_cons	2.949 (0.377)	3.142 (0.347)	3.039 ^{***} (0.015)	3.137 ^{***} (0.012)
Adj- R ²	0.058	0.058	0.043	0.043
F-value	56.978	56.660	23.761	23.419

$$\begin{aligned}
 &MER = \alpha_0 + \alpha_1 \times RE + \sum_{i=1}^0 \gamma_i \times Control + \epsilon(Model\ 1) \quad MER = \alpha_0 + \alpha_1 \times RENUM + \sum_{i=1}^0 \gamma_i \times Control + \epsilon(Model\ 2) \quad DAC = \beta_0 + \beta_1 \times RE + \sum_{i=1}^{12} \gamma_i \times \\
 &Control + \epsilon(Model\ 3) \quad DAC = \beta_0 + \beta_1 \times RENUM + \sum_{i=1}^{12} \gamma_i \times Control + \epsilon(Model\ 4)
 \end{aligned}$$

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A New Method Based on Grey System

Yingjian Qi, Zhengpeng Wu, Ying Li, and Jing Yu

Abstract Based on the reason that the growth of discrete grey model is constant, the paper proposed the quadratic time-varying parameters discrete grey model (referred to as QDGM (1,1)) by introducing quadratic time-varying terms. Next we researched the properties of the new model, which possessed white exponential law coincidence, linear law coincidence, quadratic law coincidence and consistency of stretching transformation. Finally, the new model was compared with another two discrete grey models through an instance. It was proved that the new model greatly improves the simulation and prediction precision.

Keywords Grey system • Simulation and prediction • Quadratic time-varying parameters

1 Introduction

Grey system is a new theory for both hard and soft science characteristic which has been founded by the famous scholar professor Deng in the early 1980s, it has been successfully employed in engineering technology, society, economy, agriculture, environment, military and many other fields [1]. In the process of the theory's development and research, the researchers from various fields do much in-depth study about GM (1, 1) model from the point of theoretical analysis and practical application, and put forward to many improved models [2–4]. These models have demonstrated satisfactory results in terms of reduce the error and advance the forecasting precision, but ignored the hop error in predicting the continuous time response sequence. Xie [5] put forward to non-homogeneous discrete grey model. They optimize the iterative starting value of the new model. Based on the parameter characteristics of discrete grey model, Zhang [6] structured time-varying parameters discrete grey model by analyzing the causes of the growth of discrete

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grey model is constant to introducing quadratic time-varying terms. The new model has better simulation and prediction precision than another two discrete grey models.

On the basis of literature, the paper brought forward to quadratic time-varying parameters discrete grey model by introducing quadratic time-varying terms [6]. And then the paper researched properties of the new model. Finally, it was proved that the new model have better predictive validity compared with other existing discrete grey models through one instance.

2 Quadratic Time-Varying Parameters Discrete Grey Mode

For the main text, please use 13-point type and single-line spacing. We recommend the use of Times New Roman. Italic type may be used to emphasize words in running text. Bold type and underlining should be avoided.

Assume that the sequence $X^{(0)} = \{x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(n)\}$ is a certain behaviour sequence of the system. The sequence $X^{(1)} = \{x^{(1)}(1), x^{(1)}(2), \dots, x^{(1)}(n)\}$ is the accumulated generation sequence of $X^{(0)}$, where $x^{(1)}(k) = \sum_{i=1}^k x^{(0)}(i)$, $k = 1, 2, \dots, n$.

Definition 1 The equation $x^{(1)}(k + 1) = \beta_1 x^{(1)}(k) + \beta_2$ is called discrete grey model, or termed the discrete form of GM (1,1).

Theorem 1 Assume that the sequence $\hat{X} = \{\hat{x}(1), \hat{x}(2), \dots, \hat{x}(n)\}$ is the simulate and predictive values sequence of DGM(1,1) model, $\hat{\mu}(k)$ is the growth of \hat{X} , where $\hat{\mu}(k) = \frac{\hat{x}(k+1) - \hat{x}(k)}{\hat{x}(k)}$, $k = 2, 3, \dots, n$, then $\hat{\mu}(k) = \beta_1 - 1$.

From Theorems 1 we can come to the conclusion that the simulation value of the DGM (1, 1) model has the same growth with the prediction value. It has good effect of predict and simulate to similar exponential law index. However, in reality, because of no index law in sequence, the error of the model will be very large. The reason of the error is that parameter β of the model is constant, i.e. DGM (1, 1) is linear no-varying system model. Literature [6] using linear time terms instead of the constant parameters of the original discrete grey model, structured the linear time-varying parameters discrete grey model.

Definition 2 [6] the equation $x^{(1)}(k + 1) = (\beta_1 + \beta_2 k)x^{(1)}(k) + \beta_3 k + \beta_4$ is called linear time-varying parameters discrete grey model, (abbreviated as TDGM), $x^{(1)}(k)$ is accumulating generating sequence of the original sequence.

In literature [6], we structured TDGM model, the model overcome the problem that the growth of original discrete grey model is constant, and it has better simulation and prediction effect. Structure [6] TDGM model overcame the

simulation value growth rate constant of the original discrete model, has better simulation and prediction effect. And in the field of the economic society and engineering technology, the behaviour sequence of the system itself and the interaction between different sequences of behaviour show up as complex nonlinear relations. The paper structured quadratic time-varying parameters discrete grey model as the general form of the DGM model and TDGM model.

Definition 3 The equation

$$x^{(1)}(k + 1) = (\beta_1 + \beta_2k + \beta_3k^2)x^{(1)}(k) + \beta_4k^2 + \beta_5k + \beta_6 \tag{1}$$

is called Quadratic time-varying parameters discrete grey model (abbreviated as QDGM), $x^{(1)}(k)$ is accumulating generating sequence of the original sequence.

Theorem 2 Assume that $X^{(0)} = \{x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(n)\}$ is a non-negative sequence of raw data; it's 1-AGO sequence. $X^{(1)}$ is $X^{(1)} = \{x^{(1)}(1), x^{(1)}(2), \dots, x^{(1)}(n)\}$, the least square estimate of the QDGM model is

$$\hat{\beta}_1 = \frac{B_1}{A} \quad \hat{\beta}_2 = \frac{B_2}{A} \quad \hat{\beta}_3 = \frac{B_3}{A} \quad \hat{\beta}_4 = \frac{B_4}{A} \quad \hat{\beta}_5 = \frac{B_5}{A} \quad \hat{\beta}_6 = \frac{B_6}{A}$$

For convenience, set

$$\begin{aligned} C &= \sum_{k=1}^{n-1} k, & D &= \sum_{k=1}^{n-1} k \\ E &= \sum_{k=1}^{n-1} k^2, & F &= \sum_{k=1}^{n-1} k^3, & G &= \sum_{k=1}^{n-1} k^4, & H &= \sum_{k=1}^{n-1} x^{(1)}(k), \\ I &= \sum_{k=1}^{n-1} kx^{(1)}(k), & J &= \sum_{k=1}^{n-1} k^2x^{(1)}(k) \\ K &= \sum_{k=1}^{n-1} k^3x^{(1)}(k), & L &= \sum_{k=1}^{n-1} k^4x^{(1)}(k), & O &= \sum_{k=1}^{n-1} k^2x^{(1)}(k)^2, \\ P &= \sum_{k=1}^{n-1} k^3x^{(1)}(k)^2, & Q &= \sum_{k=1}^{n-1} k^4x^{(1)}(k)^2 \\ R &= \sum_{k=1}^{n-1} x^{(1)}(k)x^{(1)}(k + 1), & S &= \sum_{k=1}^{n-1} kx^{(1)}(k)x^{(1)}(k + 1), \\ T &= \sum_{k=1}^{n-1} k^2x^{(1)}(k)x^{(1)}(k + 1) \\ U &= \sum_{k=1}^{n-1} k^2x^{(1)}(k + 1), & V &= \sum_{k=1}^{n-1} kx^{(1)}(k + 1), & W &= \sum_{k=1}^{n-1} x^{(1)}(k + 1) \end{aligned}$$

Then

$$\begin{aligned}
 A &= \begin{pmatrix} M & N & O & J & I & H \\ N & O & P & K & J & I \\ O & P & Q & L & K & J \\ J & K & L & G & F & E \\ I & J & K & F & E & D \\ H & I & J & E & D & C \end{pmatrix}, \\
 B_1 &= \begin{pmatrix} R & N & O & J & I & H \\ S & O & P & K & J & I \\ T & P & Q & L & K & J \\ U & K & L & G & F & E \\ V & J & K & F & E & D \\ W & I & J & E & D & C \end{pmatrix}, \quad B_2 = \begin{pmatrix} M & R & O & J & I & H \\ N & S & P & K & J & I \\ O & T & Q & L & K & J \\ J & U & L & G & F & E \\ I & V & K & F & E & D \\ H & W & J & E & D & C \end{pmatrix}, \\
 B_3 &= \begin{pmatrix} M & N & R & J & I & H \\ N & O & S & K & J & I \\ O & P & T & L & K & J \\ J & K & U & G & F & E \\ I & J & V & F & E & D \\ H & I & W & E & D & C \end{pmatrix}, \quad B_4 = \begin{pmatrix} M & N & O & R & I & H \\ N & O & P & S & J & I \\ O & P & Q & T & K & J \\ J & K & L & U & F & E \\ I & J & K & V & E & D \\ H & I & J & W & D & C \end{pmatrix}, \\
 B_5 &= \begin{pmatrix} M & N & O & J & R & H \\ N & O & P & K & S & I \\ O & P & Q & L & T & J \\ J & K & L & G & U & E \\ I & J & K & F & V & D \\ H & I & J & E & W & C \end{pmatrix}, \quad B_6 = \begin{pmatrix} M & N & O & J & I & R \\ N & O & P & K & J & S \\ O & P & Q & L & K & T \\ J & K & L & G & F & U \\ I & J & K & F & E & V \\ H & I & J & E & D & W \end{pmatrix},
 \end{aligned}$$

Proof Set the sequence $X^{(0)} = \{x^{(0)}(1), x^{(0)}(2), \dots, x^{(0)}(n)\}$

The estimate value of parameters of the QDGM model is $(\hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3, \hat{\beta}_4, \hat{\beta}_5, \hat{\beta}_6)$

Substitute $x^{(1)}(k+1) \ k = 1, 2, \dots, n-1$ with $\hat{x}^{(1)}(k+1) = (\hat{\beta}_1 + \hat{\beta}_2 k + \hat{\beta}_3 k^2)$
 $x^{(1)}(k) + \hat{\beta}_4 k^2 + \hat{\beta}_5 k + \hat{\beta}_6$, then we can get the sum of error squares

$$S = \sum_{k=1}^{n-1} [x^{(1)}(k+1) - \hat{x}^{(1)}(k+1)]^2 = \sum_{k=1}^{n-1} [x^{(1)}(k+1) - \hat{\beta}_1 x^{(1)}(k) - \hat{\beta}_2 k x^{(1)}(k) - \hat{\beta}_3 k^2 x^{(1)}(k) - \hat{\beta}_4 k^2 - \hat{\beta}_5 k - \hat{\beta}_6]^2$$

According to the least square method, the values of $(\hat{\beta}_1, \hat{\beta}_2, \hat{\beta}_3, \hat{\beta}_4, \hat{\beta}_5, \hat{\beta}_6)$ make s minimum and should satisfy.

$$\left\{ \begin{aligned} \frac{\partial S}{\partial \hat{\beta}_1} &= 2 \sum_{k=1}^{n-1} \left[x^{(1)}(k+1) - \hat{\beta}_1 x^{(1)}(k) - \hat{\beta}_2 k x^{(1)}(k) - \hat{\beta}_3 k^2 x^{(1)}(k) - \hat{\beta}_4 k^2 \right. \\ &\quad \left. - \hat{\beta}_5 k - \hat{\beta}_6 \right] [-x^{(1)}(k)] = 0 \\ \frac{\partial S}{\partial \hat{\beta}_2} &= 2 \sum_{k=1}^{n-1} \left[x^{(1)}(k+1) - \hat{\beta}_1 x^{(1)}(k) - \hat{\beta}_2 k x^{(1)}(k) - \hat{\beta}_3 k^2 x^{(1)}(k) - \hat{\beta}_4 k^2 \right. \\ &\quad \left. - \hat{\beta}_5 k - \hat{\beta}_6 \right] [-k x^{(1)}(k)] = 0 \\ \frac{\partial S}{\partial \hat{\beta}_3} &= 2 \sum_{k=1}^{n-1} \left[x^{(1)}(k+1) - \hat{\beta}_1 x^{(1)}(k) - \hat{\beta}_2 k x^{(1)}(k) - \hat{\beta}_3 k^2 x^{(1)}(k) - \hat{\beta}_4 k^2 \right. \\ &\quad \left. - \hat{\beta}_5 k - \hat{\beta}_6 \right] [-k^2 x^{(1)}(k)] = 0 \\ \frac{\partial S}{\partial \hat{\beta}_4} &= 2 \sum_{k=1}^{n-1} \left[x^{(1)}(k+1) - \hat{\beta}_1 x^{(1)}(k) - \hat{\beta}_2 k x^{(1)}(k) - \hat{\beta}_3 k^2 x^{(1)}(k) - \hat{\beta}_4 k^2 \right. \\ &\quad \left. - \hat{\beta}_5 k - \hat{\beta}_6 \right] [-k^2] = 0 \\ \frac{\partial S}{\partial \hat{\beta}_5} &= 2 \sum_{k=1}^{n-1} \left[x^{(1)}(k+1) - \hat{\beta}_1 x^{(1)}(k) - \hat{\beta}_2 k x^{(1)}(k) - \hat{\beta}_3 k^2 x^{(1)}(k) - \hat{\beta}_4 k^2 \right. \\ &\quad \left. - \hat{\beta}_5 k - \hat{\beta}_6 \right] [-k] = 0 \\ \frac{\partial S}{\partial \hat{\beta}_6} &= 2 \sum_{k=1}^{n-1} \left[x^{(1)}(k+1) - \hat{\beta}_1 x^{(1)}(k) - \hat{\beta}_2 k x^{(1)}(k) - \hat{\beta}_3 k^2 x^{(1)}(k) - \hat{\beta}_4 k^2 \right. \\ &\quad \left. - \hat{\beta}_5 k - \hat{\beta}_6 \right] [-1] = 0 \end{aligned} \right.$$

This is non-homogeneous linear equations. According the Cramer law to solve the non-homogeneous linear equations, we can get the estimate value of parameters which is shown in theorem 2.

Definition 4 Sequences $X^{(0)}$, $X^{(1)}$ and the estimate value of parameters of the QDGM model has been shown in Theorem 2. The recursive formula of once accumulate value of simulation of $X^{(0)}$ is

$$\hat{x}^{(1)}(k+1) = (\hat{\beta}_1 + \hat{\beta}_2 k + \hat{\beta}_3 k^2)x^{(1)}(k) + \hat{\beta}_4 k^2 + \hat{\beta}_5 k + \hat{\beta}_6, \quad k = 1, 2, \dots, n-1 \tag{2}$$

Restore it, we can get

$$\hat{x}^{(0)}(k+1) = \alpha^{(1)} \hat{x}^{(1)}(k+1) = \hat{x}^{(1)}(k+1) - \hat{x}^{(1)}(k), \quad k = 1, 2, \dots, n-1 \tag{3}$$

3 Computational Examples and Analysis

Example: On the basis of literature [6], we select 1996–2011 China’s advertising turnover from china statistical yearbook 2011 as the analysis of data. We establish secondary discrete time-varying parameter model (QDGM) on the basis of the data

Table 1 The comparison of China's advertising turnover of the value of three model's simulative prediction and the average relative error

Year	Original	NDGM			TDGM			QDGM		
		Simulative value	Relative error (%)	Relative error (%)	Simulative value	Relative error (%)	Relative error (%)	Simulative value	Relative error (%)	Relative error (%)
1996	3,666,372	780,772	78.70		3,677,713	0.00		3,672,459	0.17	
1997	4,619,638	4,138,259	10.42		4,673,931	1.18		4,640,191	0.44	
1998	5,378,327	4,982,012	7.37		5,321,196	1.06		5,378,158	0.00	
1999	6,220,506	5,898,918	5.17		6,095,361	2.01		6,115,554	1.69	
2000	7,126,632	6,895,321	3.25		7,015,667	1.56		7,033,534	1.31	
2001	7,948,876	7,978,111	0.37		8,098,719	1.89		8,092,673	1.81	
2002	9,031,464	9,154,779	1.37		9,354,951	3.58		9,323,593	3.23	
2003	10,786,846	10,433,465	3.28		10,783,890	0.03		10,734,273	0.49	
2004	12,645,601	11,823,012	6.50		12,368,315	2.19		12,319,435	2.58	
2005	14,163,487	13,333,033	5.86		14,067,646	0.68		14,046,394	0.83	
2006	15,730,018	14,973,973	4.81		15,811,274	0.52		15,836,986	0.68	
2007	17,409,626	16,757,182	3.75		17,492,895	0.48		17,543,208	0.77	
2008	18,995,614	18,694,996	1.58		18,967,308	0.15		18,918,254	0.41	
The average simulative error of 1996–2008(%)										
		4.48			1.18			1.32		
2009	20,410,322	14,496,260	28.98		20,051,360	1.76		19,589,056	4.02	
2010	23,405,076	15,753,086	32.69		98,650,322	321.49		19,043,911	18.63	
2011	31,255,529	17,118,879	45.23		159,103,239	409.04		16,658,771	46.70	
The average predictive error of 2009–2011(%)										
		35.63			244.10			23.12		
The average predictive error of 1996–2011(%)										
		8.24			46.73			2.64		

for the group in this paper. We compared it with the non-homogeneous discrete model (NDGM) and the linear time-varying parameters of discrete grey model (TDGM) at accuracy of simulation and prediction. Data from 1996 to 2008 was used as the original data in former analysis. We predict the value of 2009–2011. We establish, NDGM, TDGM and QDGM model respectively, see (4)–(6). Results of simulation and the corresponding simulation mean error are shown in Table 1.

$$\begin{cases} \hat{x}^{(1)}(k+1) = 1.0867 * \hat{x}^{(1)}(k) + 484,966 * k + 3,585,600 \\ \hat{x}^{(1)}(1) = 3,666,372 \end{cases} \quad (4)$$

$$\begin{cases} \hat{x}^{(1)}(k+1) = (1.6128 - 0.023893 * k) * \hat{x}^{(1)}(k) - 1,905,700 * k + 4,413,800 \\ \hat{x}^{(1)}(1) = 36,777,713.0 \end{cases} \quad (5)$$

$$\begin{cases} \hat{x}^{(1)}(k+1) = (-0.78725 + 0.21517 * k - 0.0068254 * k^2) * \hat{x}^{(1)}(k) \\ \quad - 371,344 * k^2 + 7,560,000 * k + 3,250,000 \\ \hat{x}^{(1)}(1) = 3,672,458.6 \end{cases} \quad (6)$$

4 Conclusions

Quadratic time-varying parameters discrete grey model is constructed by this paper, changed the constantly growth rate of simulative value of the original discrete grey model. When the modeling date conforms to the index law approximately, QDGM (1, 1) can be seen as a general form of NDGM (1, 1) and TDGM (1, 1).

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Review on Early-Warning System of Real Estate Market

Shi Tang

Abstract As the foundation and leading industry of the national economy, the healthy and stable development of the real estate industry plays a significant role in the national economy of a country. This article reviews the early-warning system of real estate market from the aspects of the definition, the choice of method, the construction of the index system. The computer system modeling technology being introduced into real estate warning areas must become a new research field and direction for the early-warning system of real estate.

Keywords Real estate market • Early-warning system • Review

1 Introduction

China has made a comprehensive reform of the housing system and accelerated the urbanization since 1998, which greatly promoted the development of real estate, and now real estate has become the foundation and leading industry of the national economy. In the development process, the real estate appears some problems such as excessive expansion of investment, steeply risen in market prices, uncoordinated development between the real estate economy and national economic, which increased the risk of the real estate market in a certain extent. Therefore, to establish a scientific and accurate early-warning system is the key to prevent the real estate bubble, and to promote sustained and stable development of China's economy.

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2 Definition of the Early-Warning System of Real Estate Market

The early-warning system of real estate, as an important branch of the early-warning system of macroeconomics, is now in a stage of exploring on its development. While different scholars have different opinions, the early-warning system of real estate did not form a unified definition.

Grecksch [1] believed that the early-warning system of real estate, which belongs to the category of economic early-warning, is based on the scientific theory and economic operation laws, with the empirical analysis on the historical process of real estate industry economic operation, and mainly through the selection and establishment of index system, revealing and recognizing the internal relations between the specific indicators and both of the overall operation situation and partial characteristics in real estate industry, deriving the accurate judgment on the overall real estate economic situation and the changes of the partial characteristic, carrying on the analysis and the countermeasure against potential problems, making right prediction and evaluation to its trend, so as to take measures to promote the sustained, healthy operation of the real estate industry.

Ye Yan-bing, Ding Lie-yun [2] gave the definition of early-warning system of real estate from the perspective of the establishment of early-warning index system: “the early-warning system of real estate, based on scientific theory instruction, through the empirical analysis on the historical process of real estate industry economic operation, with reference to the basic law of economic operation on industry similar to the real estate or other industry, and mainly through the selection and establishment of index system, revealing and recognizing the internal relations between the specific indicators and both of the overall operation situation and partial characteristics in real estate industry, with continuous monitoring changes in the relevant indicators during process of real estate economic operation, the government supervision departments can derive the overall real estate economic situation and accurate judgment, and make correct prediction and evaluation toward henceforth situation, in advance to take the supervision and control measures as far ahead as possible, and to maximize the promotion of the real estate economy sustained and well-run, but try to avoid the adverse situation or events”.

Li Chong-ming [3] believed that the early-warning system of real estate is refers to make research and analysis on the relationships between internal and external in the real estate system as well as the continuity and mutation about the entire real estate system, summed up the law of motion, and then apply these laws as early-warning mechanism to achieve the purpose of early warning.

Comprehensive views of the above scholars, combining with the actual situation of China’s real estate market, the early-warning system of real estate can be interpreted as: (1) based on the real estate business cycle theory, by analyzing the historical process, summarizing and applying real estate economy rules; (2) by selecting and establishing the index system, to recognize and reveal the development and changes in the real estate industry; (3) through continuous monitoring the

index system, to predict future trends and provide reference for government to adjust the industrial structure of national economy and guide the healthy development of real estate industry.

3 Research on Early-Warning Method of Real Estate Market

Early-warning method is the core of the early-warning system, so the choice of early-warning method is the key for early-warning system of real estate to monitor, predict and control the real estate market.

Shenzhen Early-Warning of Real Estate Group [4] designed the early-warning system of real estate by using the system dynamics method, and established early-warning system of real estate based on the business cycle, and tentatively established a real estate dynamic simulation and control system based on system dynamics method to reached the purposes of simulation, monitoring, forecasting and policy testing on the real estate system.

Ding lie-Yun, Xu Ze-qing [5] applied the computer information system modeling technology into the early-warning of urban real estate in Wuhan. Ding lie-Yun, Li Bin [6] combined with fuzzy systems theory and neural network theory, considering the influence of psychological factors on the real estate market and using the popularity index as input variables, which made the early-warning model more realistic.

Liu Jing-jing [7] established the early-warning system of real estate of Wuhan city by using the principle of “hierarchical control” structural scheme within the scope of complex system control.

Liu Ya-cheng, Sun Xiao-dan, Li Dan [8] introduced both of control chart principle and 3 Sigma principle in statistics into early-warning of real estate, and determined the warning interval of Shenyang city.

From the results of the current study, the domestic scholars have tried to carry out the research on early-warning methods of real estate and empirical analysis from different perspectives, and gradually sort out the research progress of early-warning of real estate in China, while it needs further in-depth study to build a practical computer model (system) applying to the early-warning system of real estate.

4 Research on Early-Warning Index System of Real Estate Market

The early-warning index and the index system is the basis of the early-warning system of real estate market, scientific and reasonable setting parameter system can effectively realize the function and target of early-warning system of real estate. Therefore, further research on early-warning index and index system of real estate,

is undoubtedly one of the most significant content in the research of the early warning system of real estate market.

Ye Yan-bing, Ding Lie-Yun [2] applied a series of quantitative analysis methods such as “the first principal component” analysis and correlation analysis, combining with qualitative analysis methods to explore how to establish early-warning indicators in line with the characteristics of their real estate problems. Yu Kai [9] also used by means of principal component analysis to select and construct the early-warning system consisting of seven real estate market composite index.

According to the operating mechanism of the market and the real estate cycle fluctuation theory, Li Bin [10] considered that the real estate market turmoil from two class variables: real estate exogenous variables, namely the macroeconomic variables in the area of real estate; estate endogenous variables, namely real estate endogenous variables generate endogenous oscillations, and the occurrence of endogenous oscillation and the oscillation amplitude is mainly affected by three factors such as the useful lives of real estate, fluctuations in real estate investment, the supply and demand elasticity. He analyzed the factors affecting real estate from four perspective as estate market supply, demand, investment and the macroeconomic environment, and believed that the early-warning indicators of real estate can be selected according to the specific characteristics of the city.

Li Chong-ming [3] proposed the use of gray correlation analysis and system core and coritivity theory to select the early-warning index system of real estate. According to the original index system table, by using gray correlation analysis, a series of processing the sample data, derived the correlation between the indexes, and determined the relationship between the index according to the size of the correlation, and then established the topology index system according to the relationship between the index, calculated the core of topological graph, core components is the early-warning index and the index system.

Shi Ying-lai, Wang Ping [11] proposed the use of comprehensive analysis and cluster analysis, combining with subjective analysis and objective analysis, to screen the early-warning indicators of real estate and 18 indicators have been selected from the reflection of the real estate development speed, real estate supply and demand, real estate coordinate relations with the national economy, conducting a comprehensive early-warning of the real estate industry in Wuhan city.

From the research point of view, study on quantitative methods based on qualitative analysis to build early-warning index system of real estate is the direction of development in China.

5 Conclusion

From the research and practice results, study on early-warning system of real estate have gained considerable achievements, preliminary framework has been formed, however, the research and application on monitoring, early-warning of real estate market is still in the initial stage in China, there are very few practical applications; in addition, the using index that described the development of the real estate market

at home and abroad, such as the United States Hedomic index and Rs index, China's national housing, the housing index and so on, is described the state of real estate market which has occurred, unable to advance monitoring function, also can't use "too cold" "overheating" to carry on the market early warning analysis; besides, the number of index involved in the index is very few, which can't fully reflect all relevant factors affecting the changes of real estate market; at present, all warning values in the economic early-warning indeed is determined by subjective experiences in our country, the real study on determination of safety area is still in the blank state.

Generally speaking, the theory and practice of early-warning system of the real estate market in China will enter a new era of more closely integrated development, the real estate market itself is a very large complex nonlinear systems, statistical warning method because of its fault tolerance with poor performance, unable to be self-learning and adjustment, strict requirements on the completeness of the information, resulting in failing to implement under incomplete information, which makes the research on early-warning tune to establish a pattern recognition, artificial intelligence of early warning model based on non-linear, so the computer system modeling technology being introduced into real estate warning areas must become a new research field and direction for the early-warning system of real estate.

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The Impact of the Industrial Restructuring on the Environment in the Resource-Based City: A Case Study of Daqing

Dong Tong, Juan Li, Yiou Zhao, and Lin Ta

Abstract The environmental problem is one of the major problems inhibiting the development and structure transformation of the economy in the resource-based city. The resource-based city depends on the resource-based industry for a long time, so when they face the difficulties, for example resource exhausting and environmental pollution, which don't adapt to the development of the economy and society, it is important to adjust and upgrade the industrial structure. In this paper, the econometric time series analysis method was used to investigate the relationship between the industrial structure restructuring and the environmental factors of the discharge amount of the wastewater, waste gas, SO₂, smoke, dust, and solid waste in a typical resource-based city, Daqing. Results showed the impact of the industrial structure restructuring on the environmental parameters, and suggested that the resource-based city like Daqing should realize the industrial restructuring and economic transformation under the constrains of both resources and environment.

Keywords Resource-based city • Industrial restructuring • Environment • Daqing

1 Introduction

Ecological environment problem in China is closely related to the development model of the economy. Since we used the resource-based economic growth pattern, the efficiency and the quality of the industrial development is relatively low, and structural pollution on the ecological environment is serious. Therefore, with the fast development of the economy in China, the contradiction between the economic growth and the ecological environment security is become increasing

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acute recently. Scientific development view suggest to prevent and contain environmental pollution from its source. As the national exemplary city of environmental protection, Daqing adjusted and upgraded the industrial structure, reduced the dependency degree of resources on urban economic development, improved the utilization of the energy and the resources, improved the techniques and benefits of the enterprise by technical innovation. The significance is summarizing the dependency relationship between the industrial restructuring and the environmental change in resource-based city by judging the relationship between the industrial restructuring and the environmental improvement in Daqing. The results are beneficial for resource-based city to clarify the relationship between the industrial structure and the environment. The resource-based city can improve the environment and promote the coordinated development between the industries and the ecological environment by industrial restructuring.

The scholars of different countries have done a lot of research on the relationship between the ecological development and environmental security through model building and the empirical analysis. In order to explain the invert U-shaped relationship between the environmental pollution and the economic development, Grossman (1995) decomposed the factors of the pollution discharge into the scale effect, structure effect and technology effect. However, he didn't do future quantitative analysis on the relationship between the structure effect and environmental pollution discharge [1]. De Bruyn (1998) use model to analysis the factors influencing the SO₂ discharge in Germany and Netherlands, and find that the alternation of the industrial structure showed no obviously effect on the decrease of the SO₂ discharge [2]. Stern (2002) applied modified econometric model to the decomposition analysis of the global SO₂ discharge. Results showed that the alternation of the input-output framework has limited effect on the SO₂ discharge change, while the economic scale and technology level have great effect on the change of the SO₂ discharge [3]. Xiong et al. (2011) analyzed the relationship between the industrial structure and the environmental pollution in west Dongting Lake. Results showed the factors of industrial structure were closely related to the composite index of the ecological environment, indicating that the industrial structure and ecological environment are correlated [4]. The research using mathematical model on the impacts of the industrial structure on the environment pollution is more perfect, but the application of the results is limited. Meanwhile the analyzing object concentrates on the view of countries, but neglects the view of cities and regions.

2 Models and Methods

The impact of the industrial structure on the environment is a complicated problem, the relationship between the industrial structure and the environmental pollution as: [5]

$$\bar{W}_t = \sum_{i=1}^n GDP_t \cdot I_{it} \cdot G_{it} \tag{1}$$

$$\bar{W}_t = GDP \times (I_{1t} \ I_{2t} \ I_{3t} \ \dots \ I_{nt})(G_{1t} \ G_{2t} \ G_{3t} \ \dots \ G_{nt})^T \tag{2}$$

The \bar{W}_t stands for the discharge amount of the waste water, the GDP_t stands for the regional gross domestic product, the I_{it} stands for the discharge intensity of the primary, the secondary or the tertiary industry in time T , the G_{it} stands for the proportion of the regional GDP to the national GDP for the primary, the secondary or the tertiary industry in time T , $i = 1, 2, 3$. The Eq. (1) can be transformed into the Eq. (3) by mathematical method:

$$W_t = \frac{\bar{W}_t}{GDP_t} = I_{1t}G_{1t} + I_{2t}G_{2t} + I_{3t}G_{3t} \tag{3}$$

Based on the Eq. (3), the econometric model used for analyzing is shown below:

$$W_t = \beta_{11}G_{1t} + \beta_{21}G_{2t} + \beta_{31}G_{3t} + \varepsilon_1 \tag{4}$$

Six variables are selected for analyzing the impact of the industrial restructuring on the environment, such as the discharge amount of the waste water, the discharge amount of the waste gas, the discharge amount of the SO₂, the discharge amount of the smoke, the discharge amount of the dust, and the production amount of the solid waste. In this paper, six different linear regression models are built for analyzing six different environmental pollution variables and indicators, the matrix is shown as below:

$$\begin{pmatrix} W_t \\ Q_t \\ S_t \\ Y_t \\ F_t \\ R_t \end{pmatrix} = \begin{pmatrix} \beta_{12} & \beta_{22} & \beta_{32} \\ \beta_{13} & \beta_{23} & \beta_{33} \\ \beta_{14} & \beta_{24} & \beta_{34} \\ \beta_{15} & \beta_{25} & \beta_{35} \\ \beta_{16} & \beta_{26} & \beta_{36} \\ \beta_{17} & \beta_{27} & \beta_{37} \end{pmatrix} \begin{pmatrix} G_{1t} \\ G_{2t} \\ G_{3t} \end{pmatrix} + \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \\ \varepsilon_4 \\ \varepsilon_5 \\ \varepsilon_6 \end{pmatrix} \tag{5}$$

The G_{1t} , G_{2t} , G_{3t} stand for the proportion of the Daqing's GDP to the national GDP in the primary, the secondary or the tertiary industry. The W_t stands for the ratio of the discharge amount of the waste water to the Daqing's GDP. The Q_t stands for the ratio of the discharge amount of the waste gas to the Daqing's GDP. The S_t stands for the ratio of the discharge amount of the SO₂ to the Daqing's GDP. The Y_t stands for the ratio of the discharge amount of the smoke to the Daqing's GDP. The F_t stands for the ratio of the discharge amount of the dust to the Daqing's GDP. The R_t stands for the ratio of the production amount of the solid waste to the Daqing's GDP. The data used in this paper is from *Heilongjiang Statistical Yearbook* during 1991–2011, *Daqing Statistical Yearbook* during 1991–2011, and *Daqing Yearbook* during 1991–2011.

3 Results

As the Eq. (5), the linear regression models are built to analyze the influences of the pollutant discharge amounts on the industrial structure. Based on the variables selecting, the multicollinearity, the heteroscedasticity and the autocorrelation of the model, the equations for each variables in this paper are shown as below:

$$W_t = \beta_{11}G_{1t} + \beta_{21}G_{2t} + \beta_{31}G_{3t} + \varepsilon_1 \quad (6)$$

$$Q_t = \beta_{12}G_{1t} + \beta_{22}G_{2t} + \beta_{32}G_{3t} + \varepsilon_2 \quad (7)$$

$$S_t = \beta_{13}G_{1t} + \beta_{23}G_{2t} + \beta_{33}G_{3t} + \varepsilon_3 \quad (8)$$

$$Y_t = \beta_{14}G_{1t} + \beta_{24}G_{2t} + \beta_{34}G_{3t} + \varepsilon_4 \quad (9)$$

$$F_t = \beta_{15}G_{1t} + \beta_{25}G_{2t} + \beta_{35}G_{3t} + \varepsilon_5 \quad (10)$$

$$R_t = \beta_{16}G_{1t} + \beta_{26}G_{2t} + \beta_{36}G_{3t} + \varepsilon_6 \quad (11)$$

3.1 The Relationships of Variables

According to the Eqs. (6, 7, 8, 9, 10, and 11) and the data of the industrial structure and the ecological environment of Daqing, the relationships between explained variables and the explanatory variables are shown that there are positive relations between the pollutant discharges and the proportion of the primary and the secondary industries' output to the Daqing's GDP, and there are negative relations between the pollutant discharges and the proportion of the tertiary industry's output to the Daqing's GDP.

3.2 Unit Root Test

The results of the ADF unit root test on the explained variables and the explanatory variables show that all the explained variables W_t , Q_t , S_t , Y_t , F_t , R_t and the explanatory variables G_{1t} , G_{2t} , and G_{3t} are the first-order single time series.

3.3 Cointegration Test

The cointegration relationships of the stationary time series variables between W_t , Q_t , S_t , Y_t , F_t , R_t and G_{1t} , G_{2t} , G_{3t} show that the p-value is 0.0000. The result falling into the rejection region refuses the null hypothesis and accepts the alternative hypothesis. The cointegration relationships between the explained variables W_t , Q_t , S_t , Y_t , F_t , R_t and the explanatory variables G_{1t} , G_{2t} , G_{3t} are stable.

3.4 Model Estimation

The results of the estimation are shown as follows:

$$W_t = 4.8788G_{1t} + 0.039G_{2t} - 1.037G_{3t} \quad (12)$$

$$Q_t = 0.3497G_{1t} + 0.0128G_{2t} - 0.1093G_{3t} \quad (13)$$

$$S_t = 17.8228G_{1t} + 0.3679G_{2t} - 4.2532G_{3t} \quad (14)$$

$$Y_t = 4.8981G_{1t} + 0.5865G_{2t} - 3.2387G_{3t} \quad (15)$$

$$F_t = 2.0395G_{1t} + 0.0337G_{2t} - 0.6133G_{3t} \quad (16)$$

$$R_t = 0.0764G_{1t} + 0.0017G_{2t} - 0.0185G_{3t} \quad (17)$$

The results of the estimation show that $R_W^2 = 0.8208$, $R_Q^2 = 0.8786$, $R_S^2 = 0.8757$, $R_Y^2 = 0.7549$, $R_F^2 = 0.8026$, $R_R^2 = 0.8962$. The results show that the explained variables W_t , Q_t , S_t , Y_t , F_t , R_t can be explained by the explanatory variables G_{1t} , G_{2t} , G_{3t} on the degree of 82.08, 87.86, 87.57, 75.49, 80.26, and 89.62 %.

4 Conclusions

Firstly, the aim of the research in the view of macroeconomic is to find the relationships between the industrial structure adjustment and the environmental pollution, especially to analyze the relationships between the dynamic changes of the Daqing's industrial structure and the dynamic changes of the environmental pollution. The results show that with the decreasing of the proportion of the primary and the secondary industries, the environment is improving at the same time. It means that the adjustment of the industrial structure has significant impacts on the improvement of the environment. Secondly, the results show that the increasing of the proportion of the tertiary industry has a promoting effect on the improvement of the environment in Daqing. It means to reduce the proportion of the secondary industry to the national economy, and develop the non-oil industries instead of the industries depended on the oil and gas resources. Thirdly, as an undeveloped city, the backward in internal structure of Daqing leads to the undeveloped economy. It means that the important methods of reducing the pressure on the environment are developing the tertiary industry, improving the utilization efficiency of the resources, and reducing the consumption of the resources and the discharges of the pollution.

There is a serious environment problem in the industrial structure adjustment of Daqing. In order to develop the economy, Daqing should stick three basic principles. The first principle is that the adjustment of the regional industrial structure should keep the consistent with that of the national industrial structure adjustment; the second one is that the coordinated development of the economy and the

environment should restrict the development of the industry whose relationship between the industrial development and the environmental pollution is greater than that between the industrial development and the national economy; the third one is that the sustainable development of the economy and the society should be promoted by the coordinated development of the environment and the economy.

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China's Pharmaceuticals Industrial Security at Present Time

Yifei Wang

Abstract Pharmaceuticals industry takes a great important part and has a close relationship with the national economics. With the leading of policies issue and medical reform, China's pharmaceuticals industry was blooming recent years. Along with the rapidly growth, some problems appeared in this industry and they become even worse and worse, especially the pharmaceuticals industrial security; which is what we need to pay attention to.

Keywords Pharmaceuticals industry • Industrial security • Foreign capital • Medical reform

1 Introduction

With the high speed development of global economy, the affect of globalization spread to every corner of the world and the world economic situation was earth-shaking changed. As a result, the importance of industrial security became more and more seriously, because it concerns the background of national economy, the present industrial chain, the concentration ratio and the control of core technology. Therefore, the industrial security has now become the most important factor of the national security.

2 The Significant of Pharmaceuticals Industrial Security

Accompanied by the development of pharmaceuticals industry, government and other organizations began to pay attention to field. As a result, lots of experts start to focus on different part of this field. The first part is about present situation of China's pharmaceuticals industry: China's pharmaceuticals industry got weak

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creative ability, low market concentration and unreasonable medical structure, so Chinese medical product has weak international competition ability. For the solution, China needs to dependent on innovation and transformation development mode in future [1, 2]. The pharmaceuticals industry has positive correlation with national economy, and the increasing speed of pharmaceuticals industry could be faster than national economy [3, 4]; the economic crisis in 2009 made some negative effect on Chinese national economy, but Chinese pharmaceuticals industry could keep moving forward any way because of plenty of positive factors [5].

Second part is how foreign capital influence China's pharmaceuticals industry: some expert considered that the boundary between foreign market and domestic market would be gone with the economic development, and enterprises from different nations could be interdependence and integration [6]; some others thought that merger and acquisition could make negative influence on the domestic innovation ability, competitiveness and power of industry [7].

For the third part, some experts expressed some suggestions and advices for pharmaceuticals industry: Zhang and Liu consider that government should issue some strong policy to intervene economy [8, 9]. Wang and Mei suggest government to support traditional medical industry because it has unique advantages [10]; the existence of pharmaceuticals industrial exit barriers could be helpful to optimize the industrial structure [11]; and some people thought the policy factors, especially the medical reform, could influence the pharmaceuticals industry a lot [12].

3 The Definition of China's Pharmaceuticals Industry

Industrial security is the core part of the national economic security. As one of the most important parts of national security, pharmaceuticals industry attracted a lot of attention recently. Pharmaceuticals industrial security is a complex concept, which means the existence and development of industry condition and development cannot be threatened. Pharmaceuticals industrial security contains several aspects, such as medical production security, medical transportation security, medical retailer security, and medical consumption security. As one of the important pillar industry of national economy, pharmaceuticals industrial security has its stick definition: domestically, this industry has to get enough power to make internal factors well-organized; for aboard, this industry should to be strong enough to defeat the competition from foreign countries, protect its own benefits, keep its own international competition and enforce its industry power, and finally achieve the goal of sustained and stable development (China's medical industry security report [13]).

4 The Present Situation of China's Pharmaceuticals Industry

China's pharmaceuticals industry had been started since 1980s, the whole process was from level-0 beginning to traditional technology and finally to modern technology. At present, China has the most western medicine production and raw material production in the world. In addition, as a huge market with 1.3 billion people, Chinese market becomes more and more attractive in international competition and lots of enterprises from different countries competed in this market intensely. In order to explore new international market, Chinese pharmaceuticals industry has to face to a number of questions, like industrial structure upgrading, domestic industrial keeping, and research ability increasing. However, because of some historical problem, China's pharmaceuticals industry arose some problems.

4.1 Pharmaceuticals Industry Developed Rapidly

For global medical market, the increasing rate of 2011 was 5–6 %, which was more than 2010, almost 880 billion US dollars. As forecast of IMS, the increasing rate from 2010 to 2014 will be 14–17 %. China's medical market is the largest emerging market in the whole world and it will be the second largest medical market in 2020, which will be just following US. Till 2011, there were 5,154 medical enterprises in China, and the total capital were 1,376.2 billion RMB, indicating an increasing of 23 % (China's medical industrial security research report [13]).

4.2 Technical Equipment Is Upgrading with Time

Technical equipment is the most important factor for medical product, and it would take a great part of cost, which is 13 % for the average level world-wide. For a general foreign medical enterprise, the R&D cost would take 10–20 % of their annual revenue, which is around 300–500 million US dollars; but Chinese medical enterprise did not spend enough capital in R&D, which is only less than 1 %. As a result, Chinese pharmaceuticals industry got back ward production technology and equipment. Along with blooming of bio-technology, the demand of medical enterprise is changing. What they need for present is the kind of industry with high technology, high investment, long period, high risk and big benefit. Hence, keep upgrading production technology is the secret of leading in the international market.

The R&D basis of China's pharmaceuticals industry is instable So far, there is no mature mechanism in Chinese domestic market to make the scientific finding commercialized, which is partly because government does not pay enough attention or capital to pharmaceuticals industry. New product invention means proprietary

intellectual property rights, which also means industry power and international competition power. In Chinese medical product, old product with low added value takes great part of the whole market, and that is the reason why advanced technology cannot change the traditional industry fast enough. As a final result, those old product will be die out because less of international competitive power.

4.3 The Reform of Pharmaceuticals Industry Structure

Ministry of Industry and Information Technology issued “Guiding Opinions on Speeding up the Structural Adjustment of the Pharmaceutical Industry”, which is to encourage those outstanding enterprises to do merger and reorganization in different area and ownership; and in 2013 the Bureau of Food and Drug Administration, the National Development and Reform Commission, the Ministry of Industry and Information Technology and the Ministry of Health Issued the Policy “On Accelerating the Implementation of the New Revised Drug Production Quality Management Standards to Promote the Pharmaceutical Industry Upgrade Issues Related” to increase the quality of medical patent approval and protect.

5 The Problems and Defects of Pharmaceuticals Industry

5.1 China’s Pharmaceuticals Industry Has Low Industrial Concentration

The most serious defect of China’s pharmaceuticals industry is low industrial concentration, which could cause plenty of problems, for instance, small and scattered medical enterprises, weak at research and development, unable to achieve scale effect, hardly to resist risks and lack of advantages to participate into international competition and cooperation. China has 4,063 medical enterprises in 2003, but small and medium-sized enterprises take over 82 % of them. Those small and medium-sized enterprises do not have enough capital to do their own R&D; they do not have advanced concept as their guideline to improve their management; their production technology is backward. Those are the reason why small and medium-sized enterprise cannot adapt to global competition. At the beginning of twenty-first century, the industrial concentration of top 60 medical enterprises in China was 35.7 %; meanwhile, the industrial concentration of top 20 medical enterprises of the world was around 60 %. Harbin Pharmaceutical Group is the largest medical enterprise in China, and its sales amount was less than 1 billion US dollars. Pfizer, as the largest medical enterprise in the whole world, had 43 billion dollars sale in 2003, more than China’s entire pharmaceuticals industry. From the world view, Chinese top 10 medical enterprises took 15 % domestic sales; but the world top 10 medical enterprise took over 55 % global sales.

5.2 The Upgrading of China's Pharmaceuticals Industry Technology Cannot Be as Fast as Its Development

Furthermore, China's pharmaceuticals industry also has some problem about the lack of independent innovation, which causes the dependence of imitation product. Lacking of independent innovation means cannot get core technology and features of the product itself, it will be difficult to survive and grow from international competition. The important factor of low conversion rate of scientific and technological also limits industrial development. Although China's medical raw materials production has entered the top of the world, however, China's pharmaceuticals industry still lack of independent research and development ability, and they do not pay enough attention and investment on R&D. On the raw material preparation varieties, foreign medical enterprise could make more than 10 varieties of preparation, but domestic medical enterprise could only made 3. In 2011, there were 20 national drugs and only 5 of them were 100 % independent proprietary.

5.3 The Monopoly of Core Technology and Market from Foreign Medical Enterprise

In world wild, advanced medical enterprises are concentrating in US, Japan and Europe. As the birth land of medical production, US takes over 90 % of medical sales of the whole world. US has more than 1,400 medical enterprises; as following, Japan has over 600 and there are almost 300 located in Europe. Domestically, China's medical enterprises are pretty backward. Amgon, a famous US medical enterprise, got 15 billion dollars sale amount in 2010 and which was almost equal to the sale amount of whole Chinese pharmaceuticals industry. Because of the patent, lots of drugs were monopolized by foreign enterprises. For instance, in insulin area, Novo Nordisk, Eli Lilly and Sanofi-Aventis take over 90 % of market; Vitamin market is almost monopolized by foreign enterprises, which include Pfizer, Bristol-Myers Squibb and BAYN.

The research result of NDRC (National Development and Reform Committee) shows that 80 % of the top 50 popular drugs were foreign brand, just like insulin. China started to import insulin from Denmark since 1987. With time goes by, over 500 different brands from 100 countries exist in Chinese medical market. In the past decades, thousands of drugs got import license, as a result, foreign drugs take more and more proportion of China's domestic market, which gave China's pharmaceuticals industry bigger and bigger pressure.

6 Suggestion and Advice to Protect China's Pharmaceuticals Industry Security

6.1 Improving Policy System

Because of historical reasons, lots of China's pharmaceuticals industries lack the sense of protecting intellectual property rights. Decades ago, the intellectual property right in China was shared by the whole country; they did not know the importance of intellectual property rights protection, and when they found that, it was late. Some domestic enterprises spend lots of capital in research and then found that the result was protected by foreign patent, and it was a huge loss for both enterprises and the nation. As a resolution, the whole industry needs to increase the consciousness of intellectual property rights protection which is being helpful to improve the international competitive ability. In conclusion, patent protection standards are what we must seriously concern about and we have to compare the technology of domestic and abroad, set and implement effective intellectual property management measures which favor the survival and development of the China's pharmaceutical industry. For Chinese government, they need to forecast the development direction of intellectual property rights of domestic and international market, and analysis it with China's actual situation, propose suggestions to be beneficial for China's pharmaceutical industry, to finally achieve the purpose of create a favorable environment for the development of China's pharmaceutical industry.

The quality of the products is always the core of industry competition. The improvement of national drug standards should make positive effects on the China's pharmaceutical industry consolidation. Combining with the strategic priority in China's industrial development, China needs to comprehensively improve the national drug quality according to international standards, and they need to choose some industries have strategic drug standards and norms to make more stringent detailed plan, especially for some, high risk drugs and traditional raw medicinal materials. The production of drugs must be accordance with national standards, or they will not allow entering the medical market.

6.2 Accelerate the Improvement of the Pharmaceutical Industry Innovation System

Innovation is the soul of the industry development, medical product development and innovation is the key to the pharmaceutical industry to enhance the industry power and the protection of industry security. Technological innovation of medical industry needs to increase investment in basic research of medicine; lots of Chinese medical enterprises have difficulties in financing, so the basic research shows

that they need government investment. So the government should support the pharmaceutical industry in finance and taxation policy, especially for those high input R&D enterprises, this could encourage them to invest into the development of new drugs, new technology. Even the government increases the investment in basic research; the government still cannot take care of every aspect. Therefore, it would be necessary to exert the function of capital market as the main solution to capital. The capital market should be made to encourage the development of financial innovation, venture capital investment, and promote the maturation of medical products and technology trading market. Enterprise's development needs the driving force, but the driving force of state-owned enterprise is insufficient, so they need to increase further reform strength and depth; private capital should be added to the pharmaceutical industry in order to accelerate the reform of the state-owned enterprises and improve the development of structure of the modern pharmaceutical industry as soon as possible. Chinese traditional medicine is the gem of China. Presently, Chinese traditional medicine protection must be continued to protect its intellectual property, meanwhile we have to keep on improving the laws and regulations of Chinese medicine protection and Standards.

6.3 How to Utilize Foreign Capital

With the rapid development of Chinese economy, Chinese enterprises have been less dependent on foreign capital; the hard power of some enterprises in China has been reached world advanced level. But in some soft power, China has not break through the traditional fetter yet, especially the management concept and system construction. Although these improvements may not get profit in short run, but it is a key of enterprise survival. With abundant capital, advanced concepts and scientific institutions, enterprises will be able to attract more outstanding talent people to give full performance to their potential to work, and create more products, and gradually form an innovation mechanism inside enterprises. In addition, the government should give encouragement and support to the pharmaceutical industry, promulgate policies and norms for industrial development, the development of the whole industry will finally come true. China's pharmaceutical enterprises and pharmaceutical industry should learn from foreign enterprises in many ways. Learning the advantages from competitors would be easy to understand competitors, which would achieve better cooperation and competition. Learning process includes product development, promotion, after sale services and even more. Study the competition is not only for learning itself, but the long run survival and development. In conclusion, if China's medical enterprise want to survival and develop better, they would have to cooperate with foreign enterprises.

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A Diamond Model-Based Study of the Tourism Competitiveness in Coastal Cities in China: Take Qingdao, China as an Example

Chao Yang

Abstract Michael Porter, a strategic management expert from Harvard business school, put forward “Diamond Theory” in 1990, which is a perfect model for industrial competitiveness research. This paper takes Michael Porter’s “diamond model” as the research framework and Qingdao, China as a concrete example to summarize the approaches for analyzing tourism competitiveness of coastal cities. When sorting out and analyzing different aspects of tourism of Qingdao, it judges the general situation of competitiveness of local tourism, and gives suggestions on the links yet to be improved.

Keywords Diamond model • Tourism competitiveness • Tourism in coastal cities

1 A Brief Description of Michael Porter’s “Diamond Model”

In industrial economics, Michael Porter’s competitiveness theory is one of the most extensively used tools. In 1990, in his book *The Competitive Advantage of Nations*, Michael Porter proposed his competitive “diamond” model which holds that an industry in a country or region relies on four key factors to win out in international competitions, namely (1) factor conditions, (2) demand conditions, (3) the performance of related and supporting industries and (4) the performance of corporate strategy, structure and rivalry. These together with chance and the government, i.e., the two auxiliary elements, may build a structure which is very similar to a diamond. Hence it is called the “diamond theory” (Fig. 1).

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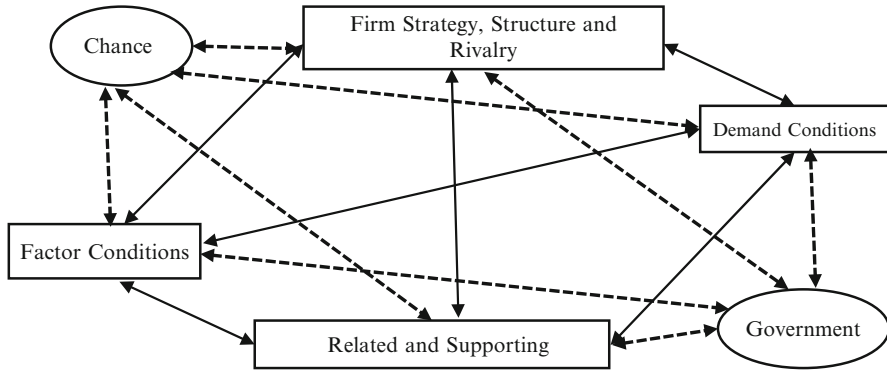


Fig. 1 Michael Porter's diamond model

2 An Analysis of Tourism Competitiveness of Costal Cities with the “Diamond Model”

Michael Porter's diamond theory proposes a framework to assess industrial competitiveness of a country or a region. The framework has been applied extensively to the researches of each and every industry. The first thing to use such framework to analyze tourism competitiveness of coastal cities is to figure out corresponding elements in tourism of the six elements in the diamond theory [1] (Table 1).

This paper takes Qingdao, China as an example when analyzing tourism competitiveness in coastal cities with the above framework. Qingdao is a famous tourist city in Shandong Province, China. It ranked the 13th of Forbes 30 cities in Mainland China with the most developed tourism in 2013, and has been one of the “Top 10 Leisure Destinations in China” for 3 years in a roll. In 2012, Qingdao got tourism revenue of RMB 80.8 billion, that is, 11 % of its total GDP [2].

2.1 Factor Conditions

Qingdao is located in the southern part of Shandong Peninsula, at the confluence of the Eurasian Continent and the Pacific Ocean. It is facing the Yellow Sea in the southeast and leans against Mount Lao, a Taoist Shrine. As for the local climate, it is monsoon climate in the North Temperate Zone, with significant features of oceanic climate. Qingdao has moist air, moderate rainfall and four distinct seasons. Along its coastline that lasts 730.64 km, there are 70 islands covering a total area of 18.5 km², of which 9 are inhabited. All these rich coastal tourism resources provide great supports for the development of tourism in Qingdao.

Table 1 A correspondence table of the six elements of diamond theory

Diamond model theoretical elements	Concrete corresponding elements in tourism
Factor conditions	Natural tourism resources and cultural tourism resources
Demand conditions	Tourism demand of neighboring countries and regions
Related and supporting industries	Transportation, hotel and catering industries
Corporate strategy, structure and rivalry	Rivalry of surrounding tourist cities
Chance	Major events to enhance tourism popularity
Government	Government leading and planning of tourism

Local cultural tourism resources in Qingdao are made up of two parts: the modern tourist area in the urban Qingdao dominated by seaside sceneries; and the ancient cultural tourist area in the outskirts around Mount Lao. The west part of the modern tourist area is the old city area of Qingdao and home to Europe-style buildings of distinctive features, being a tourist area of the European architectural culture. Here, visitors may see buildings with different characteristics in Gothic, German pseudo-classical, British country house or Spanish styles. These buildings present high artistic standards and great ornamental values. The new city area in the east sees the construction of a big comprehensive ocean park made up of the hall of marine animals, the hall of marine plants, the recreation hall, the dance hall, the dining room, etc. to meet visitors' demands.

The Mount Lao-centered tourist area contains more ancient cultural factors. Mount Lao is famous for Taoism and known as the "First Famous Sea Mountain". Many Taoists retire from the world and practice austerities here. There are many beautiful legends on Mount Lao, as well as many historical relics. Of the 44 historical and cultural sites under government protection in Laoshan District of Qingdao where Mount Lao is located, 3 are under provincial government protection and 2 are under municipal government protection. All these are very good cultural tourism resources.

2.2 Demand Conditions

To start with, Qingdao has a relatively developed economy and local tourism consumption capacity has reached a certain level. In 2012, the total population with registered permanent residence in Qingdao reached 7,695,600; local GDP hit RMB 730,211 million; and local per capita GDP reached RMB 8,268 billion, that is, 13,000 US dollars on the average. According to international practices, after per capita GDP hit 10,000 US dollars, the spending on tourism and leisure would grow rapidly. Local citizens of Qingdao have a huge tourism demand.

Secondly, tourism has been developing extremely fast in China in recent years. China's tourism revenue grew from RMB 0.49 trillion in 2003 to RMB 2.59 trillion

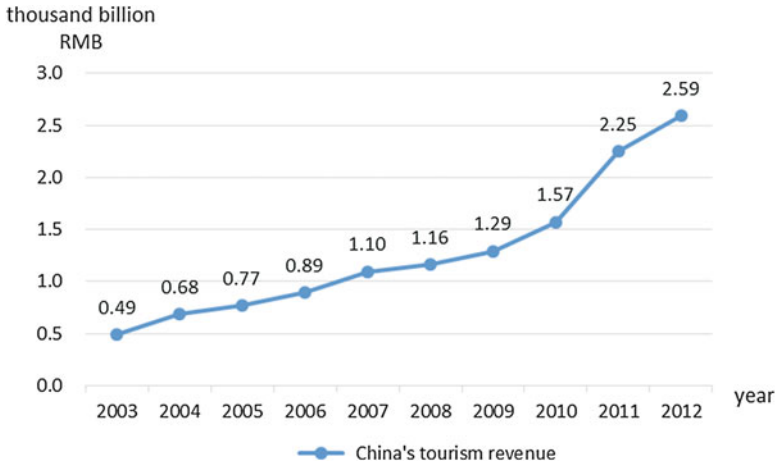


Fig. 2 Total tourism revenue of China in recent years [3]

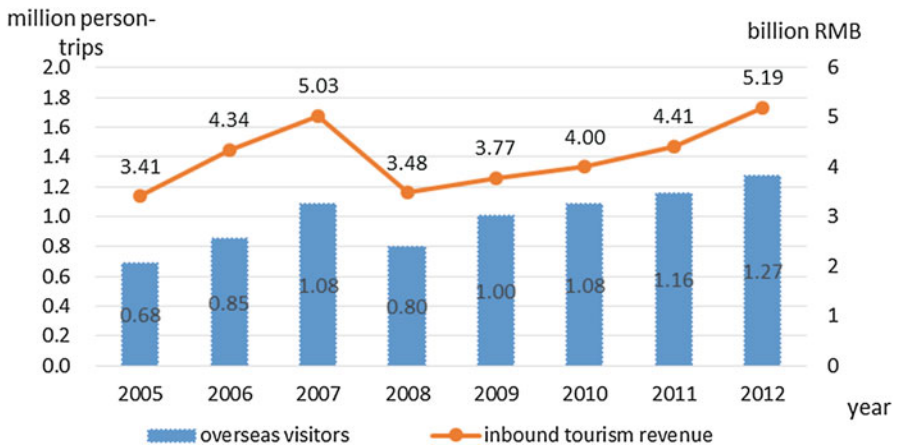


Fig. 3 Persons of inbound tourists received by Qingdao and local inbound tourism revenue

in 2012, presenting an annual growth rate of 20 %. Tourism is at the stage of rapid development. In the meantime, tourism-related industries like leisure, business and exhibitions have all seen great achievements and become new economic growth poles in China. For example, the exhibition industry has been developing from scratch in China, from small to big, from RMB 181.7 billion in 2009 to RMB 350 billion in 2012, showing an annual growth rate of 24.4 % (Calculate According to the Wind Database) (Fig. 2).

Secondly, overseas tourism in Qingdao develops fast. In 2005, Qingdao received 680,000 persons of overseas visitors. In 2012, it grew to 1.27 million persons of overseas visitors, presenting an annual growth rate of 9.33 %. In 2012, Qingdao realized inbound tourism revenue of RMB 5,194.95 million, presenting an annual growth rate of 6 % [2] (Fig. 3).

2.3 Related and Supporting Industries

Qingdao boasts a superior geological location and convenient traffic. In the middle of two metropolitan regions, namely the metropolitan region of Beijing-Tianjing-Shanghai and the Yangtze River Delta, Qingdao watches Japan and South Korea across the sea. It also has developed traffic and transportation industries. The total length of local accessible motor roads is 16,270 km, and local motor road density is 146.8 km per a 100 m². Qingdao has 13 highways totaling 728.8 km, accounting for 4.5 % of the total length of all local motor roads.

Qingdao Liuting Airport, being 32 km away from the downtown, has opened 78 domestic air routes and 14 international and regional air routes, is connected to 50 main Chinese cities like Beijing, Shanghai and Guangzhou, as well as important international metropolis in Japan, South Korea, Singapore, Hong Kong, Macao, etc., being the second biggest air harbor in East China following Shanghai.

Hotel industry has been developing well in Qingdao. As of the end of last year, Qingdao had had 132 star-rated hotels, of which 6 were five-star, 15 were four-star, 63 were three-star and 48 were first-star or second-star; guest rooms in these star-rated hotels had reached over 17,000 (suits); and direct employees in such hotels exceeded 15,800. Qingdao ranked the first in Shandong Province in terms of the scale of the hotel industry [2].

2.4 Corporate Strategy, Structure and Rivalry

Qingdao is widely recognized as a famous historical and cultural city and a scenic tourist destination in China as well. It ranked the first in the cities of China that were most desired by the public in 2005, once won such honorary titles as First Civilized Cities in China, Most Economically Dynamic Cities in China, Top 10 Business Cities in China, "Entrepreneur Satisfaction Award", "City of Brands in China", etc. A large group of well-known enterprises including Haier, Hisense, Double Star, Aucma, Bronze Cultural Communication and JIFA have settled in Qingdao.

Qingdao is a competitor and cooperater of tourist cities of Dalian and Yantai. Being adjacent, they have formed an industrial cluster. The travel route of Qingdao-Yantai-Dalian has become classic, attracting thousands of tourists each year. In some sense, they are no longer competitors, but a whole that shares weal or woe.

2.5 Chance

During Beijing Olympic Games, Qingdao, as a partner city of Beijing in the latter's bid for holding the Olympic Games, provided the venue for sailing. Taking it as the entry point and breach to develop marine tourism, Qingdao undertook

large-scale international maritime sports events like surfing, sampan competitions, swimming, diving, sea diving, beach volleyball, sand sculptures and sailing model performances.

Meanwhile, Qingdao actively holds festivals and exhibitions with distinctive characteristics. For example, Qingdao International Beer Festival is a grand and unique local festival. Since it was first held in 1991, 23 Qingdao International Beer Festivals have been held successfully. Besides beer festival, Qingdao has a big number of festivals like Qingdao Ocean Festival, Beach Culture and Tourism Festival, Haiyun Nunnery Sugar Drops Fair, Cheery Festival, Golden Beach International Kite Flying Competition, Mount Daze Grape Festival, Langyatai Xu Fu Festival, etc. Exhibitions held in Qingdao include such great events as China International Maritime Exhibition, China International Consumer Electronics Show and Qingdao International Fashion Week.

2.6 Government

In 2013, Qingdao Municipal Bureau of Tourism launched the master plan for the tourism of Qingdao, and made it the fundamental goal of tourism development to build an international tourist destination, strived to achieve the change from traditional sightseeing-dominated form of tourism to leisure vacations and establish a leisure vacation-centered tourism products system and standardization-cored tourist service system, and tried to realize the stride from “tourist city” to “city tourism”.

Qingdao is among the first cities in China to regulate tourism. As one of the five pilot cities in the standardization of tourism nationwide, Qingdao saw its government developing the implementation scheme for tourism standardization. Qingdao Municipal People’s Government takes out RMB 100 million each year to ameliorate tourism facilities, build public service platforms, nurture the brand of city tourism, and publicize and promote local tourism, going all out to build a standard tourist city.

3 Suggestions for Improving the Tourism Competitiveness in Coastal Cities

3.1 To Promote the Transformation and Upgrading of Tourism in an All-Round Manner

To guide and support the development of tourist services, including tourist reception services, tourist transport services, tourism financial services, travel equipment manufacturing, etc.

3.2 To Market Tourism

To innovate in the mode of marketing of tourism; while continuing to intensify the publicity of tourism via traditional media like TV, broadcasting and newspaper, modern means of information like the Internet, microblog, and Webchat shall also be adopted for the purpose of marketing city tourism. A series of original and flexible online publicity and promotion activities are suggested, too.

3.3 To Hold Negotiations on Tourism Investment Attraction

Financial institutions and professional media may be invited to plan and organize tourism investment attraction meetings and negotiations, hold tourism investment attraction meetings and negotiations extensively both in China and abroad, and guide good social capital to tourist areas and tourism projects.

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Risks and Pre-warning of the Application of Insurance Funds in China

Zhe Bai and Hongyan Zang

Abstract Safe application of the insurance funds is a dynamic process. This paper makes a risk evaluation of the application of the insurance funds in China, analyses the advantages and disadvantages of safe application of the insurance funds, and suggests the policy and specific measures for establishing a perfect and regulated institutional mechanism for settling insurance risks.

Keywords Chinese insurance industry • Application of the insurance funds • Risk evaluation • Safety pre-warning

1 Introduction

As the market-oriented reform of the application of funds in the insurance industry goes deeper, it becomes more important to improve the risk awareness and level of risk prevention of the insurance industry. Now the situation of guarding against risks in the application of insurance funds is severe. A relatively important problem now is to study the risks of sundry assets in the application of insurance funds, which is also a significant topic that calls for greater attention.

2 Risk Evaluation of the Application of Insurance Funds

In the recent decade, the application of insurance funds has been growing massively. As of the end of 2013, the total assets of the insurance industry had reached RMB 8,288,695 million, of which RMB 7,687,341 million was the balance

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in the operation of funds. Currently, the overall application conditions of insurance funds in China are as follows:

First, the practice in the past 10 or more years saw a growth of 8.1 times of the total assets of the insurance industry, and a growth of 8.2 times of the amount of insurance funds applied. Great achievements have been made in the insurance industry. Seen from the scale of application of insurance funds, it is directly proportional to the total insurance assets, which indeed reflects the fact that the application of insurance funds has been growing at an impressive speed.

Second, seen from the average income level of the application of insurance funds, it was the highest during 2001 and 2012, being 12.17 % (2007), and then 6.41 % (2009) and 5.82 % (2006). It was below 5 % in the rest years, even dropped to 1.89 % in 2008. In 2013, the total rate of returns on investment in the industry was 5.04 %, being the greatest level since 2010.

Third, the key to applying insurance funds is allocation. Although the stock market and the securities market performed poorly in 2013, thanks to the market-oriented reform of the application of insurance funds and the diversification of the investible varieties in the insurance industry in 2013, the allocation efficiency of insurance funds was improved significantly. In addition, more assets were used as alternative investments in both markets, which also stabilized the rate of returns on investment.

Two important indicators must be assessed in order to make pre-warning analyses of the risks of funds application in the insurance industry, namely the rate of application of insurance funds; and the profit margin of the application of insurance funds.

2.1 Rate of Application of Insurance Funds

The rate of application of funds refers to the ratio of the total investment to the total assets of the insurance industry. It demonstrates the scale of investment of insurance enterprises. The structure of the application of insurance funds refers to the ratio of the amount of various forms of insurance investment to the total assets of the insurance industry [1]. The best structure of the application of insurance funds can not only control the overall risks of capital utilization, but also ensure profits from the application of funds. Currently, the overall rate of returns on the funds of the Chinese insurance companies is low, and develops unstably, undulating greatly. As a whole, the rate of returns on the insurance funds is relatively low and unstable, which has much to do with narrow investment channels. But the channels for the application of funds have been much expanded.

2.2 Profit Margin of the Application of Insurance Funds

The profit margin of the application of insurance funds refers to the ratio of the returns on the investment made by the insurance companies within a planned period to the total amount of investment. To analyze the profit margin of the application of funds, we generally could adopt correlation approach and structure approach, or factor analysis approach. Seen from the angle of economic benefits, the current profit margin of the application of funds in the Chinese insurance industry cannot fully reflect the returns on investment. Seen from the returns on insurance investment, not only shall we compare the returns on investment with historical cost, but we shall compare the returns on investment with opportunity cost. The profit margin of the application of insurance funds in a country is subject to many factors like the country's capital market, supervision system, level of management of fund application, etc. So it is inappropriate to lump together all and sundry. Of China, US, Japan and South Korea, US has been maintained at a relatively high level of profit margin of the application of insurance funds, that is, being over 6 % on the average [1]. The profit margin of the application of insurance funds in China was high in 2006 and 2007, mainly thanks to sound economic growth and the stable development of the capital market.

3 Risk Pre-warning of the Application of Insurance Funds

At present, China is at a special stage of economic and social transformation. A variety of factors influence social stability, of which there are economic, political and various social security factors. They interact to maintain social harmony and stability.

3.1 Market Risk Pre-warning

Market risk pre-warning is a system theory-based measure that is used to avoid market risks. As the scale and scope of the insurance business expand, afterwards compensation for major risks not only brings considerable bailout costs to the insurance companies, but may very possibly cause the insurance companies their solvency, and endanger their survival. As an important supplement to risk management, the risk evaluation and pre-warning system makes risk management an integrated and complete system that highlights risk prevention, risk control and remedies. Perceiving risks in advance and taking other risk management means at different stages of risk development can help stop risks before they break out and get out of control, and minimize any possible loss that may be caused by the risks. In the meantime, the risk evaluation and pre-warning system also helps insurance companies to build a correct risk management concept and culture.

3.2 Economic Environment Risk Pre-warning

Risks are everywhere and exist all the time. What are the risks that may be faced by the Chinese economy in the following 5 years? One of the most important risks is the financial risk. Economic growth always relies on investment. Suppose investment leads to overcapacity; economic growth is inefficient; and debts cannot be repaid after great amounts of financial funds are invested, local pressures will grow, and the issue of shadow banking will appear, too.

3.3 Social Order Risk Pre-warning

The insurance industry is significant to caring for the aged and guaranteeing medical cares and properties. Any change in social order may be a deathblow to the insurance industry. Social stability and prospering development is the basis of and momentum for the continuing development of the insurance industry. Major risks of a certain social system or a turbulent economic environment of the entire society may both be important reasons causing the insurance industry to go nowhere. When considering the risks of the application of insurance funds, a systematic setting of risk management of the social order must be made [1].

4 Risk Management of the Application of Insurance Funds

China began to implement Regulations on Interim Management Measures of the Application of Insurance Funds on August 31, 2010, in which it requires the application of insurance funds to be stable, follow the principle of safety and meet solvency regulations and adopt assets and liabilities management and overall risk management according to the nature of the insurance funds to make such management intensive, professional, standardized and market-oriented.

4.1 Speeding Up the Transformation of the Regulatory Approaches

The overall idea of “releasing the front end, taking control of the back end” shall be followed to achieve the transformation of the regulatory approach. Concrete constraints of solvency and capital allocation shall be intensified; concrete requirements on information disclosure and the person liable for the risks shall be strengthened; priority shall be given to preventing and controlling risks in such fields as internal control and related party transactions; and the bottom line of never

causing systematic risks shall be stuck to. The application of insurance funds is faced with great challenges and hard-won opportunities. Opportunities are greater than challenges. The period in the near future will prime for the development of the application of insurance funds [2].

4.2 Unswervingly Pushing Forward the Development of Main Insurance Businesses and Making It the Development Objective of the Application of Insurance Funds

Efforts have to be made to further emancipate our minds, seek truth from facts and correctly understand the essential requirement of the application of insurance funds, that is, to serve main insurance businesses. Firstly, to serve main insurance businesses shall be taken as the development objective of the application of insurance funds. Secondly, to better serve main insurance business, it is necessary for the insurance assets management agencies to improve their skills. Thirdly, insurance assets management agencies shall make it their primary task to well manage the insurance funds. Now the involvement of the insurance industry into the competitions on the financial market has become a trend. Insurance funds management agencies may fully display their professional and shareholder advantage and develop into highly market-oriented assets management agencies.

4.3 Releasing the Reform Bonus of Developing the Application of Insurance Funds

CIRC will continue to push forward the market-oriented reform of the application of insurance funds, further decentralize, clarify its position as the supervisor, return the functions that belong to the market back to the market, and well finish the work of supervision. It will change the priority of supervision and centralize main forces to improve supervision and regulate industry development. Efforts have to be made to improve the ways of supervision, reduce administrative examination and approval, perfect regulatory procedures, improve regulatory efficiency, enhance market vitality and promote the development of the industry. It will promote the setting of an industry self-discipline organization. It will promote communication, study industry matters, raise the level of professionalism and strengthen industry self-discipline to further push forward the market-oriented reform and innovation of the application of insurance funds, all relying on the platform of Assets Management Association.

4.4 Unswervingly Pushing Forward Innovation and Promoting the Application of Insurance Funds

Currently, the insurance industry is still less innovative than the other financial sectors in China. Regulatory authorities have to create a relaxed and orderly development environment for industry innovations. In the process of making innovations, there will certainly be problems, and the regulatory authorities have to treat innovations and the problems brought about by innovations with the most tolerance. The development and innovation of insurance funds management products shall be supported; a system for product trading and circulation shall be established; and alternative investment market shall be nurtured gradually. An alternative investment market that matches the feature of insurance funds of being long-term, has the requirement for fixed returns and is highly fluid shall be built so as to meet the need for investment of insurance funds and pension funds.

5 Well Supervise and Manage the Funds in the Insurance Industry

In the future, the supervision and management of the insurance funds will become increasingly important, and that will undoubtedly make it more difficult to prevent and manage risks. It requires the regulatory authorities in the insurance industry to effectively strengthen supervision to minimum systematic and regional risks in the application of funds in the insurance industry [3]. Risk management in the application of insurance funds may cover below several aspects:

Firstly, effectively pushing forward ratio supervision and control of the application of insurance funds, which can help effectively carry out and promote the system for supervising and managing big ratio categories; achieve a new ratio supervision system; and strengthen the proportion of risk monitoring and the proportion of internal control of the insurance companies.

Secondly, effectively establishing a system for centralized registration and trading of assets management products. To start with, it enables CIRC to achieve a system for centralized registration and trading of assets management products; enables the establishment of a trading circulation mechanism that is good for the market; also enables centralized registration of the assets management products in the insurance industry and listed transfer of them in corresponding exchanges.

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An Analysis on the Relationship Between Land-Based Finance and Local Economic Development in China

Xin Wang and Peihong Chen

Abstract The local government of China had started to get funding from transferring the land-use right to promote economic development since 1989. From 1989 to nowadays, the proportion of land-based finance in fiscal revenue has being increased in most Chinese provinces. The effect of this policy was confused. The paper was aimed to study the different impact of land-based finance on economic development in different provinces, based on the cross-section data in 2003, 2007 and 2011. The all 31 provinces of China have been divided into four classes on the basis of local GDP through cluster analysis. The virtual variables which could distinguish the four-class provinces were introduced in the process of building regression model between local GDP and land-based finance. The conclusion was that the local economic growth was dependent on land-based finance in inverted U-shape.

Keywords Land-based finance • Cluster analysis • Regression analysis

1 Introduction

After central and local tax sharing scheme had been implemented, land-transferring income was assigned to local governments in 1994 in China. Land-based finance refers to the part of finance revenue depending on land and real estate [5]. Land-based finance mainly includes three parts: the land-transferring income, the tax revenue related to the land and the land mortgage financing income. According to data released by the Ministry of Land and Resources, the total amount of national land-transferring income had reached 4.1 trillion yuan in 2013, which has made a new record.

Some scholars have carried on empirical analysis about the relationship between the land-based finance and economic growth. They generally believed that the land-based finance had a positive effect on economic growth, such as: Du et al. [1] argued that the impact mechanism was that land-based income had increased the

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local government revenue and the investment expenditure in infrastructure [1]; Ge and Qian [2] proposed that land-transferring income increase 1 %, there was 0.173 % of the growth of the local GDP [2]. There are some scholars have carried on theory discussion, for example: Liu [3] argued that local government financing mode in our country need to adjusted. More resources beside public land should be utilized to attract social capital [4]. This paper was aimed to study the different impact of land-based finance on economic development among different economic development levels.

2 Cluster Analysis

In order to study the different impact of land-based finance on economic growth under different economic levels, the 31 provinces had been divided into four classes through system cluster based on per capita GDP from 2003 to 2012 [5]. The result is:

Group 1: Guizhou, Yunnan, Gansu and Tibet autonomous region. These four areas are of the lowest level in the national economy, per capita GDP is only less than 30,000 yuan in 2012 [6]. Group 2: Hebei, Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan, Hainan, Sichuan, Shanxi, Qinghai, Chongqing, Guangxi zhuang autonomous region, Ningxia hui autonomous region and Xinjiang Uyghur autonomous region. The economic levels of these 17 cities are in the middle and lower reaches, both GDP and per capita GDP are generally lower than the national average. Group 3: Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Inner Mongolia autonomous region. The cities' per capita GDP are in hierarchical levels across the country, in 2012 the per capita GDP reached 50,000 yuan of above. Group 4: Beijing, Tianjin, Shanghai. These three municipalities directly under the central government as the national important economic exchange center, their economy develop rapidly, per capita GDP are above 80,000 yuan. They are the most economically developed cities.

These four types of urban economic development level are from low to high.

3 Regression Model

3.1 Model Specification and the Data Source

In order to study the degree of local economic growth dependence on land-based finance, this article selects the land-based finance (X_1) and other tax revenues (X_2) as explanatory variables. Here, land-based finance = land transaction fee+ building tax+ tax on using urban land+ increment tax on land value+ tax on land occupation+ deed tax; other tax revenues = tax revenues- tax revenues related to land. GDP (Y) is as explained variable, represents the local economic growth. In order to

distinguish among economic development levels of different areas, this paper introduces some virtual variables in the model to classify. Virtual variables are defined as follows:

$$D_1 = \begin{cases} 1 & \text{the first group} \\ 0 & \text{others} \end{cases}, D_2 = \begin{cases} 1 & \text{the second group} \\ 0 & \text{others} \end{cases},$$

$$D_3 = \begin{cases} 1 & \text{the third group} \\ 0 & \text{others} \end{cases}.$$

Plan to build regression model as follow:

$$\ln Y = \beta_0 + \beta_1 \ln X_1 + \beta_2 D_1 \ln X_1 + \beta_3 D_2 \ln X_1 + \beta_4 D_3 \ln X_1 + \beta_5 \ln X_2 \quad (1)$$

This paper concludes the degree of influence of economic development level's on the relationship between land-based finance and GDP, by comparing the difference among the four effect coefficients. This paper selects three time points, and uses the related data of 31 provinces, cities and autonomous regions to study. The data of GDP, tax revenue, building tax, tax on using urban land, increment tax on land value, tax on land occupation and deed tax are from China statistical yearbook, the data of land transaction fee are from China yearbook of land and resources.

3.2 Regression Analysis

In 2003 the national economic growth has a powerful momentum, in addition, the Ministry of Land and Resources issued < Agreement to sell the state-owned Land Use Rights > to strengthen the management of state-owned land assets and optimize allocation of land resources in 2003. In 2007, the domestic economy grew rapidly and at the same time economic efficiency increased continuously, especially in terms of finance revenue. But the inflation pressure increased greatly, and the domestic economic growth was facing the risk of overheating. After the global economic crisis in 2008, the world economy began to recover, while in 2011, it presented the sluggish recovery. In such a context, China adopted a soft landing, GDP growth had also fallen to 9.2 %. Meanwhile, from the data of land transaction fee during 2003–2012, land transaction fee in 2011 reached the maximum amount of 3.2126 trillion yuan. Therefore, this article chooses the data of these 3 years to analyze.

The estimate equations obtained by the least squares are as follows (Table 1).

For the estimated equations, adjusted R² and F-value are high, which show that the equation passes the significance test, and there is a high degree of fitting. In 2003, in the case of a significant level of 10 %, β₁ and β₂ fail to pass the t test.

Table 1 The regression results

Years	Constant	$\ln X_1$	$D_1 \ln X_1$	$D_2 \ln X_1$	$D_3 \ln X_1$	$\ln X_2$	Adjusted R^2	F value
2003	3.409*	-0.055	0.047	0.130*	0.106*	0.883*	0.976	242.58
2007	3.491*	-0.026	0.066**	0.118*	0.099*	0.837*	0.958	138.68
2011	2.921*	0.136	0.057***	0.096*	0.076*	0.765*	0.945	104.48

Notes: The dependent variable is $\ln Y$. *Statistical significance at the 0.01 level; **Statistical significance at the 0.05 level; ***Statistical significance at the 0.1 level

Therefore, accept the null hypothesis, that the two coefficients are 0. For group 2 and group 3, the land-based finance increase 1 % causes GDP increased by 0.130 % and 0.106 %. But for other groups, the GDP's dependence on land-based finance is very low-closing to zero. By comparing the four types of areas, it is obvious that the promoting effect in the group 2 is higher than other three groups. In 2007, in the case of a significant level of 10 %, only β_1 fails to pass the t test. So for each group, 1 % increasing of the land-based finance leads that the GDP increases 0.066 %, 0.118 %, 0.099 % and 0. In 2011, the result is similar to the result of 2007, for each group, 1 % increasing of the land-based finance leads that the GDP increases 0.057 %, 0.096 %, 0.076 % and 0.

4 Conclusions

By comparing the above estimating equations, it is easy to find that the economic level is a factor affecting the relationship between land-based finance and economic growth.

As shown in Table 2, from the point of horizontal, four types of cities' corresponding coefficients are in inverted U-shape in each year, therefore, we can draw the following conclusion: when the level of economic development is special low or high, the economic growth dependence on land-based finance is very low, close to zero; with the improvement of economic development level, degree of dependence on land-based finance increasing, but when economic develops to a certain level-a turning point, economic growth has less dependence on the land-based finance. For the longitudinal view, the coefficients of group 2 and 3 from 2003 to 2011 present a state of decline, which also show that with the improvement of economic level, land-based finance's influence on economic growth is weakened. But the characteristic of the first and fourth groups is not obvious; this may be caused by virtual variable (Table 3).

From the point of columns, values show the characteristic of reducing with the time, therefore draw the conclusion: with the constant improvement of the economic level, the gap narrows between the two groups

Table 2 The comparison of regression coefficients

Years	Group 1	Group 2	Group 3	Group 4
2003	0	0.130	0.106	0
2007	0.066	0.118	0.099	0
2011	0.057	0.096	0.076	0

Table 3 The comparison of difference

Years	Difference between the first and second groups	Difference between the second and third groups	Difference between the third and fourth groups
2003	0.130	0.024	0.106
2007	0.052	0.019	0.099
2011	0.039	0.020	0.076

5 Recommendation

Land-based finance's impact on economic growth is complex, and it will change along with the economic development stage. So in order to improve land-based finance's sustainability and promote economic development, this paper puts forward the following policies and suggestions based on the conclusion:

1. The local government should fully grasp the features of the region, and face the effect of land-based finance on economic growth objectively. When efficiency of land-based finance's service of funds and transferring the land use right are higher than other projects, expanding land-based finance has a positive effect on economic growth.
2. In the process of land development, the government should pay attention to balance the short-term and long-term, contemporary and future generations, partial and whole, not exchange for the current interests at the expense of interests in the future.
3. Under the performance appraisal system, which regards GDP and finance revenue as the core, the government operates the land in order to gain revenue. But lacking of related laws provides a possible for profiteer and corruption. So, country should strengthen legal system and constraint government's behaviors by the force of state.

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A Study on the Effect of Transport Improvement to the Tourism Development in Henan Province

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Abstract The tourists make the destination choice and tourism quality evaluation referring to the condition of transport infrastructure. Regression models have been established with SPSS 20.0 software, based on transport and tourism data in Henan Province from 2006 to 2012. The conclusions show that railways, expressways and other transportation facilities play significant roles in promoting the development of tourism in Henan Province. According to the specific situations of Henan Province, some suggestions on transportation construction have been recommended.

Keywords Transport • Tourism • Empirical analysis • Correlation

1 Introduction

Transportation conditions are always considered by tourists when they make travel decisions. Martin and Witt had pointed that the transport cost was an important factor for tourists to choose a travel destinations [1]. Prideaux had claimed that the improvement of the transport conditions would promote the development of the tourism in that area [2]. According to incomplete statistics, the survey shows that among the factors which affect tourism, compared with accommodation, restaurants, attractions and other services, about 60 % of people choose transport as the most important factor [3]. Prosperity and development of the tourism industry will bring changes in traffic flow, thus contributing to the prosperity of transportation and promoting the improvement of transport-related services and facilities [4].

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2 Overview of Tourism and Transportation in Henan

Henan Province has plenty of tourist resources. It is called a national treasure of the national heritage. Dengfeng Shaolin Temple, Longmen Grottoes are famous tourist attractions which have culture and ornamental value connotation.

Henan is located in the center of the national railway network. Zhengzhou North Station is Asia's largest railway marshalling yard. By the end of 2010, length of highways in operation is 244,000 km and total length of expressway is 5,016 km, ranking first in the country for five consecutive years. Aviation plays an important role in opening up and strengthening external ties. From Zhoukou to provincial boundaries segment has restored navigation, which is the first water channel through rivers and seas in Henan Province.

3 Empirical Analysis and Conclusion

This paper analyzes the relationship between transportation and the development of tourism in Henan Province with the data of 2006–2012. Some tourism-related indicators have been selected such as number of domestic tourists, number of international tourists, income of domestic tour and income of international tour. Select the relevant indicators for the transportation industry of length of railways, length of highways, length of expressway, length of navigable inland waterways and length of civil aviation routs.

3.1 *Correlation Analysis of Transportation and Tourism Development*

Judging from the situation of the country in recent years, China's transport industry and tourism industry have grown rapidly. This paper uses SPSS 20.0 statistical software and the selected data of 2006–2012 to make correlation analysis to verify the correlation between transport and tourism. The results are shown in Table 1.

In Table 1, the number of civil tourists and income of civil tourists have a strong correlation with a variety of transportation facilities, where the expressway and railway have the strongest correlation, and both have reached more than 0.9. Nowadays the speed of train has a huge improvement which is compared to the previous. Then domestic tourists are more likely to choose such a kind of transport. With the construction of China's high-speed line, it is able to satisfy not only the car lovers who have the short distance travel needs, but also part of the tourists tend to choose this kind of fast and convenient transportation. Number of international tourists has a strong correlation with length of civil aviation routs. However it has weak correlation with other transport facilities and does not pass the significance

Table 1 National tourism and transportation development personal correlations table

Item	Length of highways	Length of expressways	Length of railways	Length of civil aviation routs	Length of civil aviation routs
Number of civil tourists	0.960**	0.991**	0.961**	0.944**	0.897**
Number of inter-national tourists	0.643	0.704	0.631	0.798*	0.653
Income of civil tourists	0.935**	0.978**	0.945**	0.950**	0.900**
Income of inter-national tourists	0.914**	0.934**	0.883**	0.920**	0.805*

**Significant correlation at .01 level (bilateral)

*Significant correlation at the 0.05 level (bilateral)

Table 2 Tourism and transport development personal correlations table of Henan Province

Item	Length of highways	Length of expressways	Length of railways	Length of civil aviation routs	Length of civil aviation routs
Number of civil tourists (10,000 person-times)	0.993**	0.920**	0.821*	0.826*	—
Number of international tourists (10,000 person-times)	0.997**	0.887**	0.806*	0.842*	—
Income of civil tourists (100 million yuan)	0.993**	0.896**	0.835*	0.820*	—
Income of international tourists (one million U.S. Dollars)	0.998**	0.901**	0.786*	0.867*	—

**Significant correlation at .01 level (bilateral)

*Significant correlation at the 0.05 level (bilateral)

—Because at least one variable is constant, it can not be calculated

test, which illustrates that the main transportation of international tourists is air transport.

From the test results in Table 2, tourism and transport facilities all have correlation with each other. The most relevant is highway, with expressways, secondary roads continue to be built, and it plays an active role in the development of the tourism industry in Henan. The further development of the aviation industry in the province will lead to more and more foreign tourists, and thus achieve greater foreign exchange earnings. Due to geographical constraints, in recent years, the province's length of civil aviation routs has not changed, and therefore unable to be analyzed.

3.2 Comparative Analysis

To learn more about the development of tourism in Henan Province, this article makes comparison to the country’s tourism-related data. As is shown in Table 3, number of civil tourists, number of international tourists and income of international tourists in Henan Province are greater than the average growth rate of tourism of the national. The average growth rate of income of civil tourists slightly below the national level. This shows that the tourism industry in Henan Province has a good growth, and the growth rate remains at a high level.

Comparison with the development of the transport sector in the country and Henan Province (as is shown in Table 4). It can be seen that in addition to the average growth rate of civil aviation is higher than the national level, length of highways, length of railways in Henan Province is lower than the average growth rate of national. Length of civil aviation routs in Henan has not changed. And a large part of the development of the province’s tourism industry depends on the expressway and railway. It can be seen that to increase investments in expressway and railway may further promote the development of tourism in the province.

3.3 Regression Model

To further analyze the specific effects of transportation facilities for tourism in Henan Province, this paper uses SPSS 20.0 to do multiple linear regression analysis.

The goodness of fit in number of civil tourists and income of civil tourists model summaries are respectively close to 1. It indicates that these two models are more

Table 3 Tourism growth of national and Henan Province

	Number of civil tourists (%)	Number of international tourists (%)	Income of civil tourists (%)	Income of international tourists (%)
The national average growth rate	13.51	4.01	24.72	7.09
The average growth rate in Henan Province	18.61	16.67	21.89	14.36

Table 4 Transportation industry growth of national and Henan Province

	Length of highways (%)	Length of expressways (%)	Length of railways (%)	Length of civil aviation routs (%)	Length of civil aviation routs (%)
The national average growth rate	3.45	13.41	4.04	8.22	0.22
The average growth rate in Henan Province	0.92	9.69	3.39	14.98	0

Table 5 Number of civil tourists coefficient table

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	Constant	-344,794.325	53,807.670		-6.408	.023
	Length of highways	1.462	.262	.884	5.585	.031
	Length of railways	2.173	2.134	.087	1.019	.416
	Length of civil aviation routes	-.018	.018	-.104	-.980	.431
	Length of expressways	1.566	1.426	.143	1.099	.387

Table 6 Income of civil tourists coefficient table

Model		Unstandardized coefficients		Standardized coefficients	t	Sig.
		B	Std. error	Beta		
1	Constant	-38,937.353	5,366.172		-7.256	.018
	Length of highways	.164	.026	.963	6.292	.024
	Length of railways	.318	.213	.123	1.494	.274
	Length of civil aviation routes	-.001	.002	-.079	-.773	.520
	Length of expressways	.001	.142	.001	.010	.993

ideal fit to the data. According to the variance analysis, the p values of significance tests are less than 0.05, indicating that the data is statistically significant.

Multiple linear regression analysis of the data of Henan Province is drawn all types of transportation facilities on number of civil tourists and income of civil tourists coefficient of degree. Coefficient table is shown in Tables 5 and 6.

The impact of Henan traffic on number of civil tourists. Linear regression equation:

$$Y_1 = -344794.325 + 1.462X_1 + 2.173X_2 - 0.018X_3 + 1.566X_4. \quad (1)$$

The impact of Henan traffic on income of civil tourists. Linear regression equation:

$$Y_2 = -38937.353 + 0.164X_1 + 0.318X_2 - 0.001X_3 + 0.001X_4. \quad (2)$$

X₁ represents length of highways (km), X₂ means length of railways (km), X₃ represents length of civil aviation routes (km) and X₄ means length of expressways (km).

By the linear regression Eqs. (1) and (2), it shows that the impact of the railway and expressway have largest impact on domestic tourism in Henan Province. The

impact of civil aviation on the domestic development of tourism in Henan Province is not too large. Railway and expressway have the advantage of economy, convenience and other favorable factors, which make visitors more inclined to these transportation. Therefore, these two transport facilities have a more significant role in promoting the development of tourism in Henan Province.

4 Recommendation

The government should increase high-grade, high-quality investment in highways, based on the existing highway network layout, and then constantly improve highway routes. Focus on the prospects for economic and social development of the province, make scientific planning, build a modern highway network, while boosting economic and social development process. Length of Civil Aviation Routs still has a large distance with other domestic cities. The government should increase large investment in aviation accordance with the actual situation of the airport infrastructure. The government should base on the status quo, continue to maintain a rapid development of railway transport to promote the development of regional tourism. Qi Chu-min thinks that developed transportation network and a set of system-related transportation services play an important role [5]. Take a scientific and reasonable transportation network planning, based on the actual situation of the region and traffic conditions, the implementation of the integrated development of aviation, railways, highways, and promote the positive impact of transport on tourism comprehensively.

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Grey Analysis: Is South Africa Worthy to Be a Member of BRIC?

Ming-Yuan Hsieh, Tzung-Ming Yan, and Chih-Cheng Huang

Abstract This research creates the innovative Cluster-Grey-Ration-Analysis macroeconomic performance evaluation model through the integration of the Grey Relation Analysis and the Grey Cluster Analysis. This model was combined to increase the assessable sensitivity of the performance evaluation model in a macroeconomic study that discusses if South Africa has earned to be a member of BRIC by cross-analyzing ten macroeconomic indicators of eleven economies from a quantitative research perspective. The result distinctly indicates that South Africa has grown enough economically to be a member of BRIC and has played a decisive role as a rapid growth driver in the global economy.

Keywords South Africa • Macroeconometric model • Grey Relation Analysis (GRA) • Grey Cluster Analysis (GCA)

1 Introduction

As a result of a series of global financial crises and the rapid development of the emerging nations, the traditional seven industrialized nations (“G-7”) consisting of France, Germany, Italy, Japan, United Kingdom, United States and Canada have gradually lost influence and leadership in the world economy [1]. In 2001, Jim O’Neil, who was at that time the chief economist at Goldman Sachs (“Goldman”), originated the concept of the BRICs. BRIC is an acronym that refers to the countries of Brazil, Russia, India and China (“BRIC”). These countries were grouped

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because they represent emerging nations that have form a decisive power in the macroeconomic global growth as a result of their rapid economic growth with further “consideration given to the population size of these countries” [2]. In 2003, O’Neil forecasted that not only the emerging economic power of the BRICs was going to triumph over the traditionally developed nations such as the United Kingdom, France, Italy, and Germany but that they would further play a decisive role in the global economy to construct a most powerful six-nation group that also includes Japan and the United States. Since the global financial crisis that commenced in 2008, these emerging nations have played a decisive role in the global economic recovery [3]. Specifically, BRIC have superseded the traditionally developed nations to shoulder the global critical motive power of the macroeconomic recovery [4] because each developing nation have constantly suffered a series of economic troubles comprised of enormous national deficits and large outstanding national foreign loans [5]. As time goes on, BRIC have developed to be the most influential economic group to hold the global macroeconomic balance. According to the 2011 annual academic report of the Taiwanese Ministry of Economy, BRIC’s population which symbolizes the demand and consumption market has reached up to 2.8 billion people which are approximately 40 % of the world-wide population. After South Africa joined the BRIC, the letter “S” was added to BRIC or “BRICS” to symbolize South Africa as a member of BRIC. However, has South Africa really earned to be a member of BRIC?

In order to objectively identify consideration formation of the BRICS, this research cross-employed the Grey Relation Analysis (“GRA”) and the Grey Cluster Analysis (“GCA”) to create the innovative Cluster-Grey-Ration-Analysis macroeconomic performance evaluation model (“Cluster-GRA MPEM”) to objectively come up with the solution to the topic of this research – “Has South Africa Earned To Be A Member of BRIC?” The Cluster-GRA MPEM was used to cross-analyze ten principle macroeconomic performance indicators of eleven economies consisted of the United States, Japan, the Four Asia Tigers (Singapore, Taiwan, South Korea and Hong Kong) and the BRIC nations (Brazil, Russia, India and China) and South Africa in order to discuss the macroeconomic situation of South Africa. These macroeconomic indicators are comprised of six national performance indicators and four comprehensive scores as reported by the four academically macroeconomic research institutes comprised of the International Institute for Management Development (“IMD”), World Economic Forum (“WEF”), Global Business Environment Index (“GBEI”) and Economist Intelligence Unit (“EIU”) [6].

2 Relative Literatures

With respect to the objectivity regarding the solution of the topic in this research and evaluated sensitivity, this research mediates the relative literatures not only on researches regarding the financial development of industrial and emerging economies but on the purification of macroeconomic evaluated methodology through the cross-employment of GRA and GCA as well.

2.1 Macroeconometric Models (M&M)

The applied development of mathematic model in macroeconomic analysis started to attract attention after World War II. Therefore, the concept of Macroeconometric Models (“M&M”) has been utilized in the interpretation and cross-analysis of project macroeconomic circumstances [7, 8]. The Cowles Commission (1) was a professional research institute that concentrated on the applied combination between mathematic models and empirical experiments from a macroeconomic perspective. This applied combination was initiated by [9].

2.2 Evaluated Methodology

In order to solve the issue with uncertainty and missing data [10], first pioneered the more complete and innovative theory – the Grey System Theory (“GST”) and analytical methodology – the Grey Relational Analysis (GRA) by employing the associated approach, structure measure and model-making method to induce grey system which existed between block system and white system in order to purify the assessment. For doing the cross-analysis [11], commenced to integrate the indefinite research data to become useful research data which achieves the research goals of managerial control, decision-making, and foreseeing. The main goal of the GST is to calculate the grey relational coefficients and rank the grey relational grades between each influenced factors in order to handle the patterns of uncertain research problems or circumstances. The most creative idea of the GST which is distinct with traditional measure statistics is to use the trend-level among uncertain and incomplete information of each influenced factor to quantify the level of relation in order to assess the dependence or independence relations between each influenced factor. Further, there are four specific advantages in the GST: (1) the application in less and uncertain research data, (2) there is without linear relation or statistics distribution among overall impacted factors, (3) the measured processes are easier and less, and (4) the many times can be employed in the GST [12].

3 Empirical Measurements

3.1 Results of the Grey Relational Analysis (GRA)

Inductively, according to the above-mentioned measurement of the LTB (The analytical goal belongs efficient goal and satisfies the maximized analytical goal (the Larger The Better, “LTB”)); and the STB (The analytical goal belongs cost goal and satisfies the minimized analytical goal, the Smaller The Better, “STB”) of the GRA, all the GRCs of (EGR), (GDPPC), (IR), (IMD), (WEF), (BERI), (EIU), (IFR), (CPI) and (UR) of eleven economies in 2004 are shown in Table 1.

Table 1 The grey relational coefficient (GRC) of eleven economies

	EGR	GDPPC	IR	IMD	WEF	BRI	EI	IFR	CPI	UR
	R1*	R2*	R3*	R4*	R5*	R6*	R7*	R8**	R9**	R10**
2004										
USA	0.3617	1	0.3606	1	1	0.6066	1	0.6373	0.4921	0.8467
Japan	0.3333	0.7515	0.3333	0.5005	0.6441	0.7872	0.6507	1	1	0.8992
Taiwan	0.4028	0.4446	0.3468	0.5364	0.8321	0.7551	0.604	0.7647	0.6536	0.9134
Hong Kong	0.5782	0.6139	0.3553	0.9685	0.7755	1	0.8161	0.9028	0.8308	1
Singapore	0.4067	0.4553	0.358	0.4184	0.6064	0.4805	0.6952	0.6771	0.5403	0.9831
South Korea	0.5944	0.5595	0.3705	0.8097	0.5377	0.4933	0.8561	0.8442	0.7339	0.7785
Brazil	0.3680	0.3559	1	0.3333	0.3813	0.3333	0.4	0.4745	0.3333	0.5888
Russia	0.5346	0.3596	0.3899	0.3442	0.3333	0.3592	0.3394	0.3333	0.5606	0.703
India	0.503	0.3333	0.3692	0.4302	0.4351	0.3663	0.3486	0.5159	0.6981	0.6784
China	1	0.3386	0.3569	0.5742	0.3958	0.4933	0.3333	0.7558	0.6284	0.6444
South Africa	0.4404	0.3578	0.3902	0.3652	0.3877	0.3894	0.4326	0.422	0.4921	0.3333
	2004	2004	2005	2005	2006	2006	2007	2007	2008	2008
	GRG	Ranking	GRG	Ranking	GRG	Ranking	GRG	Ranking	GRG	Ranking
USA	0.7298	2	0.7305	2	0.7162	2	0.7245	2	0.7344	1
Japan	0.6389	5	0.69	3	0.7076	3	0.7004	3	0.7121	2
Taiwan	0.6454	4	0.6254	5	0.6243	5	0.6317	5	0.6351	4
Singapore	0.8093	1	0.7841	1	0.7574	1	0.7356	1	0.6804	3
South Korea	0.5651	6	0.5621	6	0.5805	6	0.584	6	0.5769	6
Hong Kong	0.7266	3	0.6578	4	0.653	4	0.6553	4	0.6032	5
Brazil	0.4582	9	0.4568	9	0.4669	9	0.4866	9	0.5411	7
Russia	0.4267	10	0.4257	10	0.419	10	0.4317	10	0.434	10
India	0.4745	8	0.4678	8	0.4672	8	0.4658	8	0.4995	9
China	0.5219	7	0.5521	7	0.5545	7	0.5162	7	0.5393	8
South Africa	0.4357	11	0.4011	11	0.3925	11	0.3901	11	0.4227	11

* = Larger the Better (LTB); ** = Smaller the Better (STB)

Table 2 The comprehensive Synthetic Corporate Financial Performance (SCFP) of eleven economies of headings

	SCFP (2004–2010)	Ranking
USA	0.6718	1
Japan	0.5242	3
Singapore	0.6268	2
Taiwan	0.3532	11
South Korea	0.4062	10
Hong Kong	0.4335	6
Brazil	0.4727	4
Russia	0.4198	8
India	0.4601	5
China	0.4310	7
South Africa	0.4063	9

Consequently, the comparison and ranking of all the GRGs (Γ_{0i}) of the eleven economies from 2004 to 2010 is also expressed in Table 1.

The compared and ranking of the comprehensive Synthetic Corporate Financial Performance (“SCFP”) of eleven economies from 2004 to 2010 are expressed in Table 2.

4 Conclusion

As for the synthetically integrated literatures associated with the performance evaluation, the macroeconomic research methodology of the evaluation performance generally utilized the traditional statistic with the complicated calculation by analyzing the relative economic elements with a large number of data in order not only to settle the specific topics but also to achieve normal distribution hypothesis. However, according to the data uncertainty and the increment of assessable sensitivity, the grey system methodology is able to significantly conquer the fore-mentioned drawbacks of the traditional statistics based on the specific characteristics of the grey analyses. Therefore, this research mode capital of Cluster-GRA MPEM is the result from the integration of GRA and GCA. These cross-analytic methodologies were combined in order to increase the assessable sensitivity of the performance evaluation model in an expounded macroeconomic performance study that discusses if South Africa has earned to be a member of BRIC by cross-analyzing ten macroeconomic indicators of eleven economies from a quantitative research perspective. The evaluated result distinctly indicates that South Africa has not only grown enough economically to be a member of BRIC but has also played a decisive role as a rapid growth driver in the global economy.

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The Investigation of Local Government Investment and Financing Platform Problems and Countermeasures

Hongwei Gai and Xingxia Hou

Abstract The local government has important role in the construction of urban infrastructure investment and financing platform, which is one of importance channels and means of government financing. Base on the theory, the paper will defined the concept and functions of local government investment and financing platform and discuss the current situation, problems and contributing factors, then give relative commendations to development of the local government investment and financing platform.

Keywords Local government • Financing platform • Basic theory • Existing problems

1 The Theoretical Analysis

In recent years, the local government establish the financing platform in order to development the local economy, to solve the capital shortage for the city infrastructure construction, and help local government to financing so that achieve reasonable assets operation and capital operation. Moreover, it is an important channel and means to construction of the city infrastructure. At the same time, because of it has rapid development which is also bring relative manage and construction problems. Therefore, the analysis and investigation of the local government investment and financing platform will be necessary and urgent to the local government.

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1.1 Concept Definition

The China banking regulatory commission is defines: the local government financing platform is funded by local governments. And it has authorization for the construction of public infrastructure projects, operation management, and external financing activity, which is enterprise legal person (matter) industry organization mainly operating income, public facilities and financial capital as a source of repayment [1]. This definition highlights the government dominance and absolute control, and specifies the financial capital for financing platform, while the fund use in the construction of infrastructure, and public utilities and other relative commonweal investment projects. In general, the investment and financing platform through funding, injection of equity, land and other assets which provide by local government departments and institutions to establish. Also, the economic entity has independent legal representative and government investment project.

1.2 The Platform Features

According to the definition, the local investment and financing platform has three main characteristics which are including: (1) the operation mode are government control and the market choice of commercial bank; (2) the local urban infrastructure construction investment company; (3) the capital from financial institution loan [2].

2 Development Status

2.1 General Situation

The local government investment and financing platform is not a innovation, while it is an inevitable outcome of China's social economic develop, from is taking shape to large-scale development has experienced its own historical evolution. According to research, the local government financing mode already has 30 year experience and the local government investment and financing platform has about 20 years history as well. Development of local government financing platform can be divided into four stages, which are including creation stage, adjustment stage, flourishing stage and standard stage.

2.2 The Existing Problems

The local government investment and financing platform has provided great promotion for the city infrastructure construction. However, it is also has five main

problems in the operation management as below. (1) The number has rapidly increasing and its positioning is not clear. The local government investment and financing platform has rapid development even has huge scale, but it does not accuracy position. Some local government investment and financial platform does not have the enterprise information so that cannot certain the scope of business and does not provide certain regulations. In addition, it is without confirm financing channel and manners. (2) Most of the financing channels of financing platform, debt decentralized management, monitoring mechanism failure. The main financing channels are limited to funding and bank credit, and most of the local government investment and financing platform for the single financing channel, which is make a great pressure to the local government investment and financing platform for financing [3]. Also it will lead to difficult adapt to the expansion of local city infrastructure construction investment and the increasing demand for funds, which is bound to affect the progress of the city infrastructure construction of local government. (3) Size of the debt is too large and there is a potential risk of investment and financing. The Local government investment and financing platform in the process of construction and development in order to help the construction of government financing as soon as possible obtain enough capital, then found on a large scale bonds or bank lending, which causes large debt scale of local government investment and financing platform, and the local government debt, debt ratio is generally on the high side. (4) Lack of market operation. In the process of local government investment and financing platform construction and management, many local governments did not adopt the market-oriented operation mode. Under this management system, local governments cannot give autonomous local government investment and financing platform, which can lead to local government investment and financing platform for the company's earnings can not get effective guarantee.

2.3 Analysis of the Causes of the Management Issues

In recent years the rapid development of the local government investment and financing platform has achieved good results. However, because of various reasons, which have brought much local government investment and financing platform problem, even behind these questions is a deep-seated reason.

Base on the city development and under the influence of government officials of subjective consciousness, city infrastructure construction has become urgent, local governments are increasingly city infrastructure construction investment. In this case, the demand of city construction of local government investment has been increasing, while due to the mismatch of the local government financial powers and responsibilities, it urgently need through the financing of local government to obtain sufficient investment funds [4].

The local government investment and financing platform mainly is commissioned by the government, which is accordance with requirements of the project

and complete city construction investment and financing of the project, to receive the recognition from the government leadership, the leadership of the government promotion rotation frequent cases, these investment projects are often short-term behavior, which makes the financing behavior of local government investment and financing platform is also a lot, and not in the long run to consider the economic benefits of city construction projects.

According to the research, under the condition of urban construction projects in urgent need of fund, commercial Banks will seize the local government financial capital for urban construction lack of need for financing opportunities, lend money to form a platform for the local government investment and financing by local government. Commercial bank is willing to loan to the local government investment and financing platform, because the investment and financing platform company won't have the risk of bankruptcy, thus ensure the bank loan interest, which is the pursuit of profit target of commercial Banks.

3 Development Strategy

At present, the local government investment and financing platform, there are many problems in the development of construction and the management risk, to regulate the construction and management of local government financing platform in China, so that the local government investment and financing platform to standardize operation and healthy development, for the local government of the municipal construction project specification is contributing to finance and investment, must strengthen the management of its operations.

3.1 Change Management Method

In Order to regulate the construction and management of local government investment and financing platform, local governments have to improve it for the construction and management, the conception change and develop the regulations to carry out the management of it, through a variety of measures to improve the quality of local government investment and financing platform and the total assets, to improve their ability of risk defense. Therefore, it will become bigger and stronger, the local government investment and financing platform for the local government continuously municipal construction health financing [5].

3.2 Broaden the Financing Channels, Financing Diversification

At present, Most of the financing is from bank loans, the traditional financing model not only makes the issuance of local government investment, but also financing

platform is becoming more and more extensive. Therefore, it is increased the local government debt burden and lead the Banks to trust companies so that other financial institutions face huge financial risk. Therefore, the local government investment and financing platform to gradually explore diversified financing channels [6], such as the PPP, BOT project financing, financing lease, the industrial fund, issue bonds, asset securitization, listing and financing, such as the financing channels. In addition, the central should push the reform of the local governments to issue bonds, such as strengthening the central undertakes to the local municipal bonds, or directly by the local government debt. The local government should attract social folk capital investment of construction projects, and therefore to establish a perfect mechanism, which will gradually improve the fiscal funds, credit capital and private capital to investment for city construction projects.

3.3 Improve the Management System and Build Up Risk Management Mechanism

The most of the local government investment and financing platform management system is not perfect, especially the construction of the risk management system need to be improved. Local government investment and financing platform to project financing effectively, and reduce the potential risks existed in the project financing, must strengthen to the local government investment and financing platform for the construction of management mechanism and risk mechanism and implement. First of all, establish and improve the debt management mechanism. Secondly, build up risk measurement systems, improve the platform risk early warning mechanism [7]. Can effectively change the bank and the present situation of the local government information asymmetry, and can effectively enhance the investment and financing platform of local government financing behavior and the effective management of debt levels, thus reducing Banks, trust companies and other financial institutions loan risks and local government finance, debt risk.

4 Conclusion

This paper systematically analyzed the present development situation of local government investment and financing platform in China, and in view of the problems that exist in the local government investment and financing platform risk and puts forward the effective solution. However, the local government investment and financing management and financing in the process of platform construction, conscientiously implement the relevant policies, to ensure the standardization of the local government investment and financing management development in our country, promoting the local government investment and financing platform for the local economic development is more positive and effective contribution.

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Prospective Analysis on Logistics Enterprises and Industry

Xiaofei Zhang and Ping Hu

Abstract Development of the logistics enterprises and therefore its industry is affected by markets, social demands, the regional industry and newly introduced technology profoundly. The features of logistics market are that gradually opening, increased competition, supply far exceeding demand. Social demands continue to grow with a decreasing rate. Logistics industry is relying on the regional industry; otherwise the logistics could be counterproductive. Logistics must attach great importance to technological innovation of intelligent, standardization and globalization in the future.

Keywords Social demands • Logistics industry • New technology • Regional industry

1 The Impact of Market on the Logistics Enterprises and Industry

1.1 *The Market Is Gradually Opening Up*

After China's accession to the WTO, the market diversification had occurred. The first is foreign logistics enterprises. The second is private logistics enterprises which are characterized by a diversified ownership structure. The third is the traditional transportation, freight forwarding, warehousing and wholesale business of state-owned economy. During the future for a long period of time, China's logistics market will show interdependence, mutually competition and reinforcing situation among the state-owned, collective, individual, Chinese and foreign logistics enterprises.

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1.2 The Market Accelerates Meet with International Standards

As the world's manufacturing center and OEM's transformation to China, as well as to the process of economic integration, the future import and export of goods, such as raw materials, components and finished products, will have significant changes both in quantity and quality. In order to adapt to this change, China is required to be meet with international docking in logistics technology, equipment, standards, management and personnel. In the process of internationalization, small scale and low technical level logistics enterprises will be eliminated eventually.

1.3 The Market Competition Is Exacerbated

Future market competition will be based on primarily service level and quality. Some logistics companies in developed countries have formed multinational integrated logistics enterprises. They are strong and competitive. Moreover, China's logistics enterprises are mostly small-scale, weak and low capacity. This is bound to promote domestic logistics enterprises pay more attention to develop its core resources and core competencies than to others. So, there will be more traditional transportation and warehousing logistics enterprises to accelerate the transition to a third party.

1.4 Logistics Distribution Is Still Hot in the Market

First, the governments pay more and more attention to logistics and distribution [1]. Second, with the development of chain operation, the requiring of rapid response and on-time delivery promote the development of logistics and distribution. Third, large-scale production companies like Haier involved in modern logistics, and built and upgraded a number of logistics distribution center. This momentum will continue. Fourth, some large foreign and domestic logistics enterprises are planning to establish their own distribution centers to improve logistics capabilities.

1.5 The Supply Is Far Greater Than the Market Demand

The demand of logistics will be released to more professional logistics companies in the future. Especially, foreign-owned and joint ventures will be the first choice. According to the investigation report hosted by related media, outsourcing ratio of multinational logistics in China is up to about 90 %.

Fig. 1 Schematic of international trade growth [2]

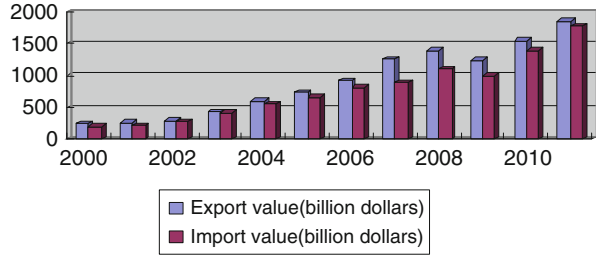
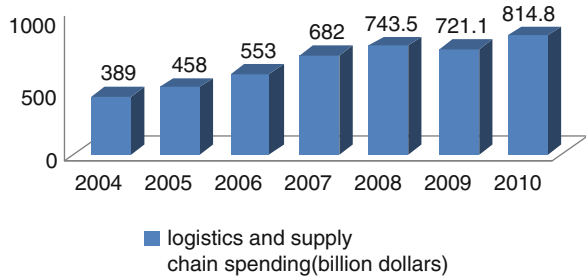


Fig. 2 Trends of China’s logistics and supply chain spending [2]



In 2001–2011, China’s GDP CAGR was 16.78 %, imports CAGR was 22.72 %, and exports CAGR was 21.71 %, which offer a wide range of business foundation for logistics and supply chain management services (Fig. 1).

In 2004–2010, CAGR of China’s logistics and supply chain expenses was 13.11 %, after experiencing a slight decline in 2009, it returned to normal growth rate in 2010. China’s logistics and supply chain management market has become the world’s second largest, right behind the US (Fig. 2).

2 The Impact of the Social Demands on the Logistics Enterprises and Industry

2.1 Social Logistics Demand Grows Continuously in a Slow Rate

In 2004–2011, CAGR of total social logistics was 22.44 %, but since the 2008 financial crisis, the growth rate has been slowing down. In 2012 January to October, total social logistics was 146.4 trillion Yuan, an increase of 9.6 %, with the increase in the first 9 month. The total industrial logistics was 133.6 trillion Yuan, an increase of 10 %, the proportion of the total social logistics was 91.26 %, total social logistics growth is driven by industrial logistics in major. The others continued to grow rapidly. Although the growth rate decline, the up-growing trend can ensure the stability of social logistics demand, hence the logistics enterprises (Fig. 3).

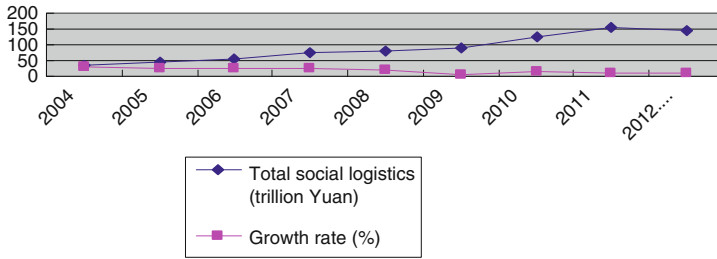


Fig. 3 The total social logistics and growth rate [2]

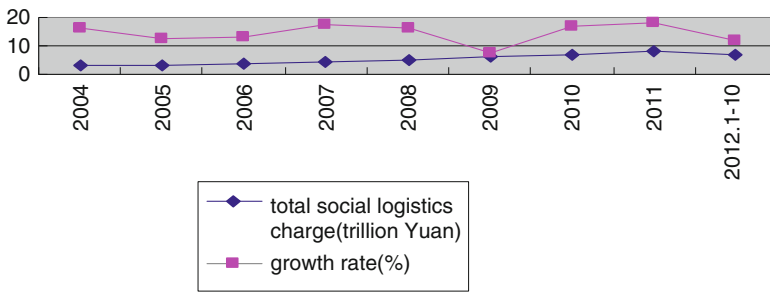


Fig. 4 The total social logistics charge and growth rate [2]

2.2 Social Logistics Charge Grew Rapidly with Its High Costs

In 2004–2011, the CAGR of total social logistics costs was 16.35 %. From January to October in 2012, total social logistics costs reached 7.2 trillion Yuan, an increase of 11.5 %, the increase of 0.2 percentage points over the previous 9 months, the increase of 1.9 percentage points over the same period. It is shown that the logistics cost was still high. So, relatively higher cost logistics enterprises by low technology and level of logistics management may gradually decline in profit margins until to be closed (Fig. 4).

2.3 Logistics Industry Grew Faster Than GDP

In 2006–2011, the CAGR Chinese logistics industry was 17.81 %. In 2011, Chinese logistics industry was 3.2 trillion Yuan, an increase of 13.9 %, an increase of 4.7 percentage points over the GDP in the same period, an increase of 5 percentage points over the added value of the tertiary industry in the same period. The logistics industry’s growth was significantly higher than the tertiary industry and GDP growth in other years beyond the financial crisis in 2009. Throughout these years,

Fig. 5 The added value of Chinese logistics [2]

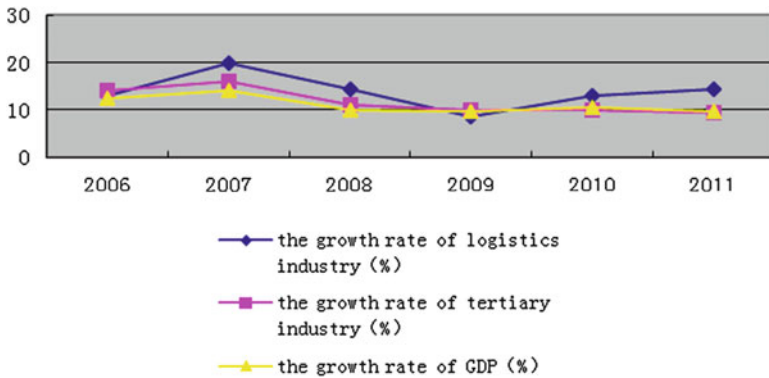
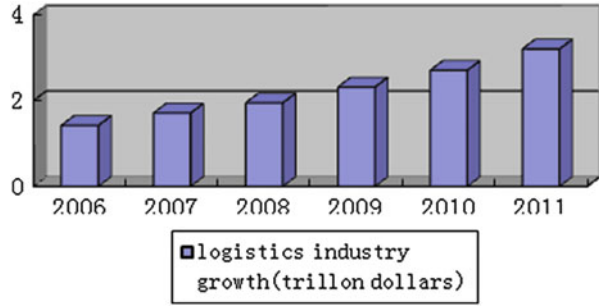


Fig. 6 The growth rate of logistics industry [2]

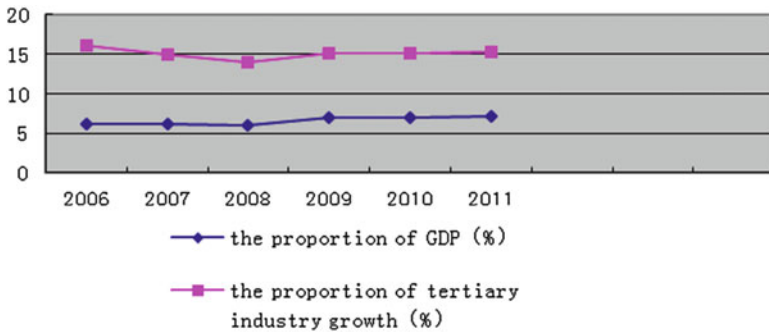


Fig. 7 The proportion of logistics industry growth to GDP and the tertiary industry [2]

the proportion of logistics industry growth to GDP and the tertiary industry remained stable. Therefore, in the macroeconomic environment, the logistics industry will maintain rapid growth (Figs. 5, 6, and 7).

3 The Impact of Regional Industry on Logistics Enterprises and Industry

3.1 The Development of Logistics Industry Must Fit the Endogenous Demands from Other Sectors

Due to the difference of resource endowment, geographic conditions, the advantages of industries among regions, the coordinated development of regional industry has become an inevitable law. Logistics demands among regions are mainly composed of direct input-output products. This makes logistics enterprises, especially integrated logistics parks, must pay attention to the current development of regional integration and the economic circle, tend to focus on the transfer of industries, and adjustments appropriately and timely.

3.2 Logistics Industry Can Also Be Counterproductive in Regional Industry

Modern logistics industry can effectively realize the link between the region, and between the upstream industry and downstream industries, so as to promote integration and alliances among regions and industries, to promote deeper division of labor of regional industrial and the integration of the advanced resources, even to promote the upgrading of regional industrial structure and industrial specialization, agglomeration and scale development. Meanwhile, logistics industry will become an important force to promote the economic development of regional industry. At present, many economically developed cities like Shanghai and Shenzhen have seemed modern logistics industry as a pillar industry of national economic development.

4 The Impact of Information Technology on Logistics Enterprises and Industry

Intelligence Is the Inevitable Trend of the Development of Logistics Technology: Logistics operation process involves a lot of decision-making. In recent years, expert systems, artificial intelligence, simulation, operations research, business intelligence, data mining and robotics technologies have had relatively mature research results in the international arena, and had gotten better application in practice. Therefore, intelligent logistics has become a new trend in logistics development.

Standardization Is the Fundamental Guarantee of Modern Unobstructed Logistics:

Transportation and distribution of goods, handling, sorting packaging, distributing and processing require a scientific standard. It is the determining factor, that the logistics process can be unobstructed among countries or regions. Especially in the new century, if an unstandardized international logistics in operations you can't achieve efficiently global logistics operations.

Globalization Is the Inevitable Development of the Logistics Business Operations:

After China's accession to WTO, more and more multinational companies are speeding up the pace of investment in China. As a result, a large number of Chinese enterprises will integrate into the global industrial chain closely, and some will become directly supporting multinational companies. These will greatly speed up the pace of the combination between Chinese economy and the international economy, which represents the higher stage of logistics development.

In the future, network communication technology-based logistics processes of integration organization will be the concerned supply chain manager. The focus of competition will shift to the improvement of management efficiency and management level in the entire logistics process. In western developed countries, the core competitiveness of logistics enterprises has begun to shift to customer responsiveness [3].

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Analysis of Fiscal Transparency in China

Ting Qi

Abstract Fiscal transparency refers to the mechanism and system that all the financial information and financial activities are released to public. Fiscal transparency can effectively promote the efficiency of the government, standardize government behavior and improve the level of people's livelihood; which is the inevitable requirement of socialist market economy, the basic step of government management legalization, the fundamental guarantee of constructing public finance framework. Along with the progress of legalization and the acceleration of the public finance system is increasingly in China, fiscal transparency becomes more and more serious, the government and the public on fiscal transparency are increasingly high degree of concern. In this article, through longitudinal comparing China's fiscal transparency and transverse drawing on the advanced experience of foreign financial transparency, describe the significance of the fiscal transparency, expound the existing problems of fiscal transparency in China, put forward a series of the improvement measures to improve the fiscal transparency in China.

Keywords Fiscal transparency • Government budget • Public finance • Government accounting • National treasury centralized payment system

1 Introduction

The problem of fiscal transparency is well worth discussing in the current society. As developed from the "Panned Finance" to the "Public Finance", China's financial operation and expenditure becomes to meet the purpose of public needs, to create a fair competition and a harmony society. It is "being of and for the people". The meaning of commonality becomes more and more significance. Therefore, in order to establish a full-fledged socialist market economy and a more open and viable economic system, the government functions must change to public government from all-powerful government. As decided by the characteristics of commonality, the financial operating mechanism should be open and transparency to guarantee

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public finance mechanism running smoothly. It is the issue of transparency which extent in public domain. It is also an important content which ensure the public right to fight corruption effectively and improve government's management level.

2 The Meaning of Fiscal Transparency

In 2007, the Manual on Fiscal Transparency of the International Monetary Fund, fiscal transparency is defined as follows: financial information maximize public access, these financial information including the financial revenue and expenditure activity, the government policy, financial analysis and decision and public sector accounts [1]. The most basic is to ensure that the financial information post on the Internet timely and accurately, in order to allow the public to master.

In this paper, the fiscal transparency is defined as: citizens have the right to know the government finance, a mechanism and system that the government open the financial activities and related activities of the target intention, balance of payments flows, government authority, operation effect, mechanism and system active to the general public timely and accurately.

3 The Existence Problem of China's Fiscal Transparency

3.1 The Fiscal Content Is Not Accurate

The fiscal transparency good practices published by the International Monetary Fund in 2007 pointed out, the budget process and budget documents in the disclosure of information is the core of fiscal transparency. Therefore, the government budget should fully cover the government in financial activities.

According to "the 2012 central budget implementation and other financial revenue and expenditure audit work report", there exists the following problems on budget content: Budget presentation does not regulate some matters. The Ministry of Finance reported the budget implementation to the National People's Congress, not reported income about 6 hundred million yuan. Issued investment plan not according to the procedure is 160 hundred million yuan.

3.2 Financial Openness Is Low

In 2013, fiscal transparency of China report pointed out that in 31 provinces, fiscal transparency conversion is calculated by percentile score of 31.4, which means that the 31 provinces as a whole words, only open the 1/3 information not to all survey information.

3.3 *The Quality of Financial Information Is Low*

The State Statistical Bureau released the latest data shows that the annual GDP is 56.9 trillion yuan, however, the 28 provinces of the GDP totally is about 58.9 trillion yuan. In addition, the same data at a different site and different source is quite different, some even is fabricated. Thus, the low quality of financial data and information, lack of credibility, all of these should be improved greatly. Normalization, timeliness and reliability of financial information need to make a big difference (Table 1).

Table 1 In 2013 China's provinces' GDP

Province	Exception in 2013 (%)	Actual growth in 2013 (%)	GDP in 2013 (trillion yuan)	Exception in 2014 (%)
Guangdong	8	8.5	6.23	8
Jiangsu	10	9.6	5.9	9
Shandong	9.5	9.6	5.5	9.0
Zhejiang	above 8	above 8	3.75	8
Henan	10	9	3.15	9
Hebei	9	8.5	2.83	8
Liaoning	9.5	9	2.71	9
Sichuan	11	10	2.6	9
Hubei	10	10	2.4	10
Fujian	11	11	2.19	10.5
Shanghai	7.5	7.7	2.16	7.5
Beijing	8	7.6	1.96	7.5
Anhui	10	10.5	1.9	10
Neimenggu	12	9	1.7	9
Shaanxi	12.5	11.1	1.6	11
Heilongjiang	11	8	1.48	8.5
Jiangxi	10	10.1	1.433	10
Tianjin	12	12.5	1.43	11
Guangxi	11	10.3	1.4	10
Shanxi	10	8.9	1.26	9
Chongqing	12	12.3	1.2657	11
Yunnan	12	12.1	1.1721	11
Xinjiang	11	11.1	0.851	11
Guizhou	14	12.7	0.8	12.5
Gansu	12	12.2	0.63	11
Ningxia	12	10	0.26	10
Qinghai	12	11	0.2	10.5
Xizang	12	12.5	0.0802	12
Total			58.842	

3.4 *Financial Information Acquisition Is Difficult*

According to the survey that Chinese Academy of Social Sciences made the focused observation and investigation on the 102 government websites, it is difficult to obtain the high-quality financial information, and there exist problems in the construction and maintenance of the government website:

The government website maintenance is not active The government website update slowly. Some government websites just provide a little data and information, some is old data, and some is no update status. Some sites will be unable to open the phenomena in some times, some web sites links could not open, and some released government telephone on the website is actually empty.

The government website form over content Existing the phenomenon that focus on propaganda and ignore open, many government website mainly as a external publicity platform, rather than an open window. Some government website failed to provide many details of the financial information, Therefore, the public understanding of government data is not deep.

The government website is unreasonable Some sites webpage setting is not clear, the retrieval is not convenient, it is more difficult for the public to query data and information. What's more, with a small amount of information, some web content repeat cross, content is not timely integration of classification.

4 The Suggestions of Improving China's Fiscal Transparency

4.1 *Improve Budget Transparency*

4.1.1 Adjust Budget Time

In fact, the department budget is from the beginning of July each year, in the end of September, the aggregate level budget units reporting to the supervisor, and then at the summary report. China's central and local budget is usually from the beginning of November each year, completed in March next year.

The adjust time of our budget extend to 10 months is appropriate. In this way, on one hand ensure adequate budget compilation time, on the other hand ensure the timeliness of budget estimation index [2].

4.1.2 Establish Specialized Budget Compilation Agency

Establishing the budget audit specialized institutions [3], ensure that the audit staff have a clear understanding of the importance of the budget, contain a certain level of understanding of the budget content, audit effectively on the budget report, improve the ability of making scientific decisions budget, and carry out the budget examination by the national people's congress.

4.1.3 Detail the Content of Budget Compilation

Detailing budget content is an important basis for improving the budget transparency. The first is to increase the budget level and subject. Change the situation that the budget content only lists to status or paragraph [4], and strengthen budget content to be organized and standardize, ensure all activities can be reflected by all levels of subjects of the government, and make the budget detailed and clear. The second is to expand the budget content. It should promote the special financial expenditure budget public, further open the “three expenditures”, social security funds, the people’s livelihood expenditure, government debt and other contents, draft the budget report explanatory documents and manuals, public the government budget report on the government website timely.

4.2 *Improve the Financial Information Disclosure System*

In 2009, the Ministry of finance published the annual information disclosure report. This paper pointed out that the budget information disclosure system established.

1. Smooth the financial open channels, and reinforce the financial disclosure efforts.

First is to maintain and enhance the construction of portal website. Second should make full use of newspaper, television, radio and other news media to disclose. Third is to public finance policy and regulations in a timely manner [5]. Forth must be good at using the new channel, using the portal of government, government hotline, advisory mailbox, feedback and other columns, listen to the opinions of the masses, and eliminate doubt and confusion.

2. Construct the government financial reporting system.

It should be reflected in the government financial report about the government income, debt, public infrastructure, real estate, public reserve assets value. Preparation including government assets and liabilities, cash flow and other contents of the government financial report [6], a comprehensive, truly reflect on the government’s financial position and operating performance. The establishment of government financial reporting system, improving financial transparency, is conducive to the public have a better understanding of government assets, liabilities, income, expenses, further strengthen and standardize the government assets, debt and budget management, reasonable allocate government resources, scientific arrange financial revenue and expenditure, and achieve sustainable economic and social development.

4.3 Improve the Financial Supervision System

Government financial activities is in the supervision of the social forces, in order to enable the government to power constraints, improve financial transparency, and ensure that the financial activities are run in the sun.

Improve the legal supervision, strengthen the supervision of the People's Congress, and strengthen the social supervision. The establishment of the supervision system, multi-level, multi angle to supervise the government fiscal activities, improve the transparency of government finance.

4.4 Strengthen Technical Support of Fiscal Transparency

Intensify the financial auditing constraints. On the one hand, horizontal expand financial audit, broaden fiscal audit areas, take all government funds into the category of financial audit, achieve full coverage of government finance audit scope; on the other hand, longitudinal extend financial audit [7], proceed the whole process audit on fiscal funds raising, distribution, use and management, follow up all aspects of financial activities. In addition, carry out the public work on financial audit results, make the financial information known to the legislature and the public actively.

Reform the government accounting system. The absence of the government accounting system, making the government budget cannot effectively reflect the government financial activities and financial status, lacking effective systems, lead to financial opaque. Therefore, it should perfect the government accounting system as soon as possible, establish the government balance sheet and statement of cash flow by all levels of governments, achieve full coverage and full caliber management, and truthfully reflect the government's financial behavior.

5 Conclusion

Faced with informatization and globalization of the integrative economy, enhancing fiscal transparency is not only the requirements of the International Monetary Fund, but is China's economic opening up requirements.

We should strengthen in speeding up the economic development, and at the same time, make efforts to improve fiscal transparency in the process of the establishment of the market economic system, standardize the government behavior, improve the efficiency of the public management, and properly adjust between policy flexibility and fiscal credibility, so as to resist financial risks.

Fiscal transparency is an important condition to guarantee the right of the citizens to know the government activities. Only the public in the understanding

of the collection and use of the public funds, can they have a better understanding of the government's activities, and supervise the government's activities. On this basis, the public protect their rights of expression, participation and supervision, thereby, they effectively carry out their responsibility of democratic election, democratic decision-making, democratic management and democratic supervision. Fiscal transparency is a solid step forward to realize this goalstep.

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Development of Chinese Experience Leisure Agriculture

Yuquan Sun

Abstract In recent years, leisure agriculture, as a sunrise industry, has developed quite rapidly in China. Leisure agriculture can be classified into a tourism type, an experience type and an education type. Chinese leisure agriculture mainly takes the form of a tourism type while the experience leisure agriculture is still in its infancy. The experience leisure agriculture can provide better leisure services with a huge market demand. Moreover, developed countries can also offer some mature experience for reference. Therefore, the Chinese government should enhance development of the experience leisure agriculture.

Keywords Leisure agriculture • Experience leisure agriculture • Tourism industry

1 Definition of Experience Leisure Agriculture

Leisure agriculture is a new mode of agricultural production and operation that makes use of agricultural landscape resources and production conditions to develop sightseeing, leisure and tourism. According to different purposes of leisure, leisure agriculture can be classified into a tourism type, an experience type and an education type. In terms of the tourism leisure agriculture, it enables urban residents to go on a short trip in rural peasants' families, including having farmhouse meals, picking fruits in the garden, fishing in the pond and going sightseeing in the nearby scenic spots. When it comes to an experience type, urban residents can rent a patch of farmland in the countryside and experience the pleasure of planting by planting some crops. The education type aims to set up specialized demonstration bases for teenagers to have a better understanding and personal experience of the development of agriculture and crops. In recent years, Chinese leisure agriculture has developed quite rapidly but it is mainly concentrated in the tourism leisure agriculture. Currently the experience agriculture only takes up quite a little proportion in the leisure agriculture, but it can better satisfy the leisure demands of urban

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residents. Thus it should be the direction for the future development of leisure agriculture and the government needs to make efforts to promote its development.

2 Rapid Development of Chinese Leisure Agriculture Whereas That of the Experience Leisure Agriculture is Quite Slow

Recently, the Chinese leisure agriculture has developed quite rapidly and becomes a motive industry and sunrise industry of the twenty-first century. The leisure industry has also developed fast in areas surrounding some big cities such as Beijing, Shanghai and Shenzhen. Take Beijing as an example, as the Chinese economic, political and cultural center, Beijing has abundant agricultural resources, profound ethnic culture and vast rural areas which provide a unique advantage for development of leisure agriculture in Beijing. According to incomplete statistics, by the end of 2010, the number of agricultural sightseeing gardens in rural areas of Beijing surpassed that of 1,300 with income exceeding RMB 4 billion [1]. In spite of the numerous sightseeing gardens in Beijing, 91.2 % of them take the theme of leisure picking while the number of agricultural gardens centering on farm planting and science education is quite few [2].

Even though the leisure agriculture has developed quite rapidly in China, yet compared with those international developed countries, it is still in its infancy characterized by a great majority of it being the tourism leisure agriculture. The tourism leisure agriculture mainly takes the form of an experience in which urban residents spend their weekend or a short holiday in the countryside picking, fishing and sightseeing. Over there they can eat farmhouse meals and live in farmhouse which can be referred to as an experience of leisure agriculture. People who provide such kind of leisure agriculture service are mainly single farmers characterized by common features of a small scale and scattering. Moreover, it is also quite simple in its functions with its farming experience being mainly fishing and picking as it is greatly restricted by the season. Instead of sightseeing, many people still spend their time in watching TV and playing cards, so the result is that people just bring their urban recreational activities to the rural areas without experiencing features of the leisure agriculture.

In comparison with the tourism leisure agriculture, an experience leisure agriculture can provide better leisure services with its main forms being providing small patches of farmland to the urban residents for planting in the spare time. On weekends and holidays urban citizens can work on the farmland they have rent such as planting vegetables, growing flowers and transplanting rice seedlings etc. while at other times they can entrust the farmland to service providers. In this way tenants can have better and more permanent experience of leisure agriculture.

3 Huge Market Potential of the Experience Leisure Agriculture

3.1 Increase of Leisure Time

With the development of economy, the productivity of human society grows higher and higher along with shortening of work time and more leisure time. The increase of leisure time enables people to have more opportunities to engage in leisure activities. Nowadays, the number of legal holidays together with weekends has already up to 113 days a year, accounting for 1/3 of the total number of days. It has increased significantly compared with previous years. The increase of leisure time enables people to have much more time to do some farm work in person.

3.2 Increase in Urban Residents' Income

With the development of economy and year-on-year increase in urban residents' income, while pursuing a well-off material life people also have the economic capacity to pursue a spiritual life. Generally speaking, the target and hot spots of Chinese residents' consumption has evolved from a type oriented towards means of subsistence solving the problem of food and clothing to one centered on a fairly well-off life for improving the quality of life. Annual disposable income of urban residents of China has been increased from RMB 19.56 thousand in 2002 to RMB 68.2 thousand in 2013; the annual average growth rate was 12 % (Calculate according to the Vendors Database). According to the international practice it means that they have been at the stage with a significant increase of leisure demands. Farm work enters into the vision of urban residents and becomes an important leisure.

3.3 The Leisure Mindset of Urban Residents

Leisure agriculture adapts to interests of Chinese people and from the perspective of Chinese people's traditional gene agricultural civilization has already been imprinted into souls of the Chinese people. There is an old saying in China "food is the paramount necessity of the people". In history, rulers attached much importance to development of agriculture and peasants occupied an extremely high position just second to rulers of the country followed by workers and merchants. A lot of intellectuals were proud of the fact that they were once farmers. The tradition of emphasizing agriculture is passed on until now.

In modern times, it was in the recent half a century that China evolved from an agricultural country to an industrial country. In the process of urbanization, millions

of farmers went to work in the city. Among those farmers, some of them became migrant workers, namely toiling in the fields in busy seasons and working in the city in slack season while others stayed in the city and became professional workers. In 2011, the total rural migrant workers of China is 252.78 million people, part of which have become urban residents [3]. Rapid development of Chinese urbanization together with continuous enlarging of the population scale creates huge market demands for the leisure industry. Urban residents need to go sightseeing in rural areas and enjoy beauty of the Mother Nature so as to release the work pressure, stretch the mind and body and have a wonderful experience.

Many urban residents have once had the experience of living and farming in rural areas. Farming used to be their means to make a living. However, after their life become well-off, farming became a happy and pleasant thing. A farmer can enjoy the pleasure and happiness in the process of watering, fertilizing, pests killing, waiting for fruits and picking. In the mind of many urban residents, they would prefer to return to the countryside to do some farming work in their spare time as a kind of leisure and hobby.

To sum up, people need this kind of leisure by working in the fields, so the experience leisure agriculture has a broad space for market growth.

4 Experience Learning from the Experience Leisure Agriculture in Developed Countries

The development of the experience leisure agriculture can draw reference from the experience of developed countries.

4.1 Leisure Agriculture of Germany

In the latter half of the nineteenth century, Germany formally established the mechanism of citizen gardens for the purpose of providing those citizens with opportunities to experience a rural life and enjoy the pleasure of countryside. The size of each citizen garden was about two hectares which were jointly leased by a group made up of about 50 families. In this way each tenant could have 100 m² or so in which they decided on their own what to do with this land such as growing flowers, grass, vegetables, trees or culturing fish. Tenants could also quit halfway or transfer the land if they did not want to continue the operation, and then management committee of the citizen garden would select a new tenant to take over the lease. This new tenant should undertake those reasonable expenses that the original tenant had invested. Management committee of the citizen garden would not interfere with planting activities of tenants, but it should sell products of the garden uniformly and allocate the income in a reasonable way. At present, the German

citizen gardens are flourishing with the number of tenants over 0.8 million and its gross product taking up one third of the national agricultural gross product.

4.2 Leisure Agriculture of Japan

Japan is an island country with extremely limited land resources, but its leisure agriculture is quite advanced among which the most typical one is a development pattern of leisure agriculture in which tourists can take a part in the farming work. Tourists can do ploughing work and transplant rice seedlings in the spring, catch fish and crabs in the summer, harvest the autumn in the autumn and milk the cow in the winter. Tourists can experience the feeling of agricultural work in different time.

As can be seen from the experience of international leisure agriculture development, experience leisure agriculture can better satisfy experience requirements of tourists with a big development potential and a good development prospect.

5 Suggestions on Improving Development of the Experience Leisure Agriculture in China

Whether it being development requirements of the Chinese leisure agriculture at present or international experience summarized, the following measures should be taken to promote development of an experience leisure agriculture.

5.1 Improve Policies of Leisure Agriculture and Optimize the Policy Environment

Development of an experience leisure agriculture is a gigantic and complex project which requires close coordination and multilateral interaction among consumers, farmers, enterprises and the government which should play a dominant role. The government should formulate reasonable industrial policies and guide development of the leisure agriculture on the basis of research on leisure agriculture. Moreover, the government should also increase investment in public leisure service and invest parts of public leisure services selectively into development of leisure agriculture so as to facilitate development of the experience leisure agriculture.

5.2 Need Offering a Certain Financing Platform

Development of the experience leisure agriculture requires servers to be equipped with substantial technologies of land, capital, management and planting for the selection and usage of tenants. Besides, it should also establish a long term relationship with tenants. All those mentioned above can only be realized with a considerable amount of natural resources and social resources. With an insufficient amount of capital and manpower, it is difficult for the rural areas to support such kind of large scale exploitation. Therefore, development of the leisure agriculture requires substantial urban capital and technology support in all areas so as to change the existing small and scattering situation. A leisure agriculture should be organized, institutionalized and intensive and gather together scattered agricultural resources and agricultural leisure requirements so as to achieve an economy of scale and promote development of the economy.

5.3 Enhance Research on Development of the Leisure Industry

The leisure industry as a sunrise industry still has a huge development space and should develop a professional research team of leisure agriculture as soon as possible. The research department can provide support of theory, technology and method for development of leisure agriculture by relying on research institutions such as universities and colleges and scientific research institutions and government support.

5.4 Improve Qualities of Practitioners

Level of the business entity and servers determine setting of rural tourism products and service quality and is a direct factor influencing the leisure experience. Currently, practitioners of the leisure agriculture know little about service of the experience leisure agriculture and lack experience of relevant planning and exploitation, so it is quite difficult for development of the experience leisure agriculture. In response to this situation, it is quite necessary to train business entity and practitioners of the rural tourism and explain to them relevant knowledge, including the development trend of leisure agriculture and changes in consumers' consumption psychology demands. In this way it can help consumers to change their operation strategies, update the product type and improve the service quality in accordance with the situation.

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Analysis on the Development of China's Commercial Banks' Intermediary Business

Juexia Song

Abstract Under the background of the interest rates market and a more open financial market, the Chinese commercial banks must change the low-level business operation which rely on Interest income and develop the Contribution of the intermediate business. Thus, this paper summarizes the condition of Chinese commercial banks' intermediate business at the present stage. Furthermore, it analyses several problems of Chinese commercial banks' intermediate business and puts forwards the suggestion of improving the competitiveness of commercial bank.

Keywords Commercial bank • Intermediate business • Suggestion

1 Development of Intermediary Business in China's Commercial Banks

1.1 *Business Has Developed Rapidly*

With the rapid evolution of China's economy, infrastructure and urbanization accelerated markedly, improvement in the living standards of urban and rural residents, the blossom of intermediate business of commercial banks have a broader market space. Meanwhile, the adjustment of the government's economic structural and industrial restructuring and upgrading strategy create a favorable policy environment for the development of macroeconomic policies among business [1]. In the environment of deepening financial reformation, accelerating the interest rate market, the increasing in capital adequacy ratio and other regulatory requirements and the influx of foreign banks, competitive pressures from the outside also forced domestic commercial banks to adjust its business structure to adapt to more complex living conditions as soon as possible. The rapid development of modern science and technology will undoubtedly improve the level of intermediary

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business and laid a solid technical foundation [2]. The utility of new equipment, such as online banking, 24-h self-service machines and other multimedia effectively expanded the commercial banks' time and space in providing financial services. To varying degrees, the above factors have contributed to the blossom of China's commercial banks in the field of intermediary business.

Overall, since 2007, the income levels of China's state-owned commercial banks' and joint-stock commercial banks' intermediary business has revealed an upward trend. In the 2009–2011, after the global economic crisis in 2008, the banks' intermediary business developed rapidly. At the same time business income level has been greatly improved, especially joint-stock commercial banks, which has a more powerful growth trend compared with the state-owned commercial banks.

The income constitute of intermediate business has both common business projects and personalized services. Affected by national policies, network distribution, banking history and other factors, the size of intermediate business incomes vary greatly. In 2011, the intermediate business of the state-owned commercial banks had a larger business scale. The three state-owned commercial banks, Industrial and Commercial Bank of China, Construction Bank and Bank of China, whose intermediate business income scale was significantly greater than other banks. And in joint-stock banks, the intermediate business of China Merchants Bank had the largest revenue.

1.2 The Increasing Proportion of Income

In the annual reports from 2007 to 2012 of the seven commercial banks published in 2012, the proportion of intermediary business revenue trends show that intermediate business income ratio fluctuated fiercely among banks [3]. But in 2012, the intermediary business revenue levels were all higher than 2007, especially during 2009 and 2010, the percentage of intermediary business revenue generally grew faster. Affected by the economic crisis in 2008, in the face of adversity, in addition to Minsheng Bank's outstanding performance, the other banks' intermediate business income was essentially flat, even declined compared with last year. In 2012, running into the economic slowdown, the changes of domestic charges regulatory policy and other factors, the contribution to operating income of banks' intermediate business income generally grew slowly, in which China Construction Bank, Industrial Commercial Bank of China, Bank of Communications and China Merchants Bank, the proportion of their intermediate business income declined, which suggests that in recent years, each bank promoted its intermediary business actively, their relative revenue among the operation income has increased compared the ones in 2007.

1.3 Different Trends Among the Various Types of Business

Influenced by environmental factors and fluctuations in domestic and international markets and other macro-policy changes, improving trends among different types of intermediate business have their own characteristics. For example, the downturn in stock market will affect commercial bank agency business, as well as, to match up the development policy of the country's support small and micro businesses, the measures that commercial banks reduce or decrease the small and micro businesses intermediate business charges will affect the guarantees and pledging income. Due to the comprehensive effect of the economic situation and national policy, guarantee and commitment business generally revealed negative growth. In the background of the global economic weak recovery which is due to European debt crisis and slowdown in emerging economies, settlement and clearing business grew tardily.

2 Problems of Intermediate Business of Commercial Bank of Our Country

2.1 The Rational Understanding to Intermediate Business by Public and Banks Needs to Be Improved

The scope of our commercial banks' middle business has far exceeded the settlement, agency, bank cards and other traditional intermediary business, while the developing speed of awareness and acceptance of the intermediate business seems unable to catch up with the one of intermediate business. As the banks themselves, all of them cannot arrange the role that intermediate business plays in the promotion of commercial banks.

With the continuously improvement in wealth of the residents and the level of sustainable development in financial market, personal intermediate business diversely emerge in an endless stream, such as personal internet bank, personal financial planning, personal wealth management and credit card business [4]. But the public still doubts to the safety and reliability. Lacking of the necessary understanding for some of the intermediate business, exclusion and non identity are barriers to the development of intermediate business of commercial banks. In terms of the enterprise, taking the cost, benefit, habits and other factors into account, many domestic enterprises lack of financial awareness and the market demand to consulting management, the weak foundation of the commercial banks in the development of intermediate business is shoot at random.

On commercial banks themselves, Instead failed to take intermediate business income as a new growth point of excess profits and cannot use intermediary business to prevent a risk and to improve competitive differentiation as well, many banks are still accustomed to regard intermediate business as incidental "voluntary labor" to deposits taking and capturing the market share, which exist

behaviors, such as free for customers to open a bank card account, bank cards without annual charge and waiving management fees and service fees when purchasing financial products on behalf of clients. Taking deposits to get profit is the most important source of funding to commercial banking, but whether it is a wise choice to abandon intermediate business income rather than innovate intermediate business types to attract deposits, whether it can help commercial banks to operate better in today's economic environment, whether to adapt to the direction of financial development, it is worth thinking by commercial banks. Not to make a timely response and seek new growth points to the changing environment, they destined to be eliminated. We should also note that the history of Chinese banking gives banks more social responsibility, so that certain practices of banking charges for many savers are unable to understand and accept. Blindly increasing in fee entries of intermediate business will likely worsen customer relationships and lose customer resources. Therefore, as the companies to seek to maximize benefits, commercial banks waiving fees on some intermediate business projects are understandable.

2.2 Lower Efficiency in Intermediate Business Market

Market concentration is an effective indicator to reflect the market structure, which measures the degree of competitive level in the overall market, the higher the concentration of market share is, the stronger the monopoly, and the weaker the competition is, the lower the market efficiency generally. Now, our intermediate businesses market has a high concentration, large monopolies and a weak competitive level. But with the advancement of expanding joint-stock commercial banks and marketing interest rate, joint-stock commercial banks will gradually break the monopoly of state-owned banks in intermediate business market, share the quotient of state-owned bank intermediary business revenue and compete for customer resources. The expanding of competitive degree is in favor of the commercial banks to strengthen their management, improve service quality and actively carry out product innovation, so that it will improve the level of China's financial services and promote economic development entities.

2.3 The Lower Intermediate Business Content

Overall, in recent years, the intermediate business of China's commercial banks experienced many innovations and formed a relatively complete system of intermediate business. However, intermediate business income is still concentrated in the agency business, settlement & clearing services and bank card business. In many banks, guarantees, commitments, derivatives trading and other business carried out less frequently or almost non-existent.

2.4 Unhealthy Way in Intermediary Business Competition

For a long time, China's commercial banks highlighted the phenomenon of irrational competition, many intermediate business products and services were not in accordance with the principle of equal between benefits and costs to charge a reasonable fee, under pricing and under price. The main reasons for this phenomenon are three points. First, due to the market entry barriers and bank deposit and lending rates has not yet completed external influences of market, coupled with the internal factor that under the existing corporate governance, managers to pursue maximizing personal interests and enterprise value maximization is not entirely consistent, when managers face intense competitive pressure, they will package the production in the table with the intermediate business to sell out to decrease the prices of the productions in the table. Second, consumers can not fully understand the variety of information like the level of risk and the pricing principles, there is information asymmetry between banks and customers. Therefore, consumers' willingness to pay for intermediate business declines, resulting in lowing in intermediate business pricing generally. Third, when the above reasons depress prices of products and services, other commercial banks have to follow up in order to maintain market share, which under prices some intermediate products.

3 Measures and Policy Recommendations for Further Development of Intermediate Business by Commercial Banks

Although the intermediary business in China's commercial banks have made great progress in recent years, but still faces many problems and challenges in this area, commercial banks should take positive measures to further promote the development of intermediary business, grasp the transition opportunity and take the overall developing ideas of intermediate business to better combine it with assets business and liability business and continuously improve the competition of banks.

3.1 Clearly Positioning and Implementing Product Differentiation Strategy

Because of their differences in history, geography and culture, commercial banks have their own characteristics, so that they should be fully aware of their situation, detailed investigate the market environment, overall consider the strength of their own business and marketing conditions, plan the development of intermediary business and improve product system of commercial banks. They would have the

deep-level development in a particular area and utilize professional manner, such as market segmentation and SWOT analysis to accurately position the products, create their personalized products and services and make their own “signature dishes”.

3.2 Consolidating the Traditional Intermediary Business, Exploring Intermediate Business for New Market Demand

First, the emphasis on innovation does not mean the negation and abandoning of the traditional intermediary business. Commercial banks business should not only play a low-risk, low cost, good stability strengths to further consolidate the traditional intermediary business, especially the intermediary and service business that carried out for many years, optimize service quality and improve business efficiency, but also bring intermediate business’ strong profitability and the wide field into full play. Secondly, the development is inseparable from the support of new banking products, new services and new channels.

3.3 The Innovation of Marketing, Take the Initiative to Open Up the Market

Having a marketable product does not represent a huge competitive customer resources, it may not be able to get substantial profits. Faced with the era of information explosive growth, a proper marketing to build a high tower for the innovation of new products to stand out seems to be more important. Commercial banks need to take the initiative to open up the market, promote the concept of progress and expand the demanding space with production. Meanwhile, with a wide and miscellaneous range of intermediate business, commercial banks need to set up a direct-to-market specialized marketing services team to improve marketing capabilities & professional service capabilities, establish a good image and reputation of banks, cultivate customers’ recognition for banking products and promote the commercial banks’ transition from the financial intermediaries to the intermediaries for financial services.

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Part VII
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A Forecasting Model Based on Time-Varying Probability Density

Wentao Gu and Jian He

Abstract It is of a great interest in literature to forecast the direction of stock returns, which is to some extent predictable. In this paper, we consider a new directional forecasting model which is based on applying and extending the time-varying probability density function theory proposed by Harvey and Oryshchenko (Int J Forecast 1(28):3–14, 2012). The empirical work in Chinese stock market shows that our forecasting benchmark model has statistically and economically significant out-of-sample prediction ability on directional forecast.

Keywords Dynamic kernel density estimation • Time-varying • Direction of stock returns • Action threshold

1 Introduction

It is now widely believed that the direction of stock returns or other financial asset returns is predictable to some extent, whereas the level is not (see [1–4]). This may be because the noise of the observed returns is too high to predict the overall return accurately. Rather than considering the overall conditional mean returns, Leitch and Tanner [5] found that the direction of the change is the best criterion for predictability when investors are seeking to maximize profit in the financial market. Merton [6]’s market timing model held the view that the mutual fund managers focused more on the sign of return rather than the overall return. The direction predicting thus became quite attractive for financial market investors; besides, it is also crucial for asset allocation decisions and risk management.

In this paper, we introduce a new nonparametric model for forecasting the direction of stock returns based on applying and extending the time-varying probability density function theory which is primarily proposed by Harvey and

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Oryshchenko [7]. To the best of our knowledge, this kind of approach has not previously been applied to forecasting stock return signs.

We apply our forecasting benchmark model empirically to the main stock price indices (Shanghai Composite Index) in China for the period January 2000 to November 2012. The results show that the benchmark model has statistically significant out-of-sample predictive ability of the directions of stock returns. In addition, the trading strategy made by benchmark model receives a much higher investment returns than the buy-and-hold trading strategy while undertaking a lower risk, which verifies that our model is also economically significant.

The remainder of this paper is organized as follows. In Sect. 2, we describe our theoretical forecasting model. The evaluation methodology for directional forecasting performance is introduced in Sect. 3. Section 4 reports the empirical results. Finally, Sect. 5 conclude the article.

2 Model Framework

One of the most prevalent time series processing schemes takes the form of an exponentially weighted moving average (EWMA). The EMWA estimator m_t of the level at time t could be written as

$$m_t = \sum_{i=0}^{t-1} x_{t-i} w_{t,i}, \quad t = 1, \dots, T \quad (1)$$

where $w_{t,i}$ are weights, and x_i are observations. Harvey and Oryshchenko [7] introduce this weighting scheme into the kernel estimator of probability density function (PDF). Thus the dynamic kernel estimator of the PDF for a sample of observations y_1, \dots, y_T is given by

$$\hat{f}_t(y) = \frac{1}{h} \sum_{i=1}^t K\left(\frac{y - y_i}{h}\right) w_{t,i}, \quad t = 1, \dots, T \quad (2)$$

for the cumulative distribution function (CDF),

$$\hat{F}_t(y) = \sum_{i=1}^t H\left(\frac{y - y_i}{h}\right) w_{t,i}, \quad t = 1, \dots, T \quad (3)$$

where $K(\cdot)$ is the kernel, $H(\cdot)$ is the kernel which now takes the form of a CDF, and h is the bandwidth.

We can make recursion forms for both CDF and PDF as,

$$\hat{F}_{t+1|t}(y) = \omega \hat{F}_{t|t-1}(y) + (1 - \omega) H\left(\frac{y - y_t}{h}\right), \quad t = 1, \dots, T \quad (4)$$

$$\hat{f}_{t+1|t}(y) = \omega \hat{f}_{t|t-1}(y) + (1 - \omega) \frac{1}{h} K\left(\frac{y - y_t}{h}\right), \quad t = 1, \dots, T \quad (5)$$

where $\hat{F}_{t+1|t}(y)$ and $\hat{f}_{t+1|t}(y)$ refer to the predicted distribution function at time $t+1$ based on information set Ω_t . According to Eqs. (4) and (5), we can forecast the CDF and PDF in next period at time t .

When $y_t > 0$, we call the realized direction of return positive, and denoted by $I_t = 1$; if $y_t \leq 0$, we call the realized direction of return negative, and denoted by $I_t = -1$. With the forecasted CDF, we can calculate the forecast probability of a positive return,

$$P = \Pr ob(y_{t+1} > 0) = 1 - \hat{F}_{t+1|t}(0) \quad (6)$$

Accordingly, the forecast probability of a negative return in next period is

$$P^d = \Pr ob(y_{t+1} \leq 0) = \hat{F}_{t+1|t}(0) \quad (7)$$

Here, the superscript d indicates a negative direction. Obviously, $0 \leq P, P^d \leq 1$ and $P + P^d = 1$.

The unknown parameters, decay factor ω and bandwidth h , in our forecasting benchmark model are estimated by maximum likelihood. The log-likelihood function, normalized by the sample size, is

$$\begin{aligned} l(\omega, h) &= \frac{1}{T - m} \sum_{t=m}^{T-1} \ln \hat{f}_{t+1|t}(y_{t+1}) \\ &= \frac{1}{T - m} \sum_{t=m}^{T-1} \ln \left[\frac{1}{h} \sum_{i=1}^t K\left(\frac{y_{t+1} - y_i}{h}\right) w_{t,i}(\omega) \right] \end{aligned} \quad (8)$$

where m is some preset number of observations used to initialize the procedure and $K(\cdot)$ is, for example, the Epanechnikov or Gaussian kernel. Harvey and Oryshchenko [7] pointed out the value of m depends on the size of the sample. In this paper, after considering the sample size and other specific circumstances, we set $m = 50$ and employ Gaussian kernel in the log-likelihood function.

3 Evaluation for Directional Forecasting Performance

3.1 The Rolling Window and Statistics

Suppose we have a sample of observations, $y_1, \dots, y_T, y_{T+1}, \dots, y_{T+N}$, then we divide it into two sub-samples: training sample and forecasting sample. The training sample is y_1, \dots, y_T and the forecasting sample is y_{T+1}, \dots, y_{T+N} .

The primary results of our model are the forecast probability of a positive return in Eq. (6). Then it is desirable to specify a threshold value that translates the probability forecasts into directional forecasting signals. We call this threshold value as action threshold, and is denoted by L . Let P_i be the forecast probability of a positive return at time $T + i$, we predict that the direction of return in next period is positive if $P_i > L$, and is denoted by $I_i^f = 1$; conversely we predict that the direction of return in next period is negative if $P_i \leq L$, and is denoted by $I_i^f = -1$. That is

$$I_i^f = \begin{cases} 1, & \text{if } P_i > L \\ -1, & \text{if } P_i \leq L \end{cases}, \quad i = 1, \dots, N \tag{11}$$

here, the superscript f indicates a forecast. In addition, we also have the realized value of return directional indicator

$$I_i = \begin{cases} 1, & \text{if } y_{T+i} > 0 \\ -1, & \text{if } y_{T+i} \leq 0 \end{cases}, \quad i = 1, \dots, N \tag{12}$$

If $I_i^f = I_i$, the true directions and the forecasts of the return directions match successfully. We show keen interests in the percentage of success ‘‘matches’’. This correct prediction ratio is denoted by CR . According to the hypothesis of no predictability in return directions, the estimated value of CR does not differ statistically significantly from 0.50. The computational procedure can be described as follows:

$$CR = \frac{\widehat{I}^{uu} + \widehat{I}^{dd}}{\widehat{I}^{uu} + \widehat{I}^{ud} + \widehat{I}^{du} + \widehat{I}^{dd}} \tag{13}$$

Where

$$\begin{cases} \widehat{I}^{uu} = \sum_{i=1}^N 1(I_i^f = 1, I_i = 1), & \widehat{I}^{ud} = \sum_{i=1}^N 1(I_i^f = 1, I_i = -1) \\ \widehat{I}^{du} = \sum_{i=1}^N 1(I_i^f = -1, I_i = 1), & \widehat{I}^{dd} = \sum_{i=1}^N 1(I_i^f = -1, I_i = -1) \end{cases} \tag{14}$$

In addition, we define the correct prediction ratio of positive directions by CR^u and negative directions by CR^d .

3.2 Economical Test: Trading Strategy

For investors, the most important model evaluation criterion is the return on their investment. There are many trading strategies can be applied with our model. In the

empirical work of this paper, a very simple trading strategy simulation is used. Suppose we make an asset allocation decision between stocks and cash. At the beginning of each period, we make a choice to hold stocks or cash. Then, if $I_i^f = 1$, i.e. $P_i > L$, we shift all cash into stocks or continue to hold stocks; and we sell all stocks or continue to hold cash when $I_i^f = -1$, i.e. $P_i \leq L$.

The value of action threshold L plays a very important role in our trading strategy. Generally speaking, L satisfies $0.5 \leq L < 1$, and as L increases, the correct prediction ratio of positive signs, CR^u , raises too, which means the speculative risk decreases.

4 Empirical Results

The sample data in this study is comprised of the weekly stock close price of Shanghai Composite Index sourced from CSMAR database. All sample prices are converted into weekly return series, i.e. $y_t = 100 \times \ln(\text{Price}_t/\text{Price}_{t-1})$ for $i = 1, \dots, T + N$, where y_t is the return at time t , Price_t is the current price, and Price_{t-1} is the price of previous period. Our sample data cover the period from 2nd January 2000 to 30th November 2012, which corresponds to 646 weeks. We divide it into two subsamples, the first one is from 3rd January 2000 to 30th January 2004, which is treated as training samples, i.e. $T = 200$; The second one is from 31st January 2004 to 30th November 2012, which is treated as forecasting sample, i.e. $N = 446$.

Table 1 reports the statistical directional forecasting performance in out-of-sample forecasting. According to Table 1, two important points can be drawn.

Firstly, with different value of action threshold L in our forecasting benchmark model, CR , CR^u and CR^d are all significantly higher than 0.5, so we demonstrate that our forecasting benchmark model has a statistically significant predictive power for the direction of returns.

Secondly, as L increases, CR^u increases. However the increasing of CR^u is accompanied by the decreasing of CR^d . While L is too high, it means we only trade for a very high P . As a result, we do not invest stock in most of the time.

Table 1 Statistical directional forecasting performance: Shanghai index

	CR	CR^u	CR^d
<i>Raw conditional probability: P</i>			
L = 0.500	0.588	0.613	0.563
L = 0.525	0.593	0.644	0.558
L = 0.550	0.588	0.664	0.548
L = 0.575	0.591	0.695	0.547
L = 0.600	0.591	0.717	0.545
L = 0.625	0.568	0.703	0.528

Table 2 Trading strategy performance: Shanghai index

	Mean (%)	SR	LP	SP	NT	R (%)	Rc (%)
<i>Raw conditional probability: P</i>							
B&H	0.119	0.017	396	0	2	6.222	6.220
L = 0.500	0.358	0.117	199	197	31	18.687	18.667
L = 0.525	0.359	0.121	163	233	27	18.697	18.679
L = 0.550	0.294	0.102	137	259	23	15.334	15.319
L = 0.575	0.306	0.111	118	278	13	15.964	15.956
L = 0.600	0.337	0.133	106	290	11	17.580	17.572
L = 0.625	0.299	0.120	91	305	17	15.611	15.600

Notes: Mean is mean weekly return, SR is Sharpe ratio, LP is periods of long position, SP is periods of short position, NT is number of trades, R is annualized return without transaction costs and Rc is annualized return with transaction costs. B&H is the buy-and-hold trading strategy

Now we consider the trading strategies based on the forecasting benchmark model. We employ mean weekly return, Sharpe ratio, periods of long position, periods of short position, number of trades, annualized return without transaction costs and annualized return with transaction costs as our evaluation criterion on trading strategies. The buy-and-hold trading strategy is used for comparison.

Table 2 reports the trading strategy performance. It is clear that trading strategies based on the forecasting benchmark model offers a substantial improvement over the buy-and-hold strategy across measures like annualized return, Sharpe ratio and so on. For example, mean weekly returns vary from 0.294 to 0.359 %, while for buy-and-hold strategy, mean weekly return is 0.119 %.

5 Conclusion

In this paper, we examine the predictive ability of a new forecasting model in predicting the direction of stock returns. This forecasting model is based on applying and extending the time-varying probability density function theory. We apply our forecasting benchmark model to the main stock price indices (Shanghai Composite Index) in China. The empirical results show that our forecasting model has statistically significant out-of-sample directional predictive ability of stock returns. A simple trading strategy based on our methodology can yield a much higher investment returns than the buy-and-hold trading strategy while undertaking a lower risk.

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Review of the Studies on Banking Industrial Organization Security

Jinjie Zhao

Abstract First, this paper reviews the studies on the industrial organization theory and the research status of banking at home and abroad. Then it reviews the current research status of the theory of industrial organization security. At last, from above review, it makes a point that it's very necessary to make a systematic and in-depth study on banking industrial organization security, including the connotation, the influencing factors, the evaluation system and early warning system of banking industrial organization security.

Keywords Banking industry • Industrial organization security • Market structure

1 Introduction

China's banking industrial organization face more and more problems, and it's likely to endanger the safety of China's banking industry. Such as, compared with foreign banks, the domestic banks have the lower level of risk management and operational efficiency, the domestic banks must face the challenges come from foreign banks, the shadow banking maybe causes risk to China's banking industry, and so on. These problems can be attributed to the issue of banking industry organization security.

This paper sorts out the general theory and research status of banking industrial organization, for the purpose to lay the theoretical foundation for further research on the banking industry organization security.

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2 Review of Banking Industrial Organization Theory and Research Status

2.1 Foreign Research Status

Due to the importance of banking industry in national economy, the western scholars applied the industrial organization theory to the process of researching on the banking industrial organization structure, to develop an independent study system. There are two types of research mode, one is the structure mode which based on traditional industrial organization theory of Harvard School Economics and Chicago School Economics, another one is the non-structure mode which based on game theory, new institutional economics, and mathematical economics model.

The structure mode, according to the different explanation of the relationship between the structure and performance, is divided into two categories, as shown in Table 1.

SCP hypothesis is the SCP analysis framework using in the banking industry. The theoretical implication is that in the higher concentration of market, the easier to produce collusion between banks, as a result, banks can be obtain excess profits by collusion [1]. They advised to use antitrust policy to make the concentration lower, reduce the monopoly rent and improve the efficiency of bank [2].

The relative market power hypothesis considers that only the banks which have larger market share and higher product difference degree, have the power to set the price of product, and obtain excess profits [3].

Easy life hypothesis argues that companies with high market power could profit through non-competitive pricing, managers do not have to work hard to maximize business efficiency. Therefore the relationship between market power and efficiency is a negative correlation [4].

Smirlock (1985) who first to apply efficient structure hypothesis in the study of banking sector, the results showed that the United States banking sector from 1973 to 1978 supported efficient structure hypothesis [1].

X efficiency refers to the efficiency of the management level, the bank cost lower and earn more when who has higher management level of production technology [1]. According to scale efficiency structure hypothesis, different profitability between enterprises is not caused by differences in the levels of management, but by the difference of enterprise scale efficiency [5].

Table 1 Structure mode

Structure mode	Market power hypothesis	SCP hypothesis
		Relative market power hypothesis
Easy life hypothesis		
	Efficient structure hypothesis	X efficient structure hypothesis
		Scale efficiency structure hypothesis

Compared with the structure mode, the study on non-structured mode is relatively scattered. McKinnon (1973) first proposed the “Theory of Financial Repression”, referred to administrative intervention made the bank inefficiency [6]. And Stiglitz et al. proposed the “Theory of Financial Restraint”, referred to the government through making a series of financial policy, could avoid the potential adverse selection behavior and moral hazard, encourage innovation, maintaining financial stability. Berger, Demirguc-Kunt et al. (2004) using the data of 1,400 Banks in 72 countries, proved that under the condition of controlling other variables, bank regulation had significant influence on banks’ earning [7].

2.2 Domestic Research Status

The domestic scholars studied on banking industrial organization problems mainly focus on the characteristics of China’s banking market structure, market concentration effect on the performance of banks, foreign banks entering and shadow banking influence of China’s banking industry.

The domestic studies of banking industrial organization began in the mid of 1990s. Most of the early literatures of banking industrial organization were investigate the bank market structure type, such as Xue (2010) etc. scholars generally agreed that China’s banking market structure concentration was higher, between monopolistic competition and oligopoly market [8]. Zhao et al. (2005) derived H statistic by the Panzar – Rosse model to test the degree of bank competition in China, showed that the bank of China basically had the characteristics of the monopoly competitive market structure [9].

The research on the performance of China’s banks are divided into two parts, one part using frontier analysis methods and regression methods to study bank efficiency, such as [10]. The other part is the validation of foreign theory and models, such as Qin and Ouyang (2001), the results showed that in the Chinese banking market, the relative market power hypothesis, and efficient structure hypothesis were not established [11]. Liu and Huang (2003) etc, questioned the applicability of the standard of industrial organization theory in China’s banking [12]. But there are also some scholars hold the opposite view, such as Gao (2010), his research results supported the SCP hypothesis [13].

Since China joined into WTO, the scholars began to study foreign capital and foreign capital bank’s influence on the banking of China, such as [14–16] had studied the impact of the performance in China’s banking industry by foreign investment. The results showed that with the constant improvement of domestic law and regulations, foreign banks entry had a significant role in promoting the domestic bank’s performance. But when facing the exogenous shocks, financial excesses open maybe let domestic banking into giant systemic risk by foreign banks “contagion effect”.

Shadow banking is a new problem after the international financial crisis in 2008. The Chinese Academy of Social Sciences recently released China Financial

Supervision and Regulation Report 2013, believed that China's financial security is facing the "shadow banking" and other security problems. In June of this year, Fitch Ratings had also declared that the "shadow banking" will give more and more high risk to Chinese financial stability. In order to solve this issue, emerged a large number of research literature after 2008, the main research direction is the definition of shadow banking, analyze the influence of the banking system, and how to regulation the shadow banking.

3 Review of Banking Industrial Organization Security Theory

The industrial organization security has not been researched by foreign scholar, and the theory has just started to be researched in the domestic. Li (2013) is the first one that constructing the theory system of industrial security, in his academic monograph of *Research on Industrial Security Theory*, first on the basis of the relevant concepts defined, he pointed out the industrial organization security should be known from three aspects. First of all, the industrial organization security services and subjects to the overall strategy of the national economic security needs. Second, Industrial organization security refers to the status of continuous industrial growth and effective competition of intra-industry enterprises in a country or region. Third, Industrial organization security refers to the intra-industry enterprises are organizational in order, and no individual enterprise control is too large and cause the excessive concentration of industry. He thinks the factors influencing industrial organization security are market concentration, economic characteristics of industry scale, administrative barriers of host country's government, and tactical conducts of transnational companies. The measures maintaining industrial organization security include encouraging different forms of competition and optimizing market structure, implementing core enterprise strategy and building domestic enterprise brand, appropriately maintaining administrative barriers, reducing the possibility of transnational companies' practicing tactical conducts [17].

Specially for banking industrial organization security issues' literature is rare, comparison of similar research only that Ye and Lian (2012) analyzed the banking industrial security in Hebei province [18], and Wang (2013) brief described the foreign banks' market control and other financial institutions' competition relations how to effect the banking industrial security in his doctoral thesis *Studies on Chinese Bank Industrial Security* [19].

4 Summary and Future Research Prospects

From above literature review we can see, although the domestic and foreign research achievements on the industrial structure of banking industry are rich, but on the one hand, because of the national conditions at home and abroad are

different, foreign mature theory can't be copied to make a study on the domestic industry, there is still much research space in the area of China's banking industrial organization and structure problems according to China's national conditions. On the other hand, most of the domestic existing literature studied on the China's banking development from one of the characteristics or elements which influence the bank industrial organization and the efficiency of bank, but there is no literature that systematic studies the banking industrial organization of our country, nor the research on China's banking industrial organization security problem from the angle of industrial organization security theory. So, the author thinks it's very necessary to make a systematic and in-depth study on banking industrial organization security, including the connotation of banking industrial organization security, the influencing factors on banking industrial organization security, the evaluation system and early warning system of banking industrial organization security.

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Chinese Mortgage Securitization Risks and Prevention Measures

Congcong Guo

Abstract Mortgage securitization is an entry point for the development of housing and financing in Mainland China. As a financial instrument, Mortgage-backed security is a combination of risks and returns as well as other financial tools. This article analyses the main risks arising from the departure of the participating subjects, analyses risk causes, combined with China's specific situation and puts forward relevant prevention measures, providing protection for the smooth development of China's mortgage securities.

Keywords Mortgage-backed securities • Subprime mortgage crisis • Risk prevention

1 Introduction

Mortgage securitization is a financing process; Financial institutions (mainly commercial banks) set up the illiquid mortgage they held but with future cash flow of income for the mortgage loan, restructured to become a group. It is acquired by securitization institutions in cash, and then afterwards the guarantee or credit enhancement (in the form of securities) is sold to investors [1].

Mortgage securitization process has five basic parts of the operation. First, formation of asset pool. Second, establishment of SPV (Special Purpose Vehicle). Third, credit enhancement and credit rating. Fourth, the issuing of securities. Fifth, the reimbursement. Promoters sell mortgage loans which are able to generate stable cash flow to the SPV. The SPV then use these mortgages financing to support issuance of securities in the financial markets. Finally, the cash flow generated by the asset pool to settle the securities issued.

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2 The Meaning and Origin of Mortgage Securitization Exposures

2.1 Credit Risk

Credit risk also known as default risk. It refers to the borrower' of individual housing mortgage loans default loan principal and interest due to lack of repayment ability or repayment reduction [2]. It includes the risk of the borrower not paying or not paying on time. Information asymmetry resulted from the borrowers deliberately concealing the true information or major changes occurring in the borrower's repayment period; health, marital status, income, etc. will lead to a deterioration in the borrower creditworthiness, and may finally lead to a credit risk.

2.2 Risks from Originating Bank

Currently, the mortgage is the relatively high-quality assets of each bank. In order to gain more market share, some commercial banks reduce grass lending standards which reducing the review steps, seriously affecting the safety of the banking assets. Due to lower lending standards, the quality of the mortgage is difficult to guarantee. Mortgage securitization is a mortgage-based assets, the quality of which directly affects the size of the housing mortgage loan securitization exposures, thereby affecting the smooth progression of the entire securitization process.

2.3 Risks from Third Parties

Risk from third parties mainly refers to the credit risk of credit rating agencies and credit enhancement institutions. Their level of integrity and quality of service are directly related to whether securities investors get repaid on time. Take the rating the company as an example; the domestic rating agency is still in the early stages of development. It lacks a unified industry standard scientific management system, does not have all the professional ability to assess risk, so it is difficult to provide a more scientific, comprehensive asset-backed securities rating services. These problems led to the available rating results made by rating agencies lacking in sufficient influence of investors

2.4 Technical Risk

Mortgage securitization is a very comprehensive financing business which is an extremely meticulous technical specialization project, and its management

requires continuous collection of information, statistical analysis and economic forecasts. However the mortgage market which has a short history in our country is still at a very small scale. It lacks a large number of high-quality modern finance, accounting, law, management, computer knowledge and practical experience of professionals, lacking basic data and information, besides the loan agreement not yet having a realized standardization. These factors have caused the technical risks of mortgage securitization implementation to exist [3].

2.5 Interest Rate Risk

Interest rate risk is also known as market risk. This risk is one of the main risks investors in the securitization market face. From the perspective of investors of securities: interest rate risk is the risk of changes in the price of securities subject to fluctuations in interest rates caused by reverse occurrences. Although China's interest rates are not fully market-oriented, China is now increasingly using monetary policies for macroeconomic regulation. Fluctuations in mortgage rates will have a direct impact on the price of the asset-backed securities.

3 China Housing Mortgage Loan Securitization Risk Prevention Measures

3.1 Credit Risk Prevention

The credit risk early warning system is to consider the borrower's production and business process changes or factors which have been faced, analyze a number of the most relevant factors and the borrower's credit capacity, track changes in the study of these factors, and promptly issued a risk warning signal. The single customer warning system can consider internal and external variables factors. First, if commercial banks can identify those customers when a problem in their financial position appears before it has become serious, they can take effective measures for monitoring and management, which can greatly reduce the risk of bank loans. Second, looking at the external variables; commercial banks need to judge major shareholders and competitors and then do dynamic tracking and comprehensive judgment; the purpose of which is to identify potential risks that may adversely affect the borrower's assets safety.

3.2 Originating Bank Risk Prevention

From the lessons learnt from the U.S. subprime crisis, easy credit audits are particularly easy to breed risks. It is an important cause of the sharp increase in loan delinquencies and the crisis itself. Banks and credit officers need to further strengthen the notion of responsibility to ensure the borrower has sufficient ability to repay the loan. Accountability mechanisms can be introduced. When we find application materials are untrue, we will hold the credit officers accountable. At the same time, we must put an end to the occurrences of the “zero down payments” method of payment. China’s real estate market continued to go on in recent years, despite there being some bubbles, especially in China’s recent efforts to strengthen regulation and control of real estate.

3.3 Third-Party Risk Prevention

For credit rating agencies, first, we should develop the rating agencies and improve rating technology. China should vigorously develop authoritative rating agency, improve technology and continuously improvement rating business capabilities. Second, we should maintain the independence of the rating agencies, improve information transparency. At this stage, China can learn from the U.S. domestic “dual rating” system to promote healthy competition among rating agencies, improve the transparency of information [4]. For credit enhancement mechanism; China should first gradually establish specialization and divide the labor market position. Second, China should improve risk management techniques, establish a sound financial guarantees project evaluation, and establish monitoring and processing mechanisms. Third, China should strengthen capital management of guarantee agencies.

3.4 Technical Risk Prevention

At present, China has very few professionals, and apparently lacks cross-industry knowledge, thus limiting the industry practitioners to understanding of MBS and the maturity of investor groups. China should learn more from development experiences and learn from the United States, in accordance with international practices and in line with international standards, while implementing consistent with China’s actual MBS situation. In the short term, China may consider the introduction of experts with rich theoretical knowledge and practical experience from developed countries and regions, These experts can increase technical training of existing employees and college graduates, train a number of familiar securitization business operations ability to meet international standards as soon as possible.

3.5 Interest Rate Risk Prevention

Interest rate risk can be circumvented through the use of financial derivatives. First, we can operate in the financial derivatives market to achieve spread income, so as to be able to realize the transfer of risk. Second, build the interest rate market; we should build a true market-oriented government bond market, and promote market-oriented interest rates. This includes the development a large number of rational and sophisticated investors, increasing treasury bonds and diversification of bonds species. Third, diversification of the loan interest rate adjustment period. By redesigning the interest rate adjustment period, form different risk assessment structures between borrowers and lenders, and match different risks associated with different risk preferences.

4 Conclusion

This article analyzes the reasons for the risks which already exist and may occur in China's commercial banks mortgage securitization Such as credit risk、 the risk from originating banks, technical risk, interest rate risk and risk from third parties. Meanwhile, it learns from the lessons of the U.S. subprime crisis, and then proposes various risk measures. These measures provide a strong guarantee to China's housing mortgage securitization development.

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The Personal Income Tax System Status and Reform in China

Jiamei Xing

Abstract In 2011, the cost of the personal income tax deduction and tax class times of personal income tax law have been adjusted, but this is only the start of the tax reform, most of China's personal income tax systems are not perfect, and they need further reformed. This paper introduces the conception and functions of the personal income tax, and point out the shortcomings of the current personal income tax system, drawing the tax system of United States and Japan, it puts forward reasonable proposals to promote the reform of the tax system.

Keywords Personal income tax • Current situation • Reform

1 Introduction

Personal income tax is one of the main taxes what is closely related with people's lives, and plays an important role in the tax system.

Although, compared with the beginning of the establishment of the personal income tax, the current personal income tax system has made great progress, it is still lower than then universal standard and only occupying lower percentages in all the tax. Consecutive years of the "two sessions", the deputies have raised the proposal to modify the personal income tax exemption amount. September 2011, the 3,500 yuan exemption amount has finally replaced the \$2,000 standard. In fact, the existing problems in China's personal income tax system are not only in the exemption amount and even tax system and tax rate. We should accelerate the perfecting of the personal income tax. Personal income tax reform has become an important and realistic issue.

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2 Current Situation of Personal Income Tax in China

2.1 The Conception of Personal Income Tax

Personal income tax is the general term for the legal norms of adjusted the social relations what is happening in the process of the management of personal income tax levied between the tax authorities and natural persons (residents and non-residents). Essentially, the main purpose of the levy is to reduce personal income gap between rich and poor, balanced social income [1]. At present, the levy pattern of our country's personal income tax system is classification collection method. The tax rate applicable to the resulting are different, some implementing a progressive tax rates, and some practice proportional tax rate, which the tax forms are more complicated, and the tax burdens are more different.

2.2 The Development of Personal Income Tax in China

In 1993 China began to carry out personal income tax reform, combined some taxes as a unified personal income tax, and implemented classification levied mode. However, with the continuous development of diversified personal income and the widening wealth gap in personal income, the contradictions and problems exposed can't be ignored in practice, such as classification imposed mode, rate design, expense deduction standard settings has been increasingly unable to meet real needs. October 27, 2005, the Tenth NPC Standing Committee 18th Meeting, "the draft amendment to the Individual Income Tax Law" Once again, the NPC Standing Committee meeting voted to adopt a decision on the amendments to the personal income tax law, in January 2006 implemented from the 1st exemption amount 1600 yuan. December 29, 2007, the Tenth National People's Congress thirty-first meeting voted to adopt a decision on the revision of the personal income tax law. Personal income tax threshold changed from 1,600 yuan to 2,000 yuan on March 1, 2008. 2011 NPC Standing Committee adopted a decision on the amendments to vote on the personal income tax law, the tax threshold raised to 3,500 and simplify the progressive tax wage income for the nine seven progressive tax [2].

3 The Problems of Personal Income Tax

Organization and regulation of income distribution revenue are the two basic functions of the personal income tax, but the income gap continues to increase, the disparity is getting worse in reality, China's current personal income tax effect of adjusting personal income hardly let people satisfied.

3.1 Unfair of the Tax System Mode

In the early days of the establishment of personal income tax, the source of income is single and the income is generally low. As a result, China has taken the classified income tax law. Currently, the economic globalization driven the economy continues to develop, diversify income also improve the income, so that the current personal income tax system increasingly exposed more functional defects. The current classification of the income tax system, has no different between the income levels or regions, and the threshold is relatively low, deductive range is also not perfect, thus it does not reflect the reasonable tax payment in the perspective of personal total income taxes, it is also difficult regulating the income, preventing the effects of polarization [3].

3.2 Inadequate Way to Pay Personal Income Tax

For actual situation, there are two kinds of the personal income tax paid. The first one is the initiative to declare; the second is the source of withholding. However, both methods have serious shortage and bad effects of working-class, from hierarchy to pay a tax point of view, the weak wage earners are the important payer. Specifically, our tax system only play a regulatory role to low-income wage earners, but a little effect of the people who have more hidden income, income of the working-class is more relatively fixed and simple, the account taking into tax is more clear; while high-income people who received diversified, tacit, difficult to calculate the total income, and they possess of more social resource, the fixed wage that in the scope of the tax just a small part of their total income, because it is difficult to monitor their regulators additional income, coupled with the lack of obligation to pay taxes, resulting in high-income people who make tax evasion of violations, and even power “rent-seeking” and so on. As the imperfections of the reporting system, high-income individuals conceal their big department revenues for their own interests, making the value of self-reporting and withholding authenticity is not guaranteed.

4 The Reform Solutions of Personal Income Tax in China

To solve these problems, we should learn from the advanced experience of foreign personal income tax system, on this basis, to establish a comprehensive income tax system in line with China’s national conditions.

4.1 Experience of Foreign Personal Income Tax

In many foreign countries personal income tax has become one of the main taxes. United States, France, Germany and other countries implement personal income tax in family unit, while Japan, Britain and other countries in individual units. It selects two unique representatives: the United States and Japan, to analyze their advanced experience of collection and management in different tax payer, to reform our Family Division taxation has a certain reference [4].

After nearly a century of adjustment and optimization, the United States personal income tax has become a more just and perfect collection system, there is much we can learn from the experience. US federal personal income tax system is a comprehensive income tax system after the deduction of expenses, the concept of it is “earned money should pay taxes”. Comprehensive Income tax system is better than the classification income tax system, because it can guarantee the minimum living guarantee for low-income levels, and will not affect the fairness of the tax allocation. Therefore, more and more countries turn to a comprehensive income tax system.

Japan imposed a personal income tax model that combines comprehensive and classified, withheld at source and self-declaration effectively combined to achieve a fair tax system and efficiency collection. The biggest difference between this system and comprehensive income tax system of the United States is that at first, a certain percentage of the classification of income tax levied according to the specific taxpayer’s income, then consolidated taxpayers as a whole, if it reaches a certain taxable amount of the standard, the use of a unified progressive tax rate comprehensive income, net of classification tax that had been paid before, personal income tax system in Japan has very extensive experience in the design and administration areas, which our reform of tax in a unit of family income tax system has certain reference.

4.2 Reform Proposals in Line with China’s National Conditions

Because of our unique country situation, foreign experience is not entirely applicable, we should establish a comprehensive tax system in line with China’s national conditions.

4.2.1 Not Declare the Personal Income Tax as a Family Unit

After the establishment of a comprehensive income tax system, the general opinion is to be like the United States, the implementation of the family unit of the personal income tax reporting. However, the family unit is not suitable for China’s national

conditions reporting [5]. First, we have a large population, and complex family structure. Second, although the implementation of part of the work of individual income tax returns since 2005, also accumulated some experience, but on the family unit declaration of personal income tax has no experience. Third, currently China does not encourage “full-time wife”. So if the family not as a unit of personal income tax, how to solve the situation when the family has the elderly and children? To solve this problem we can through a personal income tax deduction worth transferring.

4.2.2 Establish a Tax Deduction System

After the establishment of a comprehensive income tax system we should have a good tax deduction system, otherwise the implementation of comprehensive income does not make sense. Accounting tax deductions shall be deducted according to family structure and personal consumption of different individuals.

The first is the value of the deductible on an individual basis, our current exemption amount 3,500 yuan, converted into income of 42,000 yuan per year. Home raising children give some deductions, but not in violation of family planning. The family lived together with elderly to give some deductions, but only 50 % when living apart to elderly to show their family pension. For the cost of public transport, children’s entertainment expenses, etc. according to the actual cost of the deductible, but the establishment of the maximum deductible amount. As for education, donations are not set up on-line, calculated according to the actual cost of the deductible amount. The health care and health insurance deductible can be directly linked to the account, the actual cost of the deductible by individuals.

5 Conclusion

According to studies, although the reform of personal income tax system in our country still has many problems, however, a comprehensive personal income tax system has its feasibility and necessity, and it has extremely important practical significance. Family Division of the typical areas of tax reform can select pilot reform, to be perfect, so as to promote down. In the personal income tax system reform, our country can learn from the advanced experience of foreign countries, combined with China’s national conditions to promote the development of China’s personal income tax system.

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Research on Credit Risk Management Issue of Commercial Banks in China

Lixia Cao

Abstract Recent years, with the blooming economical globalization, great changes in financial theory and practice bring about opportunities as well as challenges for banking industry, result in the rising severe credit risk for banking industry. This essay starts to illustrate from the concept and features of credit risk, analyzing various issues exist in credit risk management of commercial banks in China, and proposes concrete improvement measures, such as improving the credit risk management system, establishing an effective incentive mechanism, strengthening the citizens' credit awareness etc., which aim to reduce the credit risk of commercial banks.

Keywords Commercial bank • Credit risk • Credit risk management

1 Introduction

As an important part of financial market, commercial banks are facing various risks in economic development, among which credit risk is always the vital one. Take an overview of financial crises in history, such as the global financial crisis triggered by subprime mortgage of United States in 2008, we discover that there is a significant relationship between the financial crises and the banks' improper credit risk management [1]. Basel Committee on Banking Supervision proposed the "New Basel Capital Accord" (Basel III) in 2010 and issued its latest rules after several setbacks, in which the three pillars (minimum capital requirements, supervisory review and market discipline) are mirroring the value of credit risk management in banking system [2]. Due to the late start of the capital markets and low standard of credit risk management of banking industry in China under domestic financial system, the flaws existing in credit risk management would generate a long-term repressing along the actuality of economic life in China. In order to take over the high land during the severe competition in financial market, strengthening the

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overall risk prevention capacity has become even urgent [3]. Therefore, a deeper research and better analysis on credit risk management issue of commercial banks in China is of great value.

2 The Connotation of Credit Risk of Commercial Banks

2.1 The Concept of Credit Risk of Commercial Banks

The definition of credit risk can be concluded into two points.

The conventional view considers that credit risk refers to the risk of the dealer's incapacity to fulfilling the contract, namely the risk of financial loss due to the incapacity of loanee on paying back the debt. According to this definition, loss was deemed to happen when the actual violation was occurred, thus credit risk is called default risk. However, with the change in modern environment and the development of technology for risk management, this definition was assumed to be lag behind, for which cannot fully reflect the features and characteristics of credit management in modern time. The main causing that dominants the market of credit products are the constant variation on credit status of the loanee and their changing loan repayment abilities. Commercial banks as well as the investigators are not only loss for the direct violation of counterparty but also for the variation on credit quality of the counterparty.

Modern view considers that modern credit risk includes both default risk and credit spread risk. This definition however generally reflects the management philosophy and techniques in academics, regulatory authorities and banking industry, which also meet the principle of prudence of the banking industry.

2.2 Features of Commercial Bank Credit Risk

Endophytism Endophytism of credit risk is within the individual characteristic of the counterparty, which means, the major influence on default risk is loan repayment ability of the debtor and his personal willingness of repayment, thus is it necessary for commercial banks to know the credit status of the counterparties timely and thoroughly.

Non-systematic Feature Commercial banks analyze the trusted enterprises through information provided by the enterprises, public credit rating agencies, and stock markets. However, the non-systematic feature appears even evident for the imperfection of the fault system in China and the lack of authoritative rating agencies.

The Asymmetry of Distribution on Credit Risk Probability Small probability events of default enterprises and the unbalance between profit and loss of debt

have created the offset of distribution on credit risk probability [4]. Commercial banks have large probability to recover loans and scheduled profit during the contract, yet once the violation of contract occurred, the banks would be facing tremendous loss. In other words, the profit gained by making loans are stable and of upper bound, but the loss is changeful.

3 Existing Issues on Credit Risk Management of Commercial Banks in China

3.1 Single Disposal on Non-performing Loans

According to current market environment in China, dissatisfied conditions and high ratio of non-performing loans are booming in front of commercial banks in handling problem loans. Though several ways are available in dealing with bad loans such as recapitalization, capital injection, litigation, most commercial banks in China are still lack of high quality, experienced recapitalizing elites; Commercial banks cannot either reckon on government to gratuitously inject capital, for the capital injection even from government could not cover the number of bad loans; Litigation requires large amount of time and energy, and many unstable factors would influence the court when processing. Therefore, commercial banks mainly sell those non-performing loans to assets management company, and they themselves should undertake the cost damage under the immature capital market.

3.2 Over Concentration of Loans and Lack of Diversification Concept

Commercial banks distribute the raised funds in means of giving loans, while the loans are mostly over concentrated in limited industries and regions, many of them gathering in real estate, transportation, power sector, water power and supplier industry, and centered in region like Beijing, Shanghai, Guangzhou and other first-tier cities. Once there happened the periodic recession in these industries or regions, large credit risk that hard to be resolved will be triggered.

3.3 Lack of Scientific Credit Risk Management System

Risk management system of commercial banks in China is still imperfect. For instance, the monopoly of total control for commercial banks has difficulty in avoiding insider control or owner absence, so the structure of corporate governance is to be improved; Professional managers are likely to act on activity which will

benefit themselves on office environment, while improve wages and benefits through achieving short term profit, which is depart from the aim of maximizing long term benefits with shareholders, so internal incentive as well as constraint mechanism are imperfect too; Imperfect internal control system with a lack of valid concept on credit risk management, thus unprofessional operation and power abusing are often occurred.

3.4 Lack of Necessary Measurement and Efficient Management Tools for Credit Risk

At present, commercial banks in China have not yet built their own model for measuring credit risk, and evaluation of credit risk is merely rely on the subjective judgment from the banks. The disability to quantify in pricing would result in difficult in getting along with the trades, and the credit risk yet hard to transfer between different bodies, causing the direct response taking for the commercial banks themselves. Besides, the general lack of efficient management tools also restraint the development of credit risk management.

4 Solution Analysis for Credit Risk Management of Commercial Banks in China

4.1 Various Approaches for Disposal of Non-performing Loans

Commercial banks in China shall apply various means to deal with bad loans, for example recapitalization, capital injection, litigation. Till now, talent people with high quality and rich experience in recapitalization are quite needed to improve the stock market as well as the processing of recapitalization. Of course, joint venture is another way to manage non-performing loan.

4.2 Increase the Channel for Utilizing Commercial Bank Portfolio

In order to dissipate credit risk, on one hand, despite the assets used on giving loans, through purchasing treasury bill, corporation and foreign bonds with eminent credit rating to increase the stability of the capital in commercial banks; Assets can be also investigated in growing and potential companies or rising industry. On the other hand, equilibration shall be well proposed in avoid of periodic economical recession, which may trigger tremendous credit risk that can be hardly resolved.

4.3 Establish Scientific Credit Risk Management System

Shareholders' convention, board of directors and board of supervisors shall be established separately to keep the ownership, right of management and supervision separately, while responsibilities of director, supervisor and president are clearly distributed, standardizing the operation of commercial banks and perfecting the structure of corporate governance [5]; Breaking the convention of wage system decided by the administrative level and building an efficient encouraging system that combine the basic salary with long term bonus could highly motivate the employee and make themselves respected; Intensify the internal control management to improve the awareness of risk and personal quality of employee; Perfecting rules and regulations of credit risk management in commercial banks and acting them accordingly.

4.4 Establish Necessary Measurement and Efficient Management Tools for Credit Risk

Commercial Banks in China shall strengthen themselves on the research in model building on measuring credit risk, or work with relevant government and institutions to improve and develop new models for measurement. Secondly, developing tools for credit risk transfer. Credit transfer means that financing institutions, generally commercial banks can transfer credit risk to other banks or institutions via various financial instruments.

5 Conclusion

Under the overall condition of rigorous financial market, commercial banks in our country are facing more and more challenges. This article bases on the reality of domestic credit risk in commercial banks, analyses the concept and features of credit risk, while proposing solutions in stand of analyzing the issues of emerging problems in credit risk management, such as building up an internal risk-inspiring and restricted system, strengthening awareness of credit risk, constantly improving the information system and so on. However, a lack of research on the model building in credit risk needing to be continued for this essay, for instance, how to adopt the models of foreign countries and adjust them to match the condition in China; how to build up our own model according to the regional credit risk environment, and demonstrate them in practice; how to set up a reasonable internal rating system and the requirements of it.

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Chinese Food Security and the Intergovernmental Transfer

Xiaojun Jia

Abstract Food security is one of the key reasons for government supporting agricultural development. Purpose-specified special transfer is a necessary means for motivating farmers in farming and food cultivating and guiding local government to increase agricultural capital investment. However, such problems as proliferation of funds, complex application and approval procedures and nontransparent fund allocation exist in our current agricultural special transfers. In order to solve these problems, this thesis put forward that the local agriculture-associated special transfer reform by Central Government should move forward operation with fund operation model of transforming current project categorical grants into block grants.

Keywords Food security • Transfer • Agricultural special transfer

1 Introduction

Although the necessity of financial support for agriculture can be highlighted from different perspectives, food security and increasing farmers' income are the most fundamental reasons for government supporting agriculture or existence of financial funds associated with agriculture. Moreover, central government should be "leading role" in providing financial funds associated with agriculture. As for the nature of transfer, purpose-specified special transfer is more useful for achieving encouraging farmers to grow food and increasing their income.

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2 Chinese Food Security and Necessity of Government Supporting Agriculture

2.1 As Food Security Is an Important Public Product, Government Supporting Agricultural Production to Ensure Effective Domestic Food Supply Is the Only Solution to Guaranteeing Food Security

In our country of so large population. In recent years, food security has been a focus issue concerned by international society, and particularly it is so important for China with a large population. In 2012, we imported food up to 72.36 million tons, including 13.98 million tons of grain and 58.38 million soybeans which accounts for 72.8 % of all imported food. If not counting soybean, our food self-sufficiency rate would reach 97 %, while if taking soybean as food, our food self-sufficiency rate stays at about 90 % [1]. Around the world, most countries are keeping above 90 % of food self-sufficiency rate. Han Changfu, Minister of Agriculture, pointed out in 2010 that ‘China, as a country with large population, must adhere to the policy of achieving basic self-sufficiency based on domestic to ensure national food security’. For our country of so large population, government supporting agricultural production to ensure effective domestic food supply is the only solution to guaranteeing food security [2].

2.2 Inter-government Transfer Is an Indispensable Macro-control Means to Address the Contradiction Between “Government ‘Requesting Food’ and Farmers ‘Requesting Money’” [3] in Market Economy Condition and Fully Motivate Farmers to Grow Food

Food security, the public product across the whole country, should be taken in charge by Central Government. Only by ensuring certain yearly food supply and realizing balance between food supply and demand can food security be ensured; specific agricultural production is completed by dispersive peasant households who are required to grow food by administrative means in planned economy period while making their own choice on production and operating activities as independent economic entities in market economy condition to pursue maximization of self-interests. Due to current low comparative benefits of food growing, farmers would not actively choose to grow food, so the contradiction between government “requesting food” and farmers “requesting money” is becoming acuter and acuter. The only measure to cope with the contradiction is to encourage farmers to grow food through policy incentives to ensure effective food supply and national food security. Therefore, inter-governmental transfer is a necessary macro control means for motivating farmers in food growing by increasing their income.

2.3 Local Governments Lack Enthusiasm for Supporting Agricultural Production, so Food Security Should Be Taken in Charge by Central Government Which Is Responsible for Agricultural Transfer Which Is an Indispensable Macro Control Means to Ensure Fiscal Fund for Assisting Agriculture not Used in Nonagricultural Areas, Stabilize Food Production and Achieve National Food Security

The enthusiasm for supporting agricultural production by local government can be reflected by agricultural, forestry and water conservancy expenditure structure in local public expenditure. As shown in the Fig. 1, the proportions of owned fund as the expenditure of local agricultural, forestry and water conservancy are respectively 68.9 %, 64.3 %, 50.3 %, 54.9 %, 54.1 % and 53.2 % between 2007 and 2012, on a declining curve, which indicates that local government in current financial system condition is lack of enthusiasm for supporting agricultural production, resulting agricultural input depending more and more on transfer by Central Government year by year.

Local governments lack enthusiasm for supporting agricultural production mainly for the following two reasons:

Firstly, since GDP is an important indicator for China assessing local government performance, first industry GDP is in slow increase of scale due to slow

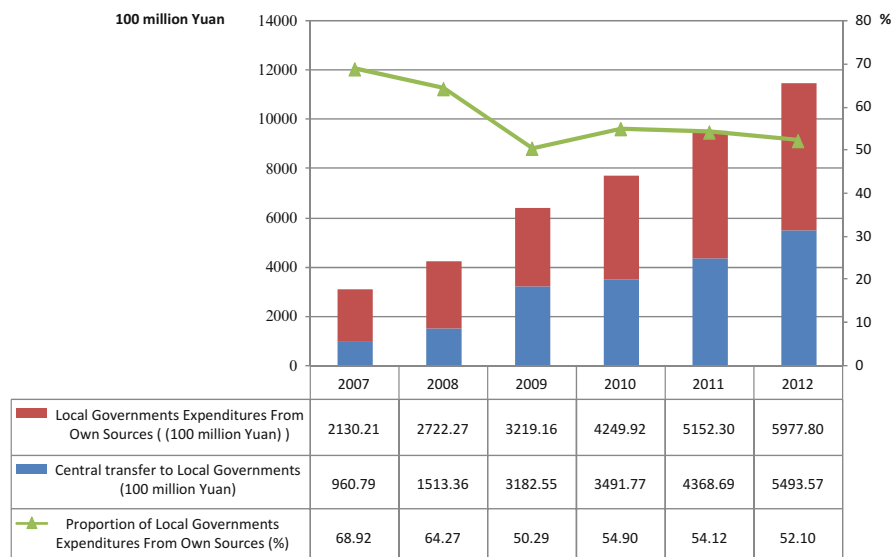


Fig. 1 Local governments agriculture expenditure structure, 2007–2012



Fig. 2 Rate of contribution of Chinese three industries to GDP, 2005–2012

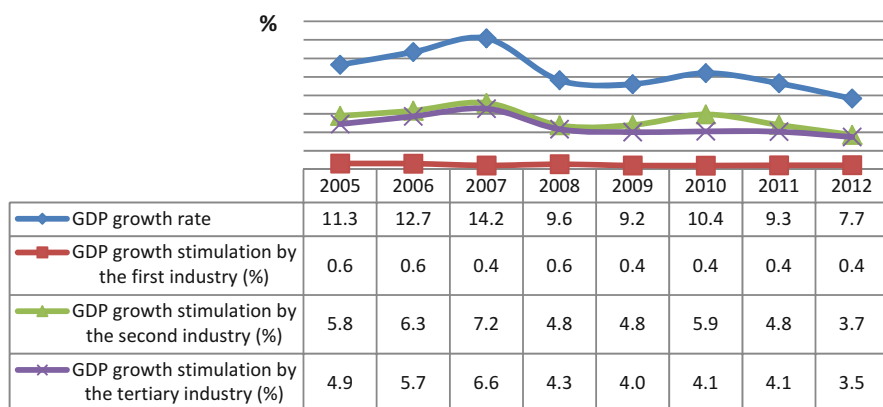


Fig. 3 GDP growth stimulation by Chinese three industries between 2005 and 2012

technological advance in first industry compared with other industries. The first industry contributes less to GDP, so local governments lack enthusiasm for supporting agricultural production.

Figures 1 and 2 show that since 2005, agriculture has contributed to GDP and stimulated growth rate much less than the second industry and tertiary industry, for the two indicators only account for about one tenth of the second and tertiary industry.

Secondly, because agricultural tax has been cancelled in China, the first industry devotes little contributes to fiscal taxation, so local government finds no incentive for attaching importance to agriculture and food production (Fig. 3).

Before year of 2004, agriculture had been a significant source of Chinese local government tax revenues, especially of township governments that rely nearly one third tax revenue on agricultural tax. After agricultural tax has been cancelled

(namely after year of 2004) in reform of taxation expenses implemented in rural areas where additional charges have been cancelled as well, thus the first industry contributes little to fiscal tax revenue and local government finds no incentive for attaching importance to agriculture and food production.

Practice has proved that in the situation of local government without enthusiasm for supporting agricultural production, Central Government can only depend on transfer to lead local government increasing agricultural capital investment to stabilize food production and achieve national food security.

3 Status of and Problems in Central Government's Agricultural Transfer to Local Government

In accordance with the mentioned above, it is very clear that Central Government should intervene with and support for food production. Central Government intervenes with food production mainly by administrative orders and financial support dominated by transfer. At present, as for food security, central and local graded responsibility system is implemented that 31 provinces, regions or municipalities across the country is classified into 13 main food producing areas, 7 main food selling areas and 11 production and sales balanced areas. Main food producing areas suffer from regional interest loss because they can not select to grow economic crops with high income. Then Central Government needs to grant them with subsidies and interest compensation through transfer to keep them away from loss on grain growing.

Our transfer is confronted with many problems, for instance, the structure of general transfer and special transfer is unbalanced; special transfer almost covers the scope of all local financial expenditure, concretely that:

The first, there are so many sources and channels for agricultural transfer, and projects are in large quantity and numerous variety with small amount, liable to overlapping and repetition. What's worse, a fixed sum is for a fixed purpose and the fund is scattered, so it is very difficult to concentrate financial resources for key projects and fund is in low use efficiency.

The second, complex project allocation and approval procedures bring heavy burden to project applicants and managers; approval of grants usually takes a long time, so the fund often cannot be up timely, which goes against local government's fund arrangement in budget year.

The third, nontransparent fund allocation easily breeds such undesirable phenomena as unwarranted diversion, project making-up, fraudulent application and claim and multiple application of one project.

4 Reform Orientation of Central Government's Agriculture-Associated Special Transfer

We suggest operating Central Government's agriculture-associated special fund with block grants to remove malpractice of our agriculture-associated special transfer to ensure food security and increase of farmers' income. In another word, fund is operated by the fund operation model of changing agriculture-associated project categorical grants currently allocated according to projects into block grants.

In the theory of transfer, transfer for relatively broad specified purposes and with fund allocated by factor method is called block grant which includes outstanding benefits in operating our agriculture-associated project categorical grants. On one hand, transfer fund allocated by factor method can solve current nontransparent special grants and all kinds of consequential malpractice in fund allocation. On the other hand, extending use limitation of grants can not only ensure grants' use conforming to intention of Central Government, but also increase autonomous right of grant use by local government to facilitate concentrating financial resources on solving key matters. Project categorical grant has been widely applied in our reform of special transfer, for example: Zhejiang experience and reform of agriculture-associated fund in "Two Plains" in Heilongjiang demonstrate great example. Opinion on Clearing, Integrating and Standardizing Financial Special Fund Management was formulated and issued in 2009 in Zhejiang Province to solve fund allocation malpractice in traditional project categorical grants and enhance fund usage efficiency, which marked reform of special grant, including: integrate and merge existing special grant programs, as well as programs of same or similar supporting direction, objects and purposes. After reform, the transfer program in Zhejiang is called "special general transfer", but obviously, it is block grant. Both financial departments and local governments receiving grants think highly of effect of this reform. In 2013, Ministry of Finance printed and issued Opinion on Integration of Agriculture-associated Fund in Comprehensive Reform Pilot Area for Modern Agriculture in "Two Plains" of Heilongjiang. Since then, pilot of agriculture-associated special fund reform started implementation in "Two Plains" of Heilongjiang. Except subsidy and relief fund to special groups, 77 - agriculture-associated funds arranged by central financial department were merged and integrated into 3 major categories: agriculture production and development, rural society development and poverty relief and development. Heilongjiang Province was allowed to properly adjust and make overall arrangements of agriculture-associated funds in the 3 major categories of funds, breaking through the limitation of fund use for specific projects. Apparently, this kind of merger and integration is in fact equivalent with transformation from project categorical grant to block grant.

Operating Central Government's agriculture-associated funds with block grants does not mean completely abandoning agriculture-associated project categorical grants whose advantages, such as specificity and emergency, would not be replaced by block grants. However, in face of the reality of current project grants, the priority

should be given to strict limitation, as highlighted by previous research, that subsidy objects should be limited to the projects of spillovers, abruptness, particularity or flexibility.

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Employing “E” Type Marketing Model to Build a Modern Marketing System of Commercial Banks

Yongli Liang

Abstract This paper elaborates the idea of “E” Type Marketing Model, theoretical basis, and puts forward the idea of employing “E” Type Marketing Model now to build a modern marketing system of commercial banks in China, the practical significance to carry out such a system and as well as the safeguard measures. Integrate the marketing organizational structures and strengthen marketing and marketing management; Improve appraisal system and establish effective stimulating and restricting mechanism; Strengthen the marketing team building and improve their comprehensive quality.

Keywords “E” Type Marketing • Marketing management • Marketing strategy • Core competitiveness

1 Overview of “E” Type Marketing Model

The so-alleged “E” Type Marketing, in essence, is integrated marketing, where the “E” consists of three transverse lines and a vertical line which respectively mean core customer as well as the core customer derived industrial chain, product chain and customer chain. “Industrial chain” means the industrial customer groups consisting of the upstream and downstream supporting enterprises around the leading customers; “product chain” means a product system where the assets, liabilities and intermediary business get comprehensive development by continuous follow-up of the products and services using some business of the banks as a pawn; there are two customer chains – one is from the companies consisting of corporate customers, senior and middle-level management staff and general staff → individual customers, and the other one is along the individuals → corporate customers triggered by individual customers.

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“E” Type Marketing Model is a kind of systematic and advanced marketing and marketing management model that complies with the operating law of modern marketing system of commercial banks with certain theoretical basis.

The first, comply with the “division theory” of the father of economics Adam Smith – divide the management and business, and separate the support system from the operating system, improving the efficiency of various layers and posts [1].

The second, comply with the “scientific management” theory of the father of management Taylor – divide the marketing process into different sections with each being divided into measurable parts, making the marketing management much easier [2].

The third, comply with the M (Multidivisional Structure) type organizational matrix management (i.e. process bank), under which the divisions are semi-autonomy profit centers whose functions inter-infiltrate, improving the resource utilization [3].

2 Employing “E” Type Marketing Model to Build a Modern Marketing System of Commercial Banks

2.1 Accurately Grasp the Marketing Concept and Firmly Establish the “Customer-Centric” Marketing Idea

To accurately grasp the marketing connotation, the “customer-centric” operation philosophy must be firmly established in marketing. Firstly, establish the concept of “customers are a valuable resource and marketing means to develop and maintain these customer resources well to achieve the purpose of profiting” in thoughts across the banks. Secondly, solicit customers and build the marketing management-centric business organizations in organizational structures setup, control well the communication and coordination across the divisions, pool the diverse financial needs of the customers together and offer send them to the marketing and production divisions for further treatment, provide the customers with integrated “one-stop” services, while motivating the enthusiasm of employees of various divisions and taking meeting the customer demand as purpose to achieve the business objectives of providing the customers with the best services and creating reasonable profits for the banks.

2.2 Segment the Market and Select the Right Target Markets for Market Positioning

Practices of foreign banks show that any bank, limited by manpower, resources, experience and capitals, cannot occupy absolute competitive advantage in all

customer markets, so we must segment the market finely, select the target markets, serve the target customers well, and make right marketing positioning. There are many standards in terms of the market segmenting, and different customer categories occur according to the customer’s property, relationships with the banks, customer credit, satisfaction, loyalty, contribution and other standards. Under such a background where the customers need banks to provide increasingly quality and different financial products, segmenting the market finely can help understand the various needs of the customers from the segment markets, solve their real needs, mine the potential demands of customers deeply, and pertinently customize financial products for them, improving the customers’ comprehensive satisfaction and constantly enhancing the marketing competitiveness of the banks.

2.3 Develop the Right Marketing Strategy

Facing the changing demand for financial products of the customers, we must focus on the integrated use of a variety of marketing strategies after market segmenting, target markets selecting and positioning so as to ensure the realization of the strategic objectives.

The first, 4p marketing mix strategy. In 4p marketing mix strategy, four elements in market activities shall be integrated – product, price, place and promotion, so as to strengthen the attraction to the target markets. Taking bank financial products as an example, the periods of part of the financial product are sorted out according to the four lifecycle theories – products input period, growth period, maturation period and decline period, while appropriate product, price, distribution and promotion strategies are made.

The second, differentiated marketing strategy. In accordance with the principles of segmentation from the customers, we put the customers into quality customers, ordinary customers, limiting customers and potential customers based on the customer contribution standard in terms of frequency and number of buying and consuming financial products by the customers. For the four kinds of customers, the banks should adopt differentiated marketing strategies for different customer and provide differentiated services, realizing the purpose of obtaining more values from the customers.

2.4 Integrate Financial Products Chains and Thoroughly Carry Out the “E” Type Marketing

Thoroughly carrying out the “E” Type Marketing means to be customer-centric, break the barriers between divisions and products, realizing the integrated marketing of all business types. However, this needs to integrate the financial products of the banks.

Financial institutions can plan product chain integration program, such as wealth management, personal finance plan, total brand of electronic banking products (services) Series, Cash management. Besides, it also includes the comprehensive brands of international settlement. foreign exchange transactions, Peony Card and assets custodian.

3 Safeguard Measures of Employing “E” Type Marketing Model

3.1 Integrate the Marketing Organizational Structures and Strengthen Marketing and Marketing Management

The first, build hierarchical operation system and further promote operation transformation. Building hierarchical operation system is not only to meet the demand of advancing the “E” Type Marketing by the banks, but also address the competition in the market, meet customer service needs and improve service efficiency. The building is also to accelerate business promotion and management process optimization and transformation, realize the shift from “division banks” to “process banks”, ensure the efficiency of scientific decision-making and management across the banks, and realize effective risk prevention for customers and business.

The second, Establish Marketing Management Committee and Build Linked Marketing Mechanism. To completely solve the problems of “concentrate on doing one thing”, multiple marketing and repeated marketing, it is suggested that the provincial banks establish Marketing Management Committee with the vice presidents as the director responsible for marketing work, while the members consist of the general managers of the Corporation Division, Investment Banking Division, Settlement Business Division, Housing Provident Fund Loans Division, Institutional Division, Personal Banking Business Division, e-Banking Division, Bank Card Division, Supplementary Pension Division, Management Information Division, Credit Approval Division, Credit Management Division, Information Technology Division, etc.

3.2 Improve Appraisal System and Establish Effective Stimulating and Restricting Mechanism

The first, carrying out the appraisal method where the interests of marketing and product divisions are coherent. For the appraisal to the customer managers, the banks should focus on the total business results, because any loss of business will directly affect the customer managers’ assessment scores.

The second, actively build the open and value creation oriented allocation mechanism for the overall payroll of performance. (1) Enhance the predictability of the appraisal. Carry out comprehensive appraisal system combining post value and personal contribution, focus on the appraisal of marketing performance and value contribution to the marketing staff, expand the proportion of performance-based pay to fully embody the principle of “more pay for more work” and stimulate their marketing initiative and creativity. (2) Establish the appraisal authority. Further establish the core position of appraisal in marketing, appraise the marketing staff mainly according to their performance following the principles of “pay for work” and “more pay for more work” to fully mobilize the enthusiasm of the staff and let the advance marketing idea win support among them and be self-conscious code of conducts for the staff when they develop the business. Meanwhile, the fulfillment of reward and punishment system should reflect the “open and fair and transparent” principle to enhance the credibility of the appraisal.

3.3 Strengthen the Marketing Team Building and Improve Their Comprehensive Quality

Improve the quantity and quality of customer managers as soon as possible; especially ensure that there has enough excellent staff ready to join the customer manager team, building the customer manager team to a high-quality group. At the same time, further improve the quality of the customer managers and deepen the professional reform among them, carry out the job appraisal certification system among them, and expand the educational training. Improve the business quality of the customer managers, fully control the assets, liabilities, intermediate business and other kinds of traditional and emerging business products, improve their marketing skills and risk control level, and better adapt to the new challenges brought by bank operation transformation.

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The Reference and Enlightenment of Fiscal and Taxation Policies on the Photovoltaic Industry in Foreign Countries

Yu Tian

Abstract Solar photovoltaic Industry is important for the global economy and the adjustment of industrial structure. Meanwhile, the development of the solar photovoltaic technology has become a hot research field around the world. This paper reviews the status of foreign solar photovoltaic industry, analyzes the existing solar photovoltaic industry development policies in Germany, United States and Japanese, so as to provide a reference for the development of China's solar photovoltaic industry.

Keywords Photovoltaic industry • Taxation • Compare • Enlightenment

1 Introduction

With the global scarcity of non-renewable energy and the growing demand for human resources, people pay attention to solar energy due to its cleanness, high efficiency and renewability. At present, the core of the global photovoltaic market is mainly in the European market, especially Germany [1]. The countries with rapid market growth in Asia are China, Japan and India. China is a strong producer of photovoltaic products and it has the world's leading industrial scale advantages. From the point of global photovoltaic industry, photovoltaic market is still policy-driven.

2 International Models of Fiscal and Tax Policies to Promote the Development of Photovoltaic Industry

2.1 German Model

Behind the brilliant German photovoltaic industry, there is strong support policy from Germany's government. Its fiscal support policies can be divided into tariff subsidies, loan subsidies, investment subsidies, tax incentives and other types. In

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2000, Germany took the lead in promulgation by implementing the “Renewable Energy Law” (EEG2000) which established a feed-in tariff system for a period of 20 years. Then in 2004, Germany announced the EEG Amendment Act (EEG2004) which refined ways of subsidies and tariffs, taking the differences between the rate of price decline for different types of photovoltaic systems and capacity to classify subsidies and form a mature FIT (Feed-in Tariff) policy. In August 2011, after the third amendment, the German “Renewable Energy Act 2012” (EEG2012) was formally promulgated. EEG2012 proposed tariff adjustments, and PV self-occupied encouragement “dual price system”. In addition, there are long-term credit incentives in Germany as well as a few tax cuts.

2.2 American Model

U.S. PV industry fiscal policies emphasize on tax credits, direct subsidies, loan guarantees, tariffs, and accelerated depreciation. Its fiscal policies have more attractions to investors and they are helpful to the rapid expansion of the PV market. Energy Policy Act established the U.S. PV industry tax credit policy, which is mainly on investment tax credit. In 2008, in response to the financial crisis, the United States implemented a new energy incentive plans and bailout programs. It allowed commercial and residential photovoltaic systems tax credit that will expire to renew for 8 years and 2 years. It also abolished the tax residential PV systems credit limitation. In addition, the federal government has also given basic state policies on ITC additional local tax credits, such as personal income tax, corporate income tax, property tax credits and so on.

In 2009, Obama’s new energy policy also involves hundreds of billions of loan guarantees for renewable energy projects. Obama’s new energy policy also allocated hundreds of millions to support solar photovoltaic project development to enhance the competitiveness of the U.S. PV technology.

2.3 Japanese Model

In 1974 Japan issued “sunshine project”, strongly promoted the development and utilization of solar energy photovoltaic power generation system. During 2006–2008, the Japan slowed down the development of photovoltaic industry. After that, Japan photovoltaic industry turned to booming since 2009.

The most prominent photovoltaic industry fiscal and taxation policy of Japan is the residential subsidy policy which began in 1994 and ended in 2005 [2]. In 2012 Japan’s FIT purchase price was 42 yen/kWh and the purchase rate of photovoltaic was the highest of the world.

Green power certification system established subsidy policy for residents. In September 2008, the Japanese ministry of economy began to give green electricity

certificate to those families that are with photovoltaic systems, and install photovoltaic power meter. The system has double incentive on residents and electric developers and promoted the popularization of the photovoltaic applications.

3 The Reference and Enlightenment of Fiscal and Taxation Policies to Promote the Development of Photovoltaic Industry

The three countries above have played an important role in photovoltaic field. Throughout the photovoltaic industry policy, we can find that oriented fiscal policies are essential for the development of photovoltaic industry. So far, the fiscal policies are mainly tax incentives, tariff, credit support and installation subsidies.

3.1 Tax Incentives

American has the most unique photovoltaic tax support policies which include not only the federal investment tax credit policy (ITC policy), but also the state government assisted tax credit policy [3]. And German photovoltaic systems allow commercial enterprises to enjoy the value-added from tax breaks. Also, manufacturing enterprises in German photovoltaic systems can enjoy the investment tax credit.

In China most of photovoltaic power tax incentives are applied on enterprises. While foreign policies have specific instructions for ordinary residents who used photovoltaic system, which suggests our government should pay more attention to tax incentives for ordinary people and small business. Policy incentives can encourage individuals to use photovoltaic power generation and small-scale photovoltaic devices. It also conforms to the plan of new energy for the future application of our country.

3.2 Tariff Policy

Tariff policy can directly subsidize to the PV electricity, and gives an incentive for the actual use of photovoltaic power generation [4]. But at present, tariff policy doesn't play a role in the Chinese photovoltaic industry. We should learn from Germany, Japan and United States. Germany's FIT policy can be named as the most successful policy in the world. Due to the critical amount of subsidies and the burden of these subsidies, Japan's "net metering" FIT policy is more prominent in encouraging residents to consume the photovoltaic power. What's more, the launch of the "dual

price system” FIT policy in German also shows that users spontaneously occupied the Government to encourage solar photovoltaic power policy intention. The United States has not yet introduced the FIT policy at a federal level. Currently establishing a unified photovoltaic power generation and network standards between states, can play a more effective role in the state government tariff policy.

3.3 Credit Support Policy

Germany provides the long-term low-interest credit and loan subsidies for photovoltaic investors. In the new energy incentive plans and Obama’s new energy policy of the United States, the federal government provides continuous strong credit guarantee for the photovoltaic companies and wants to attract investors to move closer to the photovoltaic industry.

Currently, Chinese PV industry lack credit supporting [5]. Large PV projects have long construction period and lot of money, so the government should provide long-term low-interest credit and loan subsidies to photovoltaic investors. Meanwhile, the government should provide an effective loan platform for the photovoltaic enterprises.

3.4 Other Policy

In addition to the course of typical policy, many policy experiences are worth learning from, especially from Japan, Germany, the U.S. The long-term unremitting pursuit of photovoltaic technology innovation and sustained investment of these countries are also very valuable. Both countries draw on innovation policies. It is worth mentioning that the Japanese public participation in infrastructure is very good. The Japanese people and photovoltaic enterprises often walk in front of the government to promote the voluntary implementation development of various photovoltaic industries and actively work with the government to improve the photovoltaic industry. These fiscal policies are not suitable for the development of the photovoltaic industry in each country, but in order to provide possible development references, states must be firmly rooted in the reality of the domestic photovoltaic industry, while also supporting the need for a sound system and a good operating environment with assistance.

4 Conclusion

From the lessons learnt from the experiences and lessons of developed countries, we can draw the following conclusion: Due to the existing problems and future development trends, the photovoltaic industry fiscal and taxation policy will be very timely to adjust: Firstly, we should pay special attention to the incentives for technological progress, perfect the relevant supporting facilities and systems, and use different fiscal and taxation means to promote technological progress; Secondly, use the function of government procedures, expand the demonstration effects of the government; Finally, give full consideration to the development of the industrial chain, improve the existing tax system and promote the coordinated development of the industry.

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A Study on Potential Risks of Shadow Banking in China

Xiaowen Huang

Abstract In 2013, the Chinese authorities classified shadow banking systems into the three categories based on the characteristics of the three types of institutions and businesses, which is compared to the Aggregate Financing of the Economy funds structure and can be found that the part of the social financing scale index similar to shadow banks. The traditional way of financing function abate, along with the role of shadow Banks and other financing in financing improving. At present, the amount of China's shadow banking is small, but growing faster in recent years. With the rapid development of China's new Internet financial, financial supervision is relatively lag. The means of financial regulation need constant innovation to keep pace with the development of the Internet financial pace.

Keywords Shadow banking • Bank risk • Shadow banking system

1 The Concept and Scope Identification of Shadow Banking in China

1.1 *Concept of Shadow Banking*

The concept of Shadow Banking has been widely used since its being put forward for the first time by McCully, the Executive Director of US-based PIMCO at the FED's annual conference in 2007. According to the Financial Stability Board, shadow banking refers to a credit intermediation system (including various associated agencies and business activities) that is independent of banking supervision system and likely to bring about such issues as systemic risk and regulatory arbitrage. Shadow banking constitutes an approach by which unlimited expansion of credit is available through bank loan securitization. This approach focuses on the transformation from traditional bank credit relationship to a credit relationship under the cover of securitization. In appearance, such credit relationship is

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associated with traditional bank; as a matter of fact, it performs the functions of traditional banks while comprising no organizational structure of traditional bank. In other words, this system seems to be a “shadow” of bank.

1.2 Scope Identification of Shadow Banking System in China

View of the relatively low level of asset securitization in China, China is significantly different from developed American and European countries in terms of the scope of shadow banking system since market-oriented interest rate regulation has not yet fully realized in China due to the restrictions on deposit rates despite the fact that lending rates have been liberalized. For a long period, the scope of shadow banking has not been clearly defined in China. The circle of banking generally considers organizations which are not subject to strict supervision but performing the functions of commercial banks to be “shadow banking”. The Circular on Issues of Enhancing the Supervision of Shadow Banking [1] printed and distributed by the General Office of the State Council in December 2013 classified shadow banking systems into the following three categories: Category I: Credit intermediaries without financial license and subject to no supervision, including new-style online financial companies and third-party money management organizations etc.; Category II: Not adequately regulated credit intermediaries without financial license, including financing guarantee companies and small loan providers etc. Category III: Organizations with financial license engaged in activities that are inadequately regulated or protected against supervision, including money market funds, asset securitization and certain money management services etc. [1].

2 Analysis of the Scale of Shadow Banking

Aggregate financing of the economy refers to the total funds received by real economies (i.e. businesses and individuals) from financial system within a certain period of time (monthly, quarterly or annually).

Aggregate financing of the economy is principally composed of four parts. Category I: Financial support provided by local financial institutions for real economies through on-balance sheet items, including loans in RMB and foreign currencies; Category II: Financial support provided by local financial institutions to real economies through off-balance sheet activities, including entrusted loans, trust loans and bankers’ acceptances undiscounted; Category III: Direct financing obtained by local real economies using standardized financial instruments on formal financial market, including domestic equity financing for non-financial enterprises, and Net financing of corporate bonds financing; Category IV: Financial

support for real economies by other means, including compensation from insurance companies, investment in real estate, microfinance loans, and loans from loan providers [2].

To determine the scale of shadow banking in China, it's advisable to sort and classify some data relevant to the information about scale of social financing announced by the People's Bank by the level of supervision. First, the organizations are divided into organizations holding no financial license and organizations holding financial license by the availability of financial license for business entity. Second, by the existence of supervision for business, the activities are divided into businesses within standard regulatory scope and inadequately regulated business or activities protected against supervision.

The part of the social financing scale index similar to shadow Banks. The microfinance loans and the loan service of loan provider are provided by organizations holding no financial license and inadequately regulated; entrusted loans, trust loans and bankers' acceptances undiscounted are classified as off-balance sheet activities of organizations holding financial license, thus being inadequately regulated or protected against supervision. From this point of view, both types of business described above could be classified as shadow banking service.

The data of social financing published by the People's Bank involve only seven indicators, i.e. RMB bank loans; loan in foreign currency; entrusted loan; trust loan; undiscounted bankers' acceptances; corporate bond; domestic equity financing for non-financial enterprises; enterprise bond. The entrusted loan, trust loan and undiscounted bankers' acceptances could be brought into the coverage of shadow banking.

According to Table 1, the scale of social financing has experienced rapid growth in China since 2002. The scale of social financing amounted to 17.29 trillion Yuan in 2013, 8.6 times that of year 2002, that is to say 2.01 trillion Yuan.

The analysis of data shown in Table 1 and Table 2 demonstrates that the source structure of social financing has been diversified in China since 2002; the edge of traditional financing methods is taken off, while the role of such financing means as shadow banking in financing has been continuously enhanced. As a result, the following specific features came into being:

First, the significant decline of RMB loans, and the remarkable increased in amount and percentage of other financing methods than RMB bank loans. The RMB bank loans increased by 8.89 trillion Yuan in 2013, 4.81 times that of year 2002, that is to say 1.85 trillion Yuan; the contribution of other financing means than RMB loan amounted to 8.4 trillion Yuan in 2013, 52.5 times that of year 2002, that is to say 0.16 trillion Yuan, accounting for 48.6 % of the scale of social financing in corresponding period, indicating an increase by 40.5 percentage points than in 2002.

Second, significantly enhanced financing ability of financial institution by means of off-balance sheet activities. In 2013, the real economy borrowed a total of 5.16 trillion Yuan from financial system through undiscounted bankers' acceptances, entrusted loan and trust loan; but in year 2002, such financial instruments contributed an extremely financing amount.

Table 1 Aggregate financing of the economy from 2002 to 2013 (Unit: 100 million Yuan)

	Aggregate financing of the economy		RMB bank loans	Foreign currency bank loans (converted into RMB)	Entrusted loans	Trust loans	Undiscounted bankers' acceptances	Net financing of corporate bonds	Equity financing on the domestic stock market by non-financial enterprises
	Of which:								
2002	20,112	18,475	731	175	—	—	-695	367	628
2003	34,113	27,652	2,285	601	—	—	2,010	499	559
2004	28,629	22,673	1,381	3,118	—	—	-290	467	673
2005	30,008	23,544	1,415	1,961	—	—	24	2,010	339
2006	42,696	31,523	1,459	2,695	825	1,500	1,500	2,310	1,536
2007	59,663	36,323	3,864	3,371	1,702	6,701	6,701	2,284	4,333
2008	69,802	49,041	1,947	4,262	3,144	1,064	1,064	5,523	3,324
2009	139,104	95,942	9,265	6,780	4,364	4,606	4,606	12,367	3,350
2010	140,191	79,451	4,855	8,748	3,865	23,346	23,346	11,063	5,786
2011	128,286	74,715	5,712	12,962	2,034	10,271	10,271	13,658	4,377
2012	157,631	82,038	9,163	12,838	12,846	10,498	10,498	22,551	2,508
2013	172,904	88,917	5,848	25,465	18,448	7,750	7,750	18,022	2,219

Table 2 Aggregate financing of the economy structure from 2002 to 2013 (Unit: %)

	Aggregate financing of the economy		RMB bank loans	Foreign currency bank loans (converted into RMB)	Entrusted loans	Trust loans	Undiscounted bankers' acceptances	Net financing of corporate bonds	Equity financing on the domestic stock market by non-financial enterprises
	Of which:								
2002	100		91.9	3.6	0.9	—	-3.5	1.8	3.1
2003	100		81.8	6.7	1.8	—	5.9	1.5	1.6
2004	100		79.2	4.8	10.9	—	-1	1.6	2.4
2005	100		78.5	4.7	6.5	—	0.1	6.7	1.1
2006	100		73.8	3.4	6.3	1.9	3.5	5.4	3.6
2007	100		60.9	6.5	5.7	2.9	11.2	3.8	7.3
2008	100		70.3	2.8	6.1	4.5	1.5	7.9	4.8
2009	100		69	6.7	4.9	3.1	3.3	8.9	2.4
2010	100		56.7	3.5	6.2	2.8	16.7	7.9	4.1
2011	100		58.2	4.5	10.1	1.6	8	10.6	3.4
2012	100		52.0	5.8	8.1	8.1	6.7	14.3	1.6
2013	100		51.4	3.4	14.7	10.7	4.5	10.4	1.3

Third, rapid enhancement of support by non-bank financial institutions for the real economy. Loan amount provided by small-loan companies increased by 226.8 billion Yuan in 2013, 1.89 times that of year 2010, that is to say 120.2 billion Yuan.

3 Potential Risks of Shadow Banking and the Countermeasures

As described above, all the component parts of shadow banking in China are the result of interest rate control and market players' avoidance against supervision, of which the root cause depends on the fact that traditional financial system is not capable of meeting the needs of real economy and investors. From the perspective of social and economic development, shadow banking in China constitutes an effective complement to the formal financial system, having played a positive role in the stimulation of real economy. From the analysis of the various components of China's shadow banking it is observed that the risks of shadow banking in China are at a relatively low level in view of the relatively low level of asset securitization by reason that the interest rate market has not yet fully realized though shadow banking exhibits a tremendous overall size.

Despite the relatively small overall size of shadow banking in China, it has experienced fast growth in recent years. Take year 2013 for example, the instant development of Yu E Bao, WeChat Pay and other novel internet based financial instruments revealed the slow pace of traditional financial regulation. The Circular on Issues of Enhancing the Supervision of Shadow Banking printed and distributed by the General Office of the State Council in December 2013 brought internet based banking under regulation, but corresponding regulatory means has to keep pace with the development of internet-based banking.

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Research on Income Distribution Inequality of Our Country Under the Conditions of Open Economy

Lin Ta

Abstract In this article, we build an econometric model based on open economy and the laborer status, to study the influence that the opening up had on China's income distribution during 1996–2011. We consider the population proportion of primary industry, sex ratio and education condition on the base of the former research results, and come up with that, China's foreign trade has widened the income gap, but FDI would help to narrow it.

Keywords Income gap • Open economy • Direct investment

1 Introduction

In recent years, our country's economy has developed rapidly, especially with the opening-up of the market in our country, foreign trade and foreign direct investment plays an important role for promotion of our country's economic growth. According to the traditional H-O theorem, a country exports the products made by intensively using its rich elements [1], and import the products made by intensively using its scarce elements. And the S-S theorem clearly indicates that trade spurs the income of the rich element industry of a country increased, and the income of the scarce element industry decreased [2]. Therefore, the income of the rich labor force in our country also should be increased, the salary of the scarce hi-tech industry should be decreased, and our country's income gap should become smaller and smaller. But this is totally incompatible to the reality in our country.

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2 Model Specification and Data Collection

This paper selected Gini coefficient to represent income gap, the factors affecting Gini coefficient are many, this paper mainly considers the effect of open economy for income gap, therefore it firstly selected the proportion of really used foreign investment in GDP to represent the effect of the proportion of foreign investment for income gap, and selected the proportion of total import-export volume in GDP to represent the effect of the degree of foreign trade dependence for our country's income gap [3]. And then this paper added three explanatory variables, used the proportion of employed population of the first industry in total population to represent the effect of industrial development for income gap, used the illiteracy rate to represent the effect of the technical level for income gap, and used sex ratio to represent the effect of sex for income gap [4]. What needs explanation is that before most of researches used the proportion of college student in all laborers to represent the effect of receiving higher education for income gap, but in fact in recent years college education has become very common education, and now the laborers with the educational background of postgraduate and above have become more and more, so it seems not so good to use this index to measure the skill of laborers, and it could be a new trial for this paper to use illiteracy rate to replace this index, the result needs further observation; in addition [5], this paper used the effect of the sex ratio for income gap, which is rarely considered by people before, in fact in daily life under the condition of the same educational background, the effect of the proportion of sex difference for income of laborers is very obvious, the reason for this paper to consider this factor is the hope to further subdivide labor group. Because it is not clear if the model is a linear model, so it first carried out Box-Cox transformation for this model.

Suppose:

$$GINI^{(\lambda)} = \begin{cases} \frac{GINI^{(\lambda)} - 1}{\lambda} & \lambda \neq 0 \\ \ln GINI & \lambda = 0 \end{cases} \quad (1)$$

For the time being the concrete model is not confirmed.

The one selected by this paper is the data from 1996 to 2011, and the data source is from China Statistical Yearbook. The final data is obtained through calculation, and in the process of calculation it carried out unified conversion for data units.

3 Econometric Analysis

When λ takes different values, evIEWS regression results are as follows:

Table 1 shows that, when λ takes different values, the effect of educational level for income distribution is not remarkable, all models passed F test. Of which, when

Table 1 Eviews regression results

	$\lambda = 0$	$\lambda = 1$	$\lambda = 2$	$\lambda = 3$
C	-2.144912 (-1.540666)*	5.809533 (3.119280)***	4.912749 (2.932117)**	3.204213 (2.820324)**
FDI	-0.023647 (-0.095085)*	-10.07862 (-2.450008)**	-9.042100 (-2.443313)**	-6.101339 (-2.431398)**
IMEX	0.228055 (2.627993)**	0.174468 (2.380239)**	0.152572 (2.313795)**	0.100329 (2.243867)**
AGRI	31.012640 (2.355947)**	1.596607 (2.614593)**	1.414560 (2.574963)**	0.942933 (2.531346)**
EDU	-0.049899 (-0.510719)*	-0.174455 (-0.369290)	-0.128012 (-0.301217)	-0.067858 (-0.235480)
GENDER	-5.338405 (-1.711157)*	-5.510799 (-2.893769)**	-4.843422 (-2.827126)**	-3.20135 (-2.755795)**
F	5.724157***	6.553982***	6.408519***	6.243789***
R2	0.741072	0.766191	0.762146	0.757393

Note: The value in brackets is the t statistical value of the estimated coefficient. *, **, ***, *** respectively represent that the t statistical value and F value of coefficient are remarkable when they are at the level of 1 %, 5 % and 10 %

$\lambda = 1$, $R^2 = 0.776191$, which is the maximal value among the four models, and means that the residual sum of squares of the linear model is minimal. Therefore, the linear model could be taken as the estimated model of this paper, now the equation model is confirmed as:

$$GINI = \beta_0 + \beta_1 FDI + \beta_2 IMEX + \beta_3 AGRI + \beta_4 EDU + \beta_5 GENDER \quad (2)$$

The following equation is obtained according the output results of the linear model when $\lambda = 1$:

$$GINI = 5.80953302962 - 10.078622920 FDI + 0.174467584887 IMEX + 1.5966070402 AGRI - 0.174454651063 EDU - 5.51079870312 GENDER \quad (3)$$

$R^2 = 0.766191, \overline{R^2} = 0.649286, F = 6.553982$

Because that the explanatory variable of educational level is not remarkable, in order to make the model further precise, judge the effect strength of all explanatory variables for income gap, it would carry out stepwise regression for the model as follows. This paper adopts backward elimination method, and the eviews operational results are as follows (Fig. 1):

Sample: 1996 2011				
Included observations: 16				
No always included regressors				
Number of search regressors: 6				
Selection method: Stepwise backwards				
Stopping criterion: p-value forwards/backwards = 0.05/0.051				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
X5	-5.459126	1.823141	-2.994352	0.0122
X2	0.166424	0.067184	2.477145	0.0307
X3	1.604785	0.585805	2.739452	0.0193
C	5.757049	1.782640	3.229507	0.0080
X1	-10.75672	3.533702	-3.044036	0.0112
R-squared	0.763002	Mean dependent var	0.461375	
Adjusted R-squared	0.676821	S.D. dependent var	0.036276	
S.E. of regression	0.020623	Akaike info criterion	-4.674537	
Sum squared resid	0.004678	Schwarz criterion	-4.433103	
Log likelihood	42.39630	Hannan-Quinn criter.	-4.662173	
F-statistic	8.853482	Durbin-Watson stat	2.006409	
Prob(F-statistic)	0.001891			
Selection Summary				
Removed X4				
*Note: p-values and subsequent tests do not account for stepwise selection.				

Fig. 1 Eviews operational results

Therefore, after explanatory variable of educational degree (X4) is eliminated, the regression equation is:

$$\begin{aligned}
 GINI &= 5.757049 - 10.75672FDI + 0.166424IMEX + 1.604785AGRI - 5.459126GENDER \\
 t &= (3.229507) \quad (-3.044036) \quad (2.477145) \quad (2.739452) \quad (-2.994352) \\
 R^2 &= 0.763002, \bar{R}^2 = 0.676821, F = 8.853482
 \end{aligned}
 \tag{4}$$

It carries out T test for the model:

At 5 % remarkable level, it is known through checking the table that the critical value of t distribution with free degree of 12 is $t_{0.025}(7) = 2.129$, and $t(\hat{\beta}_0) = 3.229507$, $t(\hat{\beta}_1) = -3.044036$, $t(\hat{\beta}_2) = 2.477145$, $t(\hat{\beta}_3) = 2.739452$, $t(\hat{\beta}_5) = -2.994352$, from which we could see that the effect of all explanatory variables for income gap is remarkable.

Again it carries out F test for the model:

$$H_0 : \beta_0 = \beta_1 = \beta_2 = \beta_3 = \beta_5 = 0
 \tag{5}$$

$H_1 : \beta_j(j = 0, 1, 2, 3, 5)$ is not completely 0.

At 5 % remarkable level, it is known through checking the table that the critical value $F_{4, 10} = 3.48$, and in the model $F = 8.853482$, which is greater than the critical value, therefore it refuses the original supposed H_0 , which means the regression equation is remarkable.

But we see $R^2 = 0.763002$, the linear degree of the model is better.

4 Basic Conclusions

According the results it shows that, foreign trade dependence, the proportion of the employment quantity in first industry in the total employment quantity has positive correlation with income gap, and the proportion of foreign investment and the sex ratio have negative correlation with income gap.

The greater the foreign trade dependence is, the wider the income gap is. That is to say, the greater the proportion of the total import-export volume in GDP is, the wider the income gap is. Foreign trade is one of the three carriages to spur economic growth, and the major companies with higher efficiency have more possibility to carry out overseas business than small companies, and the salary of employees could be higher, similarly the threshold to enter this kind of company would be higher.

The greater the proportion of the employment quantity of the first industry in all employment quantity is, the smaller the proportion of the employment quantity of the hi-tech industry in all employment quantity is, these people obtain higher

income, and many people working in low value-added first industry share small income, which makes the income gap among industries become wider.

The higher proportion of foreign investment could decrease Gini coefficient, narrow income gap, and this effect is most remarkable. In recent years a large number of foreign investment entered China market. According to the analysis of Buckley, foreign direct investment in China has three motivations: Foreign market seeking type; efficiency seeking type and resource seeking type [1]. Foreign direct investment in China basically is efficiency seeking type, that is to say, they have strong demands for our country's cheaper labor force, which created a large number of jobs for our country's labor market. Because the efficiency seeking type foreign investment does not have higher requirements for the skill level of labor force, so a large number of migrant workers with lower skills entered those positions. This increased the salary of this group of people and narrowed income gap to some extent.

The greater the sex ratio is, the wider the income gap is. This could be understood, generally speaking, the salary of the male in our county is higher than that of the female at large, and the male could more easily get some works than the female, therefore if averagely a household has one more the male, then which could increase the per capital income of the household for one time, therefore, the income gap of our country should have been narrowed.

Notably, in 2011 the sex ratio of the male and the female at age of 0–20 in our country is 1.16: 1, and this ratio is much higher, if things go on like this for a long time, then it will be a hidden danger to society.

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Empirical Research on the Influence of FDI on China's Cultural Industry: Analysis Based on VAR Model

Jianping Wang and Haibing Wu

Abstract In recent years, the pace of foreign investment has accelerated into China's cultural industry. But there are still some problems, such as smaller scale of investment, narrower field of investment, low proportion in China's cultural industry. Factors, restricting FDI into China's cultural industries, include unsound legal environment of industry, commercial credit environment which needs to be improved, and the lack of cultural talents etc. When we use VAR model to estimate FDI's effect on promoting the value-added of cultural industry from 2002 to 2012, the results indicate that foreign investment does promote cultural industries, but the effect operates with a lag. Foreign investment needs a period of time to form a positive effect on cultural industries. To this end, under the premise of safeguarding national cultural security, China should further adopt more liberal policies, perfect the legal system, optimize the structure of foreign investment and encourage foreign investment taking part in the construction of China's cultural industry.

Keywords FDI • Cultural industries • VAR model

1 Introduction

In recent years, the central government has intensified the policies to support for the cultural industry, and introduced a series of incentive policies to encourage foreign investment into China's cultural industry. In July 2009, the state promulgated "Cultural Industry Promotion Plan", which provides the direction of the future development of the cultural industries. It pointed out that "to lower the access threshold, actively absorb social capital and foreign investment into the field of policy-allowed cultural industries, participate in the joint-stock transformation of state-owned cultural enterprises, form the cultural industry pattern of public

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ownership as the main body while a variety of ownership jointly development.” In February 2012, the Central Office and the State Council jointly issued National 12th Five-Year Outline for Development of Cultural reform and proposed to “absorb foreign capital into the field of laws-allowed cultural industry, encourage cultural units collaborate with the competitive foreign cultural institutions, learn advanced production technology and management experience.” The above policies and programs have a certain influence on promoting a healthy development of China’s cultural industry.

1.1 Author Information

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2 The Status of the Domestic Cultural Industries Utilizing Foreign Capital

Since China joined WTO in 2001, foreign investment has accelerated its pace into China’s cultural industry [1]. Film, television, book publishing and audio products become major areas of investment [2]. Foreign capital accelerates the expansion. However, comparing the cultural industries with other industries, it can be found that the level of cultural industries is lower than other industries by using foreign capital, which are mainly reflected in the following three aspects:

First, the proportion is lower. According to the second economic census data released by the National Bureau of Statistics, the added value of cultural enterprises participated by foreign capital only accounts for 14.2 % of the national cultural industries. China’s cultural industry practitioners are 14.32 million, while foreign-funded enterprises and cultural practitioners accounts [3] for only 8.5 % of all.

Second, the scale of investment is small. Up to the second national economic census, the sum of paid-in capital of China’s domestic cultural institutions was 45.922 billion yuan, while foreign-funded enterprises was only 1.211 billion [4] yuan, less than 3 % of domestic enterprises; domestic cultural institutions was

12.549 billion yuan, while foreign-funded enterprises was only 0.04 million yuan, less than 0.03 % of domestic enterprises; Fixed assets of domestic enterprises was 144.485 billion yuan while foreign-funded enterprises was less than 1 % of the former.

Finally, the foreign-funded enterprises are in a narrower field. The main areas of foreign investment are the film, television, entertainment and audio-visual products etc. The scale of investment is small. Up to the second national economic census, there are only 14 categories of sino-foreign cooperative publishing audio and video products, accounting for 0.01 % of the total national audio visual products; 8 television series, accounting for 0.03 % of the total television circulation; 27,000 foreign issued tapes, accounting for only 0.05 % of all total.

Overall, the proportion of foreign investment is still very low in China's cultural industry. There is a very large gap between foreign investment and domestic investment on the capital structure, proportion and fields. Foreign investment which supports for cultural industries needs to be further expanded in the future.

3 The Effect on the Promotion of Foreign Investment to the Development of China's Cultural Industry

3.1 Contribute to the Capital Accumulation of Domestic Cultural Industry

Foreign investment enters into the field of culture, which can promote the development of cultural industries in two ways: one is to provide a lot of money [5], accelerating capital accumulation of cultural industries, providing power to support industrial development; the second is to boost domestic consumption of culture, promote the growth of cultural consumption market, thereby expanding the productive value of cultural industries. In 2005, the Ministry of Culture, Press and Publication Administration, SARFT and other two ministries jointly issued "Opinions on foreign investment in the cultural field", which allows foreign investment enters the field of domestic theater building. Thereafter, China's cinema has made leaps and bounds development [6]. China's film production jumped from 212 in 2004 to 745 in 2012; film investors increased from dozens in 2004 to more than 300 now; the investment body trend to diversity and mainly are private enterprises Lord; movie box office created breaking record from 10 billion yuan in 2004 to 170.73 billion yuan in 2012, an average annual increase of 42.6 %. Revenue from cinema ticket sales only rank after the United States. China becomes the world's second largest film market.

3.2 Contribute to Enhance the International Competitiveness of Domestic Cultural Industries

Currently, the issue of independent intellectual property rights is an important limiting factor to enhance the competitiveness of China's cultural industry. China's cultural industry has very little intellectual property rights, especially in the fields of games, animation products. In the United States, Britain, Japan and other developed countries, cultural industries, cultural and creative industries started early and full developed, have become an important support of their national economy and have a large number of independent intellectual property rights. In addition, some of the production technology of key areas has been monopolized by foreign cultural enterprises, which caused a certain limit to enhance the competitiveness of China's cultural industry. Therefore, foreign capital enters into the country's cultural industry, will not only provide us with more development capital but also promote the innovation of domestic cultural enterprises. Joint ventures makes China have an opportunity access to the most advanced and innovative ideas. Under the effect of technology spillover, Chinese enterprises must be able to enhance the capability of independent innovation, master core intellectual property rights, so as to enhance international competitiveness, promote the sustainable development of the industry.

Film is a typical example, which can provide a lot of inspiration. In 2004, Hong Kong TOM Group staked \$10 million in Huayi Brothers in mainland, which not only brought millions of dollars annually for the Huayi Brothers, more importantly, introduced strategic investors, and brought first-class international business ideas. Since then, Huayi Brothers successfully introduced Hollywood Mode of Director Studio. World – renowned Studio of Feng Xiaogang and Zhang Jizhong are excellent examples. In 2009, Huayi Brothers listed on GEM as the first domestic film and television production companies. Huayi Brothers has now become the top domestic film companies. Therefore, the case of Huayi Brothers reveals successfully grasping the opportunity of bringing foreign capital into China's can achieve a win-win situation for companies and industry development.

3.3 Contribute to Improve the Technological Level of Domestic Cultural Industries

As mentioned above, cultural industry is an industry with knowledge, technology, creativity-intensive, and high technology requirements. With the foreign capital entering into the Chinese market, cooperating with domestic enterprises and joint operating with domestic enterprises, it will put their advanced production technology and advanced equipment into China's production process. According to the classification standard of technical level by the United Nations on Trade Development Commission, by the end of 2008, there are 1,204 multinational

companies investing in China, of which 684 belongs to medium technology industry, 303 belong to the high-tech industry, the higher technology industries accounted for 82 % of the total.

With the large number of outstanding international cultural enterprises joined the domestic cultural market, the scale and proportion of foreign capital investment will continue to increase, so the corresponding implant technology level will be increased. Accordingly a large number of high-tech industries will be able to bring a lot of advanced technology. In the role of business communication, turnover, market competition, technological level of China's cultural enterprises will certainly be improved.

3.4 Contribute to Build a National Culture Brand

When foreign capital enters into China, on the one hand, it expands the financing ways for domestic cultural enterprises and solves the problem of funds shortage; on the other hand it optimizes the business philosophy and develops enterprise spirit, so that some domestic companies are capable of forming their own enterprise brand in the world. Building a well-known national brand, accumulating intangible assets, cohesion enterprise culture, while could expand the company's influence at home and abroad, form inner attraction for talents, capital and projects, and further polymerize the development of enterprises.

4 Empirical Analysis on the Impact of Foreign Investment to the Development of China's Cultural Industry

Using VAR model, affected by the availability of data, the data of foreign direct investment (FDI) from 2002 to 2012 and the data of added value (AD) of cultural industry are selected respectively. Meanwhile, new time series LnFDI and LnAD are get by taking logarithmic of two time series in order to increase the stability of time series. Using the same method to determine the number of lags, we carry out Granger causality test and the stability test, establish VAR model, and finally estimate parameters.

(a) To determine the lag period and Granger test (Table 1)

Confirm the lag order as the second-order through the same operation in the first period. The result of Granger causality test is as shown above.

The results show LNFDI is the Granger cause of LNAD and growth motivation of LNAD.

Table 1 Results of Granger lag test in the third-order lag

Null hypothesis	Obs	F-Statistic	Prob.
LNAD does not Granger Cause LNFDI	11	1.35752	0.2113
LNFDI does not Granger Cause LNAD		5.3487	0.0027

Table 2 Characteristic root of polynomials

Root	Modulus
0.934075	0.934075
0.361233-0.785175i	0.864285
0.361233+0.785175i	0.864285
0.735479-0.311768i	0.798829
0.735479+0.311768i	0.798829
-0.706443	0.706443
No root lies outside the unit circle	
VAR satisfies the stability condition	

(b) Stability test

In the case of third-order lag, the results of stability test of LnGDP and LnFDI is (Table 2).

(c) Estimate of VAR model

All the characteristic roots are less than 1, so the sequence is stable. The model can be created, and the results is:

$$\begin{aligned} \text{Ln AD} &= 1.31 \text{ Ln AD} (-1) - 0.03 \text{ Ln AD} (-2) - .010 \text{ LnFDI} (-1) \\ &\quad + 0.82 \text{ LnFDI} (-2) - 1.09 \\ T : &(5.81) (-0.22) (-1.59) (2.7) (-1.54) \\ R^2 &= 0.88 \end{aligned}$$

As can be known from the regression results, LnAD in the first-order lag and LnFDI in the second-order lag have a certain promoted effect on LnAD. Parameter estimations are respectively 1.31 and 0.82, and the T-test values are all greater than 2, namely one unit LnAD and LnFDI are able to drive 1.31 unit and 0.82 unit LnAD.

LnAD in the second-order lag has a negative effect with LnFDI in the first-order lag, but T-test values are less than 2, which show the parameter estimation is not significant and the effect is not obvious.

Thus, from the model estimation, it can be known that foreign investment does impetus to the cultural industry, but the effect has hysteresis. That is foreign investment needs a period of integration to form a real positive effect on the culture industry. This requires us to be able to correctly view the role and effect of foreign capital in the future, allowing foreign investment to enter into more areas, participating in the competition and innovation of the cultural industries, helping China’s cultural industry to develop on a healthy development road.

5 The Suggestions of Using Foreign Capital to Develop China's Cultural Industry

5.1 Loosening Up Policies and Encouraging Foreign Investment

At present, lower degree, small scale and scattered fields are characteristics of utilizing foreign capital of domestic cultural enterprises. The government should further relax policy restrictions, encourage and guide the foreign capital orderly into China's cultural industries. The administrative department of culture should change the previous stringent management policy of foreign capital change the management situation which is too tight and too rigid. On the existing basis, simplify administrative procedures, delegate powers to lower levels, relax restrictions on the management policy of foreign capital, make foreign investment easier to enter cultural industry, and actively guide the foreign investment orderly into the field of culture. In the way of entering the cultural industry, it allows wholly foreign-owned, joint ventures, Sino-foreign cooperation to establish different types of cultural enterprises, such as enterprises of selling books and periodicals, packaging and printing, CD burning, art business etc.

5.2 Improving Legal System

With the deepening of China's opening up policy, the need for foreign investment in domestic enterprises will further increase. The absorption degree of China's cultural industry to foreign investment is still relatively low. In the foreseeable future, massive foreign investment will certainly into the Chinese cultural market, which will have a positive role in promoting the development of China's cultural industry. The state should create a favorable legal environment and make a good system. These laws will further improve China's system environment in the cultural field, effectively guide the behavior of foreign investment in our country and promote international development of cultural industries. Therefore, to further improve our culture laws are particularly important.

5.3 Maintaining a Leading Position in the State Economy

Cultural industry is of peculiarity, whose products have economic attributes and ideological attributes more . It can play the role of publicize ideology and political ideas. Therefore, in view of the national cultural security, opening up of culture field must follow the principle of gradual and orderly progress of the program. When doing classification guidance of culture industry, to small industries, such as

art performances, film and television production, culture and entertainment etc., we can expand the degree of openness and closely cooperate with foreign investment. To cyclical industries related to the country's political security, such as broadcasting and TV, journalism and publishing, etc., we should maintain the state economy as the dominant position.

5.4 Optimizing the Structure of Foreign Investment and Improving the Efficiency of Usage

For a long time, the rigid management mechanism of cultural units, low utilizing efficiency of asset, slow update speed of technology and poor performances of enterprises all seriously affected the performance of China's cultural enterprises. In order to infuse foreign capital, we should accelerate the renewal of ideas of cultural enterprises and improve operational efficiency, which is an effective way to enhance the international competitiveness of China's cultural industry. Therefore, while using foreign capital, we must absorb international first-class management experience. With the means of capital operation, improve the efficiency of foreign investment, so as to enhance the level of China's cultural industry development.

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Foreign Protocol Control: The New Challenges Faced by Our Country's Industrial Security

Xiao Sun and Yuan Zhang

Abstract The main contribution of this paper is to point out what means the foreign capital is adopted to circumvent the current government regulation, and how to solve this problem. In recent years, China has a strict policy of foreign access. Over the years, government censors became an inevitable path when the foreign investment getting into key industry areas. However, the current review system is not improved and perfect, foreign companies generally choose to make a compact in order to avoid government regulation. Getting help of a group of controlling agreements with clear purposes, foreign companies could join some industry which is prohibited or restricted in China's "Catalogue for the Guidance of Foreign Investment Industries". This is a new and substantial threat for China's industrial safety. Facing the new situation, the traditional government censorship measures appeared to be inadequate, we must seek a breakthrough and innovation system from a macro perspective by selecting regulatory tools.

Keywords Protocol control • Regulation • Judicial review

1 The New Situation of Foreign Investment

Involving the safety of industrial economy, China has a strict policy of foreign access. Over the years, government censors became an inevitable path when the foreign investment getting into key industry areas. However, the current review system is not improved and perfect, foreign companies generally choose to make a compact in order to avoid government regulation. Getting help of a group of controlling agreements with clear purposes, foreign companies could join some

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industry which is prohibited or restricted in China's "Catalogue for the Guidance of Foreign Investment Industries". This is a new and substantial threat for China's industrial safety. Facing the new situation, the traditional government censorship measures appeared to be inadequate, we must seek a breakthrough and innovation system from a macro perspective by selecting regulatory tools.

2 The Hazards of VIES

On the structure of the transaction, VIES are composed of multiple contracts or steps, and the operating mode is extremely complex. Firstly, the foreign capital and the actual controller of the target company will set up a joint venture in overseas with a special purpose. Subsequently, this company could establish a shell company in the territory. Next, the shell company and the target company will sign a series of agreements which may transfer the control and income rights of the latter. Eventually, foreign investment and the actual controller can control the target company cooperation, and foreign company will control the target effectively.

By dismantling an illegal transaction into multiple independent steps and contracts, foreign investment can be easily to achieve the goal avoiding regulations and washing transaction chain. In this mode, target companies can transfer a substantial interest of company owners to shell companies under foreign control in the form of agreement [1]. The content of the agreement usually contains provisions relating to shareholders' rights, such as the transfer of the right to appoint or remove directors, major decisions of the company and core assets. In order to avoid government censorship, the transfer of these rights will be accomplished through a number of agreements in the decomposition. Every single protocol can only be transferred to one or several minority rights, through a gradual approach emptied target companies, shell companies ultimately have the final control on foreign capital. In short, the conclusion of the agreement will not only achieve an effect similar to the actual acquisition of equity, bur also avoiding the administrative review from regulatory agencies. Therefore, academia calls this mode as Protocol Control. Through these methods, the target company can get outside financing with the special purpose company's identity and way of casing, but this makes the foreign capital getting opportunities to penetrate into some industry security field in our country.

3 Defects of Administrative Review

After the new century, foreign capitals generally choose VIE strategies in security penetration to circumvent the administrative review. For economic considerations related to financing and listing overseas, class domestic technology and media companies have a strong impulse to the introduction of foreign investment and breaking the government control. With the bulk of domestic companies in overseas

financing successfully through this mode, now the foreign capital is already indirectly holds control over a significant proportion of the domestic company. In order to prevent the serious trend, the Chinese government promulgated the “notice” of the State Council on the establishment of the security review system for merger and acquisition of domestic enterprises by foreign investors in 2011; the Ministry of Commerce in August the same year supporting the introduction of the “Department of Commerce implement the provisions of the relevant security review system acquisition of domestic enterprises by foreign investors.” These two documents form the basis of a preliminary legal framework which are used to prevent foreign capital evading government censors, and for the first time, VIE had been included in the scope of government censorship.

However, the method probably will not be effective only by extending the scope of the government’s review to solve the control problem. On the one hand, foreign VIE needs to sign a number of contracts and going through multiple programs, it requires cooperation and collaboration during multiple administrations [2]. However, the current system still lacks appropriate coordination mechanism, it is not easy to achieve the timely, efficient and unified supervision [3]. On the other hand, it is difficult for administrative review to regulate secret VIE behaviors effectively. Secret protocol control protocol is often presented in the form of a drawer agreement. Secret drawer agreement is actually signed and executed, but it is inconsistent with the agreement with the surface. Because hidden in the “drawer”, the tacit agreement is reached only on the surface, but there is no real agreement. Therefore, regulatory authorities can hardly investigate the truth. In practice, such agreements are widespread, and the files are not in the company’s official depositary. This leads to the current administrative review system cannot find or identify the existence of drawer agreement effectively.

4 Introduction of Judicial Review

For the protocol control regulation, in theory, there are two paths to choose from, including a review of government review to access and judicial review. Government review means certain government agencies review the controlling agreements which are signed by foreign capital and domestic companies, the one who matches the requirements of industrial safety could be approved, otherwise, it will get a veto administrative regulation measures, so does the measures promulgated by Ministry of Commerce [4]. Judicial review means, stakeholders prosecute the foreign companies who were suspected of violation of industrial safety, and court ruled that the legality and effectiveness of VIE.

Typically, western nations take two measures to regulate, but more rely on the judicial review. For example, in terms of judicial review, the U.S. courts often review VIE separately to distinguish attributes between function and purpose [5]. In the early history, America court more review VIE’s purpose, so a lot of decisions of protocol control were completely negative. But in this case modern company law

usually make a distinction, functional reviewing by court is more loosely, but the purpose review is extremely harsh when relating industrial safety. For the function to protocol control, only in certain circumstances expressly prohibited by law protocol control will be determined to be invalid. In addition, as long as the protocol itself does not violate any third party interests, that will be effective. But for the purpose of property, when the agreement is essentially posing a threat to national security, the court will usually decisively identify trading invalid. Compared with the judicial review, government regulation focuses on the collection and disclosure of information. Controlling agreement must be disclosed by law, and accept the administrative jurisdiction and supervision by disclosing consolidated financial statements to assist regulatory mechanisms.

At present, China has not set up the appropriate mechanism for judicial review, lawsuits filed by stakeholders is still lack of a clear legal basis. Compared to government censorship, judicial review has unique institutional advantages. In this regard, China should improve the relevant laws and guidelines for judicial review from the following two aspects. First, we should improve the laws about the definition of the Act, such as the legality of the VIE, and nail down that VIE cannot infringe upon the interests of third parties by the method of exemplified; the law should define the legal scope of the agreement which is related to the Company's shareholders' rights or the powers of internal configuration; formal requirements, substantial elements, disclosure and filing methods of VIE also should be specified provided in law. Second, the national industrial security policy should be used as one of the types of public order In the "Civil Law" and "Contract Law", and make it become a clear standard of judicial review. This court can determine whether the VIE is contrary to public order, and ensure the implementation of the national industrial safety policy under premise of the expressly authorized in law.

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Research on Security of China's Insurance Industry

Huaiying Yu

Abstract The sustained and rapid development of economy and society led to the growth of the insurance industry and its commitment to social responsibility. This paper presented the sustained and rapid development of the insurance industry, analyzed the security issues with it, such as investment risks caused safety problems, insufficient solvency problems, integrity issues etc., proposed that the nation, insurance companies, societies and individuals, as the main behavior subjects should be concerned about and endeavor to overcome this problem.

Keywords Insurance industry • Industrial security • Research

1 Introduction

As China's insurance industry entered a new stage of deepening reform, full open, and accelerated development, it has been increasingly widening its service area of economic society and undertaking more social responsibility: from Wenchuan earthquake to Centennial Olympic event in Beijing, from cross strong insurance system implementation to real estate investment lifted, from coping to international financial crisis to participating in medical dispute mediation, from Endowment community investment to new agricultural collection construction, from agricultural insurance coverage expanded to environment responsibility insurance pilot started. . . the insurance industry is working to improve the scientific development and the ability to serve the global economy and society, and has made remarkable achievements in exploring the development road with Chinese characteristics in the insurance industry and safeguarding the people's livelihood. Now, standing at a new starting point, the insurance industry has entered a new stage, while China is becoming an emerging insurance power. In 2011, in the face of many difficulties [1] and challenges, the insurance market maintained a smooth development-achieved premium income of 1.43 trillion Yuan nation widely, of which property insurance premium income 461.79 billion Yuan, an increase of 18.5 %; life insurance

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premiums 969.98 billion Yuan, an increase of 6.8 %. Total assets of the insurance companies in China reached 5.9 trillion Yuan.

From January to August in 2012, China's insurance industry achieved a total premium income 1.072724 trillion Yuan, an increase of 6.52 %, among this, the property insurance 353.56 billion Yuan, an increase of 14.72 %; life insurance 719.164 billion Yuan, down 2.91 %.

On August 3, 2011, the CIRC issued a formal "Outline of the development of China's insurance industry in the 12th five-year". This "Outline" made it clear that in 2015, the National Insurance premiums will reach 3 trillion Yuan, insurance penetration be up to 5 %, insurance density reach 2,100 Yuan per person, the insurance industry's total assets reach 10 trillion Yuan.

2 Security Issues

For China's insurance industry, while maintaining the momentum of sustained and rapid development there are also many security issues.

2.1 *The Insurance Investment Risk Caused by Security Problems*

Low Profits of Insurance Funds Investment rate of return of the long-term insurance funds is low, further reducing the attractiveness of insurance products for consumers and the insurance industry's competitiveness, but also directly pose a threat to the insurance company's solvency. In 2013 regulatory policies of insurance funds and Training Conference, Vice Chairman Chen Wenhui of CIRC said the return on investment of insurance funds in 2012 was 3.39 %. Historical data showed that from 2006 to 2011, the insurance industry funds yields were 5.8 %, 12.1 %, 1.9 %, 6.4 %, 4.8 % and 3.6 %, most of which are lower than the five-year bank fixed deposit interest rate. Obviously the investment rate of return in 2012, hit a new low since the 2008 financial crisis. Comparing 2011 and 2012, insurance funds investment yield were 3.6 % and 3.39 %, while five-year bank fixed deposit interest rate were 5.50 % and 4.75 %. As it shows, the yield gap is quite big. CIRC Chairman Xiang Junbo stressed that in the analysis of labor place situation of this industry, 2013 is likely to be the most difficult year! This is evident from the data of insurance funds.

The Insurance Fund Structure Is Irrational CIRC statistics showed that since 2003, bond investment proportion in this 10 years remained between 45 % and 55 %, while the proportion of bank deposits experienced a parabolic change, from the over 80 % before 2004, to 16.5 % of minimum, rose again in past 2 years to 33 % by the end of 2012. This series data indicates that, in recent years, the

proportion of investment assets insurance company has not changed a lot. If the bond yield investments and bank deposits are relatively stable, so much the proportion of equity assets due to the fluctuations in the yield huge returns on investment of insurance funds caused a great impact. CIRC data shows that in 2012, the loss of configured equity risk capital assets was 8.21 %, which reached 11.66 % in 2008, while in 2007 and then again in 2009 the profit of configured equity risk capital assets reached 46.18 % and 22.71 % respectively. Because the yield of fixed-income assets cannot cover the cost of debt, insurance agencies have to rely on stock market investments to obtain excess returns. When the stock market is down, due to the lack of high yield alternative investment products to stocks, insurance company cannot quickly adjust to the configuration, which brings huge risks and losses.

2.2 The Problem of Inadequate Solvency

For the insurance industry insufficient solvency is vital. The existence of the problem is caused by this industry's own attributes- the asymmetry in the rights and obligations arising from both sides on the time series, that the insurance companies first obtain the right to receive premiums, the insurance commitments agreed upon future events compensation or insurance payment obligations; while the insured obligation to pay insurance premiums in order to enjoy the right to compensation or insurance payment in the future. Therefore, once the insurance company suffers solvency deficiency or even bankrupts, most insurance contracts have not yet expired, which means the insured will lose the insurance, suffering financial losses.

2.3 The Issue of Integrity of the Insurance Industry Safety Hazard

Integrity plays a crucial and extraordinarily significant role in the development and security of the insurance industry. Not only the insurance company should maintain good faith, the insured, the insured person and the insurance intermediary also should comply with the principle of good faith. (a) insurance companies with no integrity blindly chase premium income with measures of deliberately concealing important obligations or misleading consumers to buy credit insurance products. Deliberately concealing unfavorable important information related to the contract from the policyholders and the insured will eventually leads to economic losses for both the companies and policyholders, but also causes damage to the image of the insurance industry. (b) some customers with speculative psychological tendency use social media for vulnerable groups, and fraud. This kind of action would

seriously disrupt the normal function of insurance market. (c) the insurance market is a serious information asymmetry market and place like this, principal-agent problem is particularly prominent. In pursuit of their own interests, insurance intermediaries are bound to make some use of asymmetric behavior which is contrary to good faith.

These above problems do not only directly affect economic benefits and service efficiency, also cause unnecessary legal disputes, consume unnecessary human and financial resources. What's worse, it would affect the survival and development of company, impede the normal functioning and even add a new factor of social instability.

2.4 Frequent Natural Disasters Would Increase the Burden on Insurance Industry

In recent years, the frequent occurrence of natural disasters caused heavy losses to life and property of people in disaster areas, also increased the burden on insurance companies. Nowadays, the insurance industry must be ready to face catastrophe losses caused by new global climate change [2]. After the Wenchuan earthquake in 2008, the insurance companies have launched a major natural disaster insurance, such as the responsibility of the insured person in a higher incidence of natural disasters such as earthquakes, tsunamis, landslides, mudslides and other causes of death or disability.

In post financial crisis era, China's insurance industry is facing greater challenges. The real impact of the financial crisis on China is not in the first 2 years after the financial crisis outbreak, but in recent years, which we call the post-financial crisis era. In post financial crisis era, the economic slowdown has brought amount pressure on insurance industry. Dramatic fluctuations in financial markets lead to greater pressure on adequate funding, risk management and prevention. Fluctuations in the interest rate cycle would increase the challenge and risk for matching assets and liabilities matching. In addition, risk of pricing for insurance [3] products is also increased. After the outbreak of financial crisis, there has been deterioration in the credit market in certain degree with many cases of default, which has been greatly affected export market of insurance industry.

3 Recommendation

In the development of china's insurance industry, many security hazards do exist, so the state, enterprise and society should be concerned about them and try hard to overcome. As a country, while vigorously promoting the development of China's insurance industry, to focus on the development and changes among the major

factors in the insurance industry and its impact on safe and stable operation, to build a better security system in insurance industry, not only affect social and economic security, but also is an important measure to actively cope with the impact of trade on China's economy due to international economic upheaval [4]. Insurance companies should hire and train a large number of professional talents of financial management and a reasonable capital structure, strive to improve the profitability of the insurance funds, so as to enhance their solvency while maintaining operations. Insurance companies should do business in itself the fiduciary duty. Under the present situation of China's insurance awareness is not strong, as soon as the credit crisis happened in insurance companies, not only a large number of policyholders will be discouraged, also the development of China's insurance market will suffer a big hit. Society and individuals should enhance their insurance awareness, reduce prejudice against insurance companies, and not bear resentment against them because of individual insurance fraud cases.

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Analysis of Chinese Luxury Market Status Quo

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Abstract In the economic globalization, and along with the economic prosperity, the people's living standard increased rapidly. Nowadays China has become the world's largest consumer of luxury goods. At the same time Chinese luxury consumer market is showing an unprecedented active and prosperity. The development of Luxury industry in China is showing a colorful character, towards more wide fields. However, we should realize that during the predatory market expansion of international luxury brands. Chinese domestic luxury brand is still in the immature stage of development. Luxury development still lacks of consumption driven, and many old-famous traditional brands are facing bankruptcy risk. Therefore, through the introduction of the world famous luxury brand, we should to learn concepts and marketing model, from these successful brands. Also we need to stress attention and support to domestic luxury brand. In order to make the Chinese characteristics brands. And improve the influence of Chinese culture in the international high-end market.

Keywords Luxury • Luxury consumption status • Tariff regulation • Income inequality • The Chinese old-famous brands

1 Analysis of Chinese Luxury Market

1.1 Chinese Luxury Market Status Quo

Although there has been a downturn in the global luxury trade after the 2008 financial crisis, the Chinese market has bucked the trend and maintained a 22 % increase [1]. Under the wave of global financial crisis, many luxury giants have seized Chinese market, the life-saving straw, tightly. The fast development of Chinese luxury market is both an opportunity and a challenge to the rather weak domestic luxury brands.

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In the presence of such a huge consuming market, the intervention of nation's relevant departments conforms to the developing trend of future market, responds to nation's policies to increase imports, helps to adjust our nation's huge trade surplus, and facilitates a balanced developing of trade. The establishing of Luxury Trade Committee will also promote domestic consumption upgrading and push the internationalization of Chinese luxury industry forward.

1.2 Problems of Chinese Luxury Market

Huge Price Gap Between Domestic and Foreign Luxury Brands In February 2013, CCTV exposed that luxury industry had been reaping colossal profits from China [2] and pointed out that our people's blind craze for luxury goods had caused huge price differences between domestic and foreign market. For example, the same LV's middle sized bag is sold for 9,550 RMB in China, 7,880 RMB in the U.S. and only 6,525 RMB in France. Meanwhile, the prices of the same product in English and Korean markets are also lower than the price in Chinese market. The reason which has caused such big differences is not only that Chinese customs charge high tariffs but also that the luxury industry has defined China as a new market which has a thriving high-end products purchasing power and the luxury industry has adapted a high-pricing marketing strategy. And Chinese consumers always believe that foreign products are better than domestic ones. Their distorted buying psychology, the more expensive the product is the more they want to buy it, has encouraged those big brands to raise their price.

Massive Spending Power Outflow In the downturn of global luxury market, though the Chinese luxury market is developing fast, many domestic spending powers have flowed to overseas market. 2012, during Spring Festival, Chinese people's overseas accumulated expenditure was 7,200 million dollars, far more than the expected 5,700 million dollars. New record had been made.

World Luxury Association found out from a survey for Chinese mainland outbound consumers that 72 % of people believe there's price advantage to buy luxury [3] overseas; 69 % believe there are more product types in overseas markets; 45 % choose to buy luxury goods overseas to enjoy authentic local products and services.

Income Inequality Has Significant Influence on Luxury Trade [4]: as the developing of Chinese economy, our import trade has showed new characteristic of luxury import surge. According to Staffan B. Linder's theory that trade is determined by demands, I think income inequality is also an important reason of the recent luxury import surge. Also, this phenomenon is causing the increase of luxury/necessity ratio. According to the statistics of Chinese consumers brand choices [5], the more developed the exporting country is, the bigger influence our income inequality has on luxury import.

2 Chinese Luxury Market Developing Solutions and Suggestions

2.1 Give Play to Tariff's Influence on the Luxury Market

The huge price gap of luxury goods between domestic and foreign markets has attracted wide attention to the Chinese luxury tariff. Since China has adopted circulation tax system, we charge VAT, GST and import tariff when importing goods. In my opinion, Commerce Department and Treasury Department both have their point of view.

First of all, tariff, as an important fiscal policy of a nation's international trade, mainly aims at adjusting import and export to maintain a trade balance. Besides, import tariff is an important part of state revenue. Luxury goods have big demand elasticity. If we just simply raise luxury import tariff, then luxury goods retailers will transfer those expensive tariff to our consumers, thus leading to the rise of luxury price in domestic market. Eventually, domestic consumer surplus will decrease and consumer welfare will reduce.

2.2 Suggestions on the Chinese Domestic Luxury Brands

About how to develop Chinese domestic luxury market, I think we should pay attention to several points:

Emphasize Brand Popularization. Chinese enterprises need popularization when exploiting luxury brands. They shouldn't always emphasize that their products are for royal uses but to really enhance the quality of their products so that their products can help their consumers to live better.

Pay Attention to Online Marketing Strategies. In an age of information where E-commerce is developing rapidly, luxury marketing strategy should be diversified, not restricted to exclusive stores and high-end shopping malls only. Domestic brands should promote online marketing to attract young consumers.

Improve Luxury Second Hand Market. To see from nowadays Chinese economic development structure, rich people are still the minority. The mass middle class will be the major consuming force of luxury goods. And to see from the development of international luxury market, the improving of luxury second hand market also fostered the thriving of luxury market. Second hand market is welcomed by the middle class for its cheap price and convenience. It realized the recycling of luxury products.

3 Conclusion

For an enterprise, its manager should see that a successful luxury brand is the combination of technic innovation and culture inheritance. They respond to each other and help each other to form the soul of a luxury brand. The manufacturer should on one hand take in the successful experience of foreign luxury brands, enhance technic innovation to make good qualities of domestic products and build brand's tangible value; on the other hand, inherit and develop brand culture to make domestic brand an eternal classic and at the same time a major force to lead the trend. This will be the brand's intangible value.

Similarly, when international luxury brands are invading our Chinese market, our young consumers should stop just admiring their products but to find out the culture hidden in their products and change from a consumer to an appreciator and to a creator to create a real Chinese luxury brand and culture.

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