Growth Mechanisms and Sustainable Development of the Chinese Economy

Comparison with Japanese Experiences

Edited by
Xinxin Ma · Cheng Tang

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ISBN 978-981-19-3857-3   ISBN 978-981-19-3858-0 (eBook)
https://doi.org/10.1007/978-981-19-3858-0

This Palgrave Macmillan imprint is published by the registered company Springer Nature Singapore Pte Ltd.
The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Preface

The contents in the book are based on two research projects. The first is the project titled "Comparison Research of Economic Growth and Development between China and Japan," undertaken by the Institution of Economics Research, Chuo University. Certain authors who contributed to this book are members of the research project. We have conducted several workshops in Tokyo, Japan since 2019. We acknowledge all participants and speakers at these workshops.

The second is a long-term international research project, which we have been working on since 2013, and is based on several research projects of the Japan Society for the Promotion of Science (JSPS). The studies in the book were conducted with support from several research grants offered to the editor (Xinxin Ma) as a project leader, such as the Grant-in-Aid for Scientific Research (B) from JSPS (Grant number: 20H01520 from 2020 to 2022, "Economics Analysis on Social Security Policies in China: Empirical Studies Based on Survey Data"); Grant-in-Aid for Scientific Research (C) from JSPS (Grant numbers: 16K03611 from 2016 to 2018, "The Impact of Minimum Wage on the Wage Gaps between Local Urban Residents and Migrants in China," and 25380297 from 2013 to 2015, "The Research on the Wage Gaps between Public Sector and Private Sector in China"). It was also supported by several research grants offered to the editor (Xinxin Ma) as a project member, such as Grant-in-Aid for International Joint Research Program from JSPS ("Pension Reform in the PRC: Searching for a New Framework Based on

Japanese Experiences" from 2017 to 2019); and Grant-in-Aid for Scientific Research (B) from JSPS (Grant number: 20H01489 from 2020 to 2024, "Comparison Study on Corporate Governance Systems Between China and Eastern Europe"). We have held international workshops and conferences in Japan (Kyoto, Tokyo) and China (Beijing, Zhejiang) each year since 2015, and we would like to express our gratitude to all participants for their useful suggestions and comments on these studies.

We particularly acknowledge all contributors to this book for their hard work, efforts, and cooperation. The contributors in this book are excellent scholars in their respective research fields in Japan or China. We are proud of their participation in the research projects. They are our supervisors, colleagues, co-researchers, and friends. Their assistance, lessons, encouragement, and warm friendship helped and promoted the publishing of this book.

Finally, we wish to thank Jacob Merge, Anusha Srinivasan, Jayalakshmi Raju, and the staff at Palgrave Macmillan for their interest in our research, and for their encouragement and extensive editing in publishing our research.

Tokyo, Japan
August 4, 2022

Xinxin Ma
Cheng Tang

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Abbreviations

ACFTU	All-China Federation of Trade Unions
AI	Artificial Intelligence
APL	Average Labor Productivity
ASIF	Annual Surveys of Industrial Firms
CASS	Chinese Academy of Social Sciences
CFPS	China Family Panel Studies
CHARLS	China Health and Retirement Longitudinal Survey
CHFS	China Household Finance Survey
CHIPs	Chinese Household Income Project Survey
CHNS	China Health and Nutrition Survey
COE	Collectively Owned Enterprises
CPC	Communist Party of China
CPTPP	Comprehensive and Progressive Agreement for Trans-Pacific Partnership
CSP	Civil Servant Pension
DID	Difference-In-Differences
FDI	Foreign Direct Investment
FE	Fixed Effects
FGP	Flying Geese Pattern
FMV	Fair Market Value
FOE	Foreign-Owned Enterprises
GATT	General Agreement on Tariffs and Trade
GDP	Gross Domestic Product
GHQ	General Headquarters
GLF	Great Leap Forward
GMM	Generalized Method of Moments

GRP	Gross Regional Product
HGE	High Economic Growth Era
HRS	Household Responsibility System
ICC	International Competitiveness Coefficients
ICT	Information and Communication Technology
IMF	International Monetary Fund
IoT	Internet of Things
IV	Instrumental Variable
IWRM	Integrated Water Resource Management
JHPS	Japan Household Panel Survey
JPSC	Japanese Panel Survey of Consumers
KHPS	Keio Household Panel Survey
LID(s)	Land Improvement District(s)
MPL	Marginal Productivity of Labor
NBS	National Bureau of Statistics
NRPS	New Rural Pension Scheme
ODA	Official Development Assistance
OECD	Organizations for Economic Cooperation and Development
OLS	Ordinary Least Squares
OPEC	Organization of the Petroleum Exporting Countries
PFS	Pollution-Discharge Fee System
PIM	Participatory Irrigation Management
POE	Privately Owned Enterprises
PPP	Polluter Pays Principle
PSM	Propensity Score Matching
R&D	Research and Development
RCA	Revealed Comparative Advantage
RCEP	Regional Comprehensive Economic Partnership
RDD	Regression-Discontinuity Design
RE	Random Effects
RTA	Relative Revealed Comparative Trade Advantage
SECEP	Survey on Employment Conditions of Elderly Persons
SEZs	Special Economic Zones
SL	Subsistence Level
SOE	State-Owned Enterprises
SWB	Subjective Well-Being
TFP	Total Factor Productivity
TP	Turning Point
TVEs	Township and Village Enterprises
URBPI	Urban Resident Basic Pension Insurance
WTO	World Trade Organization

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CHAPTER 1

Introduction

Xinxin Ma and Cheng Tang

1.1 Background and Purpose of This Book

1.1.1 Background of This Book

This book provides partial answers to the following questions: How has the transition phase shaped the Chinese economy since 1978? Do the processes and mechanisms of economic growth and development differ between China and the developed countries (e.g., Japan)? Are the experiences of Chinese economic growth valuable to other developing countries and emerging economies?

Regarding the goal of economic development in a society, Amartya Sen advocated a broad view of freedom, one that encompasses both processes and opportunities, and the recognition of "the heterogeneity of distinct

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_1

components of freedom" (Sen, 1999). According to Sen's Development as Freedom theory, development is defined as both constituting development and being instrumental to it. The instrumental freedoms include *political freedom*, *economic facilities*, *social opportunities*, *transparency*, and *security*, which are all different but inter-connected. Rapid economic growth during the market-oriented reform period in China has developed the nation's freedoms. However, issues in the Chinese economy remain, which may negatively affect its future sustainable economic growth and development. This book investigates and discusses these issues, which include institutional barriers in markets (e.g., monopolies or state-owned enterprises, division and discriminations caused by household registration system [*hukou*], and incomplete urbanization), low agricultural production efficiency, gender gaps in opportunities, fragmentation of social security systems, and income inequality.

Based on Sen's development theory, we summarize various scenarios in the economic growth and development of China as a background to this book.

First, regarding economic facilities, since 1978, China has promoted market-oriented economic reforms such as developing industrialization by accelerating exports, promoting foreign direct investment, promoting marketization by implementing the Household Responsibility System in rural areas, and enforcing the state-owned enterprise reform and technology innovation in urban areas (Brandt & Rawski, 2008; Garnaut et al., 2018; Lin et al., 1994). Based on competitive advantage hypothesis, export-led growth model, and new economic growth theory, these reforms may lead to economic growth. In fact, China's average real GDP growth rate reached 9.2% from 1978 to 2021, which generated a rapid economic growth.

In particular, the Chinese economy in the 2000s experienced a major turning point, which is named the "high economic growth period," similar to what Japan experienced in the 1970s and 1980s. From 2003 to 2007, the GDP growth rate was consistently reported in double-digits, which played a leading role in the growth of the world economy. In 2010, China's GDP surpassed that of Japan, making it the world's second largest economy after the United States. However, it is argued that the rapid growth of GDP was mainly fueled by government expenditure and export trade. Comparatively, household contribution to consumption rates and total factor productivity were lower (Aoki & Wu, 2012; Brandt & Rawski, 2008).

The Chinese economy entered a structural turning point during 2010s, during which it initiated the new-normal reforms by enforcing supply-side reform. The government has adjusted the industrial structure to promote the development of the tertiary industry (Lin, 2014; Zhang & Chen, 2017). Chinese economic growth previously depended on the industrialization and modernization of the manufacturing industry, however, the tertiary industry has been considerably developed in recent years. The tertiary industry contributed 45.5% of the GDP in 2012, which was the first time that the tertiary industry's contribution exceeded 45.0% and that of the secondary industry. In 2021 it reached 53.3%, while the secondary industry contributed 39.4% (NBS, 2021). The improvement of productivity in the tertiary industry has become an important policy issue in promoting future economic growth in China.

Second, in terms of social security, which aimed to realize socialism during the planned economic period, the Chinese government established a social security system, which mainly targeted the urban *hukou* residents. The Rural Cooperative Medical System covered all rural *hukou* residents. In the market-oriented reform period, with the reform of state-owned enterprises, the Chinese government reformed the social security systems to change the government security to social insurances (Ma, 2021a, 2022). The Chinese government reformed the Urban Employee Basic Pension in 1995 and the Urban Employee Medical Insurance in 1998 to cover employees with urban *hukou*. However, since the 2000s, this has been expanded to include migrant employees with rural *hukou*. The government also established new social security systems such as the New Rural Cooperative Medical Scheme in 2003 and New Rural Social Pension Scheme in 2009, which covers rural residents, and the Urban Resident Basic Medical Insurance in 2007 and the Urban Resident Pension Insurance Scheme in 2011, which covers urban self-employed workers and non-working urban residents. Recently, public pension and medical insurances have been expanded to cover the entire population of China legally. Additionally, the program guaranteeing basic living standards (*dibao*) and policies on living subsidies were implemented for both urban and rural residents.

From an institutional perspective, China established a "universal pension and medical insurance" system. However, because society and institutions are segmented by *hukou*, the workplace sectors (e.g., government organizations, state, private, and foreign owned enterprises, and those who are self-employed), the social security systems are also segmented. Therefore, establishing a true universal social security system, such as those in Japan, is still an important issue for the Chinese government (Ma, 2022).

Third, regarding social opportunities, education and health are used as the indicators of human development that determine an individual's capability (Nussbaum & Sen, 1993; Sen, 1999; United Nations, 2021). According to the new growth model (Lucas, 1988; Romer, 1994), the population's education level and health status are important factors of the nation's human capital, and they can considerably affect economic growth through innovation and technological progress. Additionally, inequality (e.g., income inequality, gender opportunity gaps, and discrimination) may also affect equal opportunities in a society. We introduce the changes in health, education, and inequality in China as follows:

Education

China's basic education has seen substantial improvement since the foundation of the People's Republic of China. In 1949, the proportion of illiterate and semi-illiterate population was more than 80% of the total population. The enrollment rate of school-age children was approximately 20%. Universal education, especially universal primary education, was the top priority in education for the government during that time. Although many large-scale literacy campaigns were implemented nationwide and the goal was to popularize primary education within a short time frame, primary education was still not universally accessible during the planned economic period.

During the market-oriented reform period, the Chinese government promoted the development of education. In 1982, the government promulgated the "Constitution of the People's Republic of China" and proposed compulsory, universal primary education. The "Compulsory Education Law" was promulgated in 1986 to ensure the implementation of compulsory education and provide nine years of compulsory education.

On January 1, 2001, the Chinese government announced that China was close to achieving the strategic goals of universal nine-year compulsory education and eliminating illiteracy among young and middle-aged people, as scheduled. At the end of 2000, the population coverage rate of the nine-year compulsory education reached 85%, and the illiteracy rate of young and middle-aged people dropped to below 5%.

In 2006, the newly revised Compulsory Education Law clarified the principle of free compulsory education and established the main mechanisms that guarantee the funding and reform of compulsory education. It exempted students undergoing compulsory education in less-developed Western rural regions from tuition and miscellaneous fees starting from the spring semester in 2006. Currently, compulsory education is free for everyone.

As a result, from 1949 to 2018, the gross enrollment rate of preschool education in China increased from 0.4 (1950) to 81.7%, and the net enrollment rate of primary school increased from 20 to 99.95%. The gross enrollment rate in junior high schools increased from 3.1 to 100.9%, and the gross enrollment rate in senior high schools increased from 1.1 to 88.8%.[1] According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO),[2] China has greatly contributed to the global enrollment rate of primary education, from 80 to 84%. From 1990 to 2005, the world's illiteracy decreased by 100 million, of which 90 million was in China. Among the nine developing countries with large populations, China is the only country that has fully realized nine years of compulsory education.

Health status

As previously mentioned, the national health status has greatly improved since the implementation of public medical insurances, which covered both urban and rural residents in China.

For example, in China, there were substantial decreases in mortality rates per thousand as follows: neonatal mortality declined from 33.1 in 1991 to 3.5 in 2019, infant mortality declined from 50.2 in 1991 to 5.6 in 2019, mortality of children younger than 5 years declined from 61 in 1991 to 7.8 in 2019, and maternal mortality declined from 80 in 1991 to 17.8 in 2019 (NBS, 2021).

Accordingly, the considerable increases in education and health status levels have improved human development in China. The increase in high-quality laborers has become a "population bonus" that contributes to the rapid growth of the Chinese economy (Cai, 2016). However, compared with developed countries, levels of human development in China are lower. In tems of the human development indicators (HDI)[3] published by the United Nations in

2021, Norway is ranked first (HDI:0.957), Japan is ranked nineteenth (HDI:0.919), and China is ranked eighty-fifth (HDI:0.761, United Nations, 2021).

It should be noted that China has become a population ageing country. The population aged 65 and above has increased from 4.2% in 1982 to 7.0% in 2000, and to 10.5% in 2015 (NBS, 2021). Along with developed countries in East Asia (i.e., Japan and Korea), China is a developing country with an ageing population (*weifu xianlao*). Therefore, the Chinese government faces new challenges in improving the sustainable development of education and healthcare services to address labor shortages in an ageing society (Ma, 2021a).

Inequality
In China, income inequality has widened along with economic growth (Sicular et al., 2020). According to data from National Bureau of Statistics (NBS), the Gini coefficient in China remained high at 0.46 to 0.49 from 2003 to 2019. The Gini coefficient increased from 0.479 in 2003 to 0.491 in 2008, and then decreased to 0.462 in 2015. However, since 2015 the Gini coefficient has been increasing again. According to the Kuznets hypothesis, the relationship between economic growth and income inequality is an inverted U-shape. This means that there is a turning point in the Kuznets curve, and that the income-inequality will decrease as the economy continues to grow. For example, income inequality decreased during the high economic growth period in Japan (Minami, 2008). Currently, in China, income inequality is still a serious issue. Because it may lead to an unstable society, reducing income inequality is an important policy issue for the Chinese government.

Additionally, along with economic growth and development, the gender gap in labor markets and families have declined in developed countries with the exceptions of Japan and Korea. However, the trend in the change in the gender gap in China is reversing. During the planned economic period, there was a decline in the gender gap in China, whereas it has widened during the market-oriented reform period and the gap has further widened in the recent times (Iwasaki & Ma, 2020; Ma, 2021b). The gender gap has become an important issue in China because it affects equal opportunities in society, the labor market, and families, and influences the decline in fertility rates, which may lead to labor shortages in the future.

Lastly, regarding transparency and political freedoms, the Chinese government has gradually reformed to focus on economic transformation (Lin et al., 1994). Several new laws and regulations were established and implemented to promote market functions. Compared with the planned economic period, it appears that institutions have become more transparent and that political processes have become more democratic during the market-oriented reform period. However, in China there are several issues on transparency and political freedoms that still need to be addressed (Liu et al., 2022; Xu, 2015). With the expansion of economic development, it is expected that there will be more transparency and political freedoms in the future. However, the focus of this book is on the growth and sustainable development of the Chinese economy from an economics perspective. Therefore, we will not discuss the non-economic issues further. Detailed studies from both economic and political perspectives should be conducted in the future.

1.1.2 Purpose of This Book

The purpose of this book is to clarify the growth mechanisms and determinants of the sustainable development of China's economy empirically. Japan's economy greatly developed in the 1970s and 1980s, and it became the first developed country in East Asia. Therefore, this book aims to investigate the processes and mechanisms of economic development in China since the ongoing market-oriented reform period, which started in 1978 and compare them with Japan. Therefore, a comparative study on economic growth and development between China and Japan will be conducted with the expectation that Japan's experience will provide profound insights, which will allow us to understand the mechanisms of Chinese economic growth in depth.

It should be noted that there are considerable background differences in the economy (e.g., the initial economic or non-economic conditions) (Nagakane, 2002) that may affect the process of economic growth and development. For example, unlike Japan and other developed countries, in the socialist planned economic period (1949–1977), the Chinese economy was controlled by the government and enterprises were either state or collectively owned. The market did not play a role during that time. During the market-oriented reform period, the Chinese government gradually implemented a transition by promoting economic reforms, while still maintaining the dictatorship of the Communist Party of China as a political system (Aoki & Wu, 2012; Brandt & Rawski, 2008; Ma, 2019; Ma & Iwasaki, 2021). It is argued that “the hybrid of market economy and command economy is a transition system that can either advance to a more matured economy based on the rule of law, or move backwards to state capitalism, and even to crony capitalism” (Aoki & Wu, 2012, p. 3). We will investigate the economic growth and development of the Chinese economy based on orthodox economic theories, such as new classical economics, as well as consider the specific features of the Chinese economy.

1.2 Main Content of This Book

This book consists of two parts: Part I, which is titled “Mechanisms of Economic Growth and Development” (Chapters 2–9), contains eight chapters that investigate institutional transformation and its impact on economic growth and development from long-term historic and macroeconomics perspectives. Part II, which is titled “Mechanisms of the Behaviors of Corporations, Households and Individuals” (Chapters 10–17), comprises eight chapters that investigate institutional transformation and its impact on the behaviors of corporations, industries, households, and individuals using a variety of survey data, including national cross-sectional and longitudinal data. Part II further provides a discussion on the mechanisms, based on results from microeconomics empirical studies conducted in China and Japan. The main content of each chapter is as follows:

This chapter summarizes and compares economic growth in China and Japan and discusses the important issues on sustainable economic development. It introduces the main content of each chapter to clarify the purpose and structure of this book.

Chapter 2: Economic development can be defined in various ways. However, when we want to compare development processes and outcomes across politically different nations, using only two perspectives will facilitate this comparison: development from a narrow scope of purely economic perspectives, and in a broader sense from politico-economic perspectives. Chapter 2 establishes an analytical framework for studies on comparative development, referring to the trend within development economics. This chapter provides an overview of several characteristics of China's development processes and outcomes vis-à-vis Japan's long-term development experiences since the Meiji Restoration, and particularly since the end of World War II. Finally, the study in this chapter selects two specific aspects to contrast the economic development of both countries: the rural–urban division and developmentalism. Considerations of these aspects lead to the conclusion that there are essential differences in China and Japan's development trajectories. The chapter concludes by pointing out that although China's development experiences include many similarities to the Japanese development path, its economic development has been deeply affected by political agendas in contrast to Japan's development which was mainly based on the market economy.

In Chapter 3 the key factors of China's economic growth from its opening-up to the outside world are identified. Two conclusions merge as follows: first, at the catch-up stage, the main goals of both economies were to earn foreign exchange and achieve current account surpluses. Japan earned foreign exchange by producing and exporting industrial products based on the legacy of prewar manufacturing industries. It was also enthusiastic about obtaining foreign advanced technology but was reluctant to introduce foreign capital. China expanded export production by relying on foreign-invested manufacturers and simultaneously reformed key non-market economic practices in line with the market economy. Second, at the development stage, both economies faced the challenge of eliminating excessive savings and dealing with external imbalances. Japan recovered from a serious recession after the oil crisis by expanding exports. However, it encountered a severe backlash caused by a huge trade surplus with the United States. Japan responded by voluntarily introducing export restraints and import expansions, and by increasing local production in the United States. After Japan's bubble economy burst, China became the main economic challenger to the United States, which was dissatisfied with China's non-competitive trade practices. Finally, the author points out that the United States–China trade war eventually evolved into a security-inclusive conflict, which continues in the current period. Furthermore, Japan has endeavored to adapt to international economic regimes, whereas China has begun to show greater interest in global governance as an economic powerhouse.

Chapter 4 provides an overview of the influence of digitalization processes on related policies in China. It examines the characteristics of

China and the impact of digitalization on employment, both domestically and in other Asian countries including Japan. The main conclusions are as follows: First, China's digital economy has been rapidly growing since the end of the 2000s. Data from internet-based payment technologies indicate that, compared to other nations with similar levels of economic development, China uses digital services more. Second, jobs in rural areas and those performed by older workers may be replaced by future innovations considering the impact of digitalization on employment. Third, digitalization strengthens China's authoritarian regime. It is important to note that the same strengthening effect occurs in other countries with authoritarian regimes. Fourth, Chinese IT companies are eager to expand their activities in both domestic and foreign territories, and their investments in unicorn companies in Southeast Asia are especially noteworthy.

Chapter 5 : Feeding an enormous population has been the greatest challenge for Chinese agriculture, and it has achieved remarkable development in agriculture since the late 1970s. Technological and institutional transformations are significant driving forces of continuous development in agriculture. However, small-scale farm households, whose farmlands tend to be fractionated and spatially dispersed, still mainly operate and manage farms in China. These characteristics of Chinese agriculture are generally common in East Asian counties, including Japan. Chapter 5 provides a comparison of the development paths and agricultural policies of China and Japan. The results reveal that the development of agriculture tends to follow a common trajectory, but the socio-economic conditions and practical policies of Chinese agriculture have unique features. China follows the same path as Japan, transforming from land-saving to labor-saving technology, however, specialized operators using large or medium-sized tractors provide mechanical services in China. The share of leased farmland in China has surpassed that of Japan, and administrative enforcement has facilitated further transactions in China. Moreover, China's agriculture has been supported by cyclical policies, and thus, raising minimum support prices for major grains to protect agriculture has been intensifying since the late 2000s. This is also practiced in Japan, but to a lesser degree.

In Chapter 6, financial development in Japan after World War II is traced and insights into recent financial development in the Chinese market economy is provided. Financial innovations are defined, in accordance with Schumpeterian theory, as a revolutionization of financial markets. The financial history of Japan after World War II is divided into three periods: (i) The high economic growth period, (ii) bubble economy and the lost ten years, and (iii) financial innovation in the twenty-first century. It traces the financial liberalization in Japan up to the formation of the bubble economy owing to the high economic growth era. Thereafter, the authors concentrate on the causes and results of the economic collapse in both the real estate and stock markets in Japan and review the situation in China. Japan's financial restructuring of its banking system after the bubble burst, provides lessons on the financial control to the real estate and other asset markets for China.

Chapter 7 focuses on the human capital agglomeration effect and regional inequality in China and Japan and conducts an empirical study using the official data of the two countries. The study shows that labor migration is thought to have been driven by employment-seeking behavior during Japan's high economic growth period. It is advocated that the reason for this migration can be explained to some extent by the Todaro model, which shows that labor migration occurs based on expected wages, that is, the amount of income to be earned in the future or in the present. The empirical results for China show that the effect of the absolute beta convergence on income inequality from 1991 to 2004 is not significantly. However, the effect of conditional convergence is significant when considering the human capital accumulation effect. In addition, the effect of the foreign development investment and trade effects, which affect regional economic development, are also significant. The authors propose that according to Japan's experience, the development of infrastructure, the establishment of production and development bases in rural areas, and the development of infrastructure for ICT technology in the future, will help raise incomes in rural areas and reduce income inequality in China.

Chapter 8 : As a consequence of rapid economic growth since the transition to a market economy, China has been facing diverse and serious environmental problems. Chapter 8 presents the achievements of China's water environmental policy and resource management through case studies with comparisons to Japanese experiences. It focuses on water, which is not only a key driver of economic and social development but also an essential element of the natural environment. The study, reported in Chapter 8, first reviews the evolution of environmental policies in both countries to show that they have been shifting from ex post regulatory measures to integrated water resource management and toward more sustainable and integrated watershed management. It further examines three examples of water environmental policies during the high economic growth period in both countries: the emission surcharge system based on the polluter pays principle, inter-sectoral water rights transfer, and participatory irrigation management at the rural community level. Finally, the author discusses the policy implications from the case studies and the challenges and future prospects for the post-economic growth and population decline phases in China and Japan. In addition, the author points out the cost-sharing problem for the operation and maintenance of water utilization facilities in the post-economic growth period.

In Chapter 9, the surplus labor in China and Japan is calculated based on the Lewisian dual economy model. It calculates the number of surplus laborers, investigates the change in wage differentials in China and Japan, and decomposes the wage differentials between migrant and local urban workers in China using official and survey data. The results suggest that with the economic development surplus labor decreased from 1990 to 2005 in China, which indicates that the Chinese economy is approaching the Lewisian turning point in the current period. In contrast, the Japanese economy passed the Lewisian turning point around 1955. In Japan the wage differential between skilled and unskilled workers decreased after the 1950s, whereas the wage differentials increased in China. The decomposition results, based on the Blinder–Oaxaca model, indicate that the discrimination against migrant workers widens the wage differentials between migrant and local urban residents in China, suggesting that the Chinese labor market is segmented by the *hukou* system. The authors suggest that in accordance with the Japanese experience, to promote sustainable economic development and reduce the income inequality between rural and urban residents, removing system barriers (e.g., *hukou* system) has become an important issue for the Chinese government.

Chapter 10 provides direct empirical evidence to answer two questions: What drives industries? Why do some industries upgrade faster than others? Although some industries rapidly expand after being established, others do not develop well even after several years. Using the longitudinal-firm and national-consumption survey data, this study investigates how consumption, specifically consumption values and variations, impacts manufacturing industries' total factor productivity (TFP) growth and new patents, and how this mechanism influences the extent to which the private sector benefits from domestic consumption. The results suggest that (i) both consumption values and variations in Chinese cities are associated with TFP growth and increased patents, and that this affects both the agriculture and manufacturing industries; (ii) the profit rate is significantly associated with consumption, and exports do not contribute to industrial upgrading in the domestic market; (iii) the share of the private sector affects consumption significantly because it benefits from the consumption of new products introduced by the private sector. These results provide direct empirical evidence to support the current policy enforced by the Chinese government to expand domestic demand and consumption.

Chapter 11: Enterprise ownership, especially the role and performance of state-owned enterprises, has attracted worldwide attention and is a significant part of the Chinese economy. As the market is segmented by public and private sectors, it is assumed that the wage determinate mechanism differs according to enterprise ownership and that there is a wage gap between these two sectors. Chapter 11 focuses on state-owned-enterprise reform and the wage gap between public and private sectors. The study in this chapter first summarizes the change in China's wage policies and then investigates the determinants of wage gaps between public and private sectors from 2002 to 2018. It points out that although China shifted to a marketization economy, the wage-determination reforms were implemented late compared to the price reforms of production and consumption goods, and consequently the wage gap between the public and private sectors has widened since the 2000s. Thereafter, using data from the Chinese Household Income Project Survey of 2002 and 2018, and a decomposition method, the changes in the wage structure and determinants of the wage gaps between the public and private sectors from 2002 to 2018 are analyzed. The authors find that the wage gap between the public and private sectors narrowed during this period and that the wage gap was wider for the low-wage group than for the middle and high-wage groups for the same period. When the wage gaps are decomposed into explained and unexplained components, the contribute rates of the former increased greatly, whereas those of the latter decreased from 2002 to 2018, suggesting that the difference in the endowment (especially education) is the main factor in the wage gap. The results demonstrate that the influence of market mechanisms on wage determination has increased, and the human capital level has become higher in the public sector during the market-oriented reform period. Finally, the authors compare the wage gaps between public and private sectors in Japan and introduce the policies to reduce the wage gaps in Japan, which provides policy implications for China.

Chapter 12: Unlike the situation in developed countries (e.g., Japan, the United States, and United Kingdom) and transition economies (e.g., Russia), despite the drastic transition from a planned economic system to a market economy, the de facto leadership of the Communist Party of China (CPC), remains dominant in China's political sphere. Using survey data from the Chinese Household Income Project Survey of 2002 and 2013 and a decomposition method, Chapter 12 counducts an empirical study investigate the following three issues: (i) What determines the probability of participation in CPC organizations? (ii) How much is the wage premium of CPC membership? (iii) How do the differentials in human capital endowments and returns contribute to the formation of the wage gap between CPC members and nonmembers? Three new findings emerge. First, the probability of joining a CPC organization is higher for male, well-educated workers and those whose parents are CPC members. Second, holding other factors constant, CPC membership maintained a wage premium in 2002 and 2013. Third, the explained component including the difference of endowment is the main factor that contributes from 66.2 to 85.0% (2002) and from 91.0 to 95.3% (2013) to the wage gap between CPC and non-CPC members. The results indicate that as the economic system transition advances, the influence of market mechanisms on wage determination becomes greater and the wage premium of CPC membership decreases.

Chapter 13: Although many studies analyze the impact of labor unions on wages that focus on either China or Japan, there are no comparison studies for China and Japan, and no studies that use longitudinal data for China. The study reported in Chapter 13 empirically analyzes the impact of labor unions on wage levels and distributions using longitudinal survey data from Japan and China for the first time. The results indicate that union worker wages are nearly 5% higher than non-union worker wages after controlling for fixed effects in China. In comparison, union worker wages are over 10% higher than non-union worker wages in Japan. The study in this chapter also invetigates the trend of union effects on wages in China and Japan using interaction terms and a pooled OLS model and find that the increases in union effects are more substantial in China and weakened in Japan. In contrast, the trend of union effects totally changes for both countries in a fixed-effects model, indicating that the trends in union effects on wages cannot explain the differences in unionization rates for both countries. The results are significant for policy-making. In many developed countries, including Japan, the participation rates of labor unions have declined, and the significance of labor unions has been challenged. However, in China, not only does the participation rate increase with strong support by the Chinese government, but labor unions also contribute to wage increases. The authors point out that this empirical result suggests that support by the government might be useful to facilitate the growth of labor unions and wage increases. However, they emphasize that the effect labor unions have on reducing the wage gap is minimal in China.

Chapter 14: According to the World Economic Forum and the World Bank's Gender Gap Index, the gender gaps in Japan and China are large. Both the Japanese and Chinese governments are trying to reduce the gender gap. However, it appears that the problem has not been adequately addressed. Chapter 14 focuses on employment equality policies and gender wage gaps in China and Japan. Using official and survey data, the study in this chapter reviews the promotion policies for women's employment and trends in gender wage gaps in China and Japan. It investigates the determinants of gender wage gaps in China and Japan based on the Blinder-Oaxaca decomposition methods. Two main conclusions emerge. First, in China, although the Chinese government enforced the implementation of equal employment opportunity policies during the market-oriented economy reform period, the gender wage gap has widened since the 1980s. The decomposition results indicate that the contribution rate of the factor price component is greater than that of the endowment component during the period from 1988 to 2013. The decomposition results based on the latest survey data from Chinese Household Income Project Survey of 2018 also confirm the conclusions. Second, in Japan, the gender wage gap has narrowed over the long term (from 1976 to 2017). The endowment components greatly contribute to the reduction in the gender wage gap. However, the change is caused by the change in the endowment of women rather than a relative change in the gender endowment difference. Additionally, after 2000, the factor price conmponent also contributes to the reduction of the gender wage gap. The results indicate that according to the Japanese experience, to reduce the gender wage gap in China, the enforcement of equal employment and family friendly policies are important.

Chapter 15 reports the results of an empirical study conducted to investigate the impact of public pension policies on the labor force participation of older adults in China and Japan and provides a discussion on social security policy reforms on labor market outcomes in both countries. The Chinese government implemented the New Rural Pension Scheme (NRPS) in 2009 in rural areas. This study uses five waves of longitudinal survey data from the Chinese Health and Nutrition Survey and a quasi-experiment method to conduct an empirical study on the effect of NRPS on the labor force participation of older adults in rural China. It also investigates the impact of public pensions on the employment of Japanese men aged 60 to 69 years using six waves of data from the Survey on Employment Conditions of Elderly Persons. The major conclusions are as follows: First, in China, NRPS decreases the probability of older adults participating in the labor force. Compared to the short-term policy effect, the negative effect diminishes in the long term. Second, in Japan, from 1980 to 2004, a higher pension benefit resulted in a corresponding lower employment probability. However, this negative effect has decreased in recent decades. The results indicate that for China and Japan, public pensions may reduce labor participation and that establishing a public pension, while still considering the negative effects on the employment of older adults, is important for both Chinese and Japanese governments. The experiences of Japanese pension reforms since the 1970s may provide evidence for the Chinese government to reform public pensions in the future.

In Chapter 16, the determinants of high saving rates of households from the perspective of bequest motives are examined using the latest survey data from the China Household Family Survey and Japan's postal savings survey data. To address the endogeneity problem, this study used the mean value of bequest motives of other families in the same community as the instrumental variable of the household bequest motive and the propensity score matching method. The result shows that, similar to Japan, the bequest motives in households with older Chinese adults positively influence the family saving rate, especially rural household savings, middle and low-wealth households with older adults, especially those whose children work outside of the government system and who have low education levels. This indicates that the bequest motives of older adults in China are more altruistic. This study assists in explaining the reasons for the high savings rates of older adults in China and provides a reference for future policymaking. Considering the strong altruistic bequest motives, it is essential to maintain economic growth, broaden employment channels, and strengthen employment security, thereby alleviating the householder's concerns over their children's future and reducing the family's saving rate. Finally, the authors suggest that future studies could investigate if Japan's experience of levying inheritance taxes to diminish the positive effect of bequest motives on household savings could be successfully applied in China.

Chapter 17: With economic development, the Chinese economy has rapidly grown. Although the individual and household income levels have risen, the income inequality has widened compared to the early stages of economic development in China. How does income-level inequality influence individuals' well-being? Using longitudinal data from China Family Panel Studies of 2014, 2016, and 2018, and the Japanese Panel Survey of Consumers from 1995 to 2013, Chapter 17 reports the results of an empirical study that tests the absolute income and relative income hypotheses and compares the results between China and Japan. The main conclusions for China are: (1) based on the results using cross-sectional data, both the absolute and relative income hypotheses are supported, similar to those in most previous studies. (2) Based on fixed-effects and dynamic fixed-effects models, the absolute income hypothesis is not supported, whereas the relative income hypothesis is strongly supported. (3) The relative income hypothesis is supported among all the groups. However, the effects of relative income on subjective well-being differ by group and are greater for low-educated men, rural residents, and those in less-developed regions. Second, comparing the hypothesis testing results between China and Japan, the absolute income hypothesis is supported in the case of both Chinese and Japanese married women. However, the testing results on the relative income hypothesis differ between China and Japan: the hypothesis is significantly supported in China, whereas it is unsupported in Japan. The authors suggest that the Chinese government should consider Japanese experiences to improve Chinese subjective well-being and implement and enforce policies that promote economic growth as well as reduce income inequality.

1.3 Significance and Contributions of This Book

This book is significant because, first, we investigate the process of economic growth and development from both macroeconomic (Chapters 2–9) and microeconomic (Chapters 10–17) perspectives. It examines important issues in depth to explain the great transformation of the Chinese economy during the market-oriented reform period.

Second, we compare China and Japan by investigating the mechanism of Chinese economic growth and development based on neoclassical economic theories and locate the common and divergent patterns in Chinese economic growth compared with economic growth in Japan. This book is the first to focus on these issues from long-term and multiple perspectives.

Third, based on the principle of "evidence-based policymaking,"[4] we included empirical studies that used official data (Chapters 2–9), national individual and household survey data including national cross-sectional survey data (Chapters 9, 11, 12, and 14–16), longitudinal data (Chapters 13 and 17), and firm survey data (Chapter 10). The results of the empirical studies, which were based on the latest survey data and advanced econometric methods, provide highly credible academic evidence. These empirical results can let us to understand the influence of policy changes on the behaviors of corporations, households, and individuals in depth. The latest national individual and household survey data provides current information to explain the recent behaviors of entities in Chinese and Japanese economies.

Fourth, the studies in this book are based on various orthodox economic theories, such as development, agricultural, labor, international, family, and transition economics. Different methodologies are used in this book including policy research, empirical, and case studies, which can provide rich evidence from multiple perspectives.

Finally, we also focus on the policy implications based on the comparative studies between China and Japan and provide policy suggestions to deal with the problems in the Chinese economy based on Japanese experiences. Therefore, this book makes considerable academic and social policy contributions, and will be of interest to scholars, policymakers, and readers interested in the Chinese and Japanese economies.

Notes

1. The data was obtained from the website of Ministry of Education People's Republic of China. http://www.moe.gov.cn/jyb_xwfb/s5147/201909//t20190926_401046.html. Accessed March 15, 2022.
2. The data was obtained from the website of the United Nations Educational, Scientific and Cultural Organization (UNESCO). http://data.uis.unesco.org. Accessed March 15, 2022.
3. The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable, and having a decent standard of living. The HDI is the geometric mean of normalized indices for each of the three dimensions, which include life expectancy at birth, years of education for adults aged 25 years and more, expected years of education for children of school entering age, and gross national income per capita.
4. Evidence-based policymaking is an approach that helps people make well-informed decisions about policies, programs, and projects. It puts the best available evidence from research at the heart of policy development and implementation (Davies, 2004; Davies et al., 2000).

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PART I

Mechanisms of Economic Growth and Development

CHAPTER 2

Chinese and Japanese Development Process Compared: Economic and Politico-Economic Perspectives

Katsuji Nakagane

2.1 Introduction

In this chapter, we attempt to provide an overview of the features of China's economic development, in contrast to the Japanese experiences, from a long-run perspective. From an economic point of view, China seems to have been trying to catch up with Japan, although their political systems and surrounding international environments were different. In the beginning, they were agriculture-based, peasant-dominant, industrially underdeveloped economies, but have been following a different path in their development history.

There are many books on economic development in China and modern Japanese economic history. However, books comparing the development

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_2

experiences of both countries in detail, as well as extensively, are few. Minami (1990) may be the first and full-fledged work to compare many aspects of the development experiences between these two countries from an economic perspective. He explains China's outcomes in economic development, from agriculture and industry to external trade, as well as its economic institutions, in contrast with the corresponding Japanese experiences. His comparisons of the two economies' development experiences are orthodox and based on traditional economic theory.

Our interest is in the uniqueness, unprecedentedness, and extraordinariness of China's development experiences. These include the radical movement of the Great Leap Forward and the People's Communes with its catastrophic aftermath, the Cultural Revolution that destroyed the society causing huge sacrifices, dramatic institutional changes after Mao's death, historically rare long-run economic growth resulting in the "Chinese miracle," and the astonishing advance to the global top two today, etc. Should we admit that the Chinese economy has been totally "abnormal" or "irregular"? If so, we cannot apply existing development economics to contemporary Chinese history. However, a more reasonable conclusion is that it can be explained by general development theories, but not perfectly. China's development experiences since 1949 can be explained partly by textbook development economics and the historical path that developed economies have passed, but partly by China's own uniqueness.

To identify the characteristics of China's development experiences, it is necessary to set up a frame of reference. Textbooks of development economics can be such a frame, but various comparisons with modern Japanese economic history can also be good tools to recognize the particularities and generalities of the Chinese development trajectory. Modern Japan and China are in East Asia and have shared a variety of developmental experiences, although at different times and in different ways.

The remainder of this paper is organized as follows. First, we conceptualize the notion of economic development to create an analytical framework for contrasting China's development experiences with those of Japan's (Sect. 2.2). We then select several features of China-specific policies and institutions that were not or rarely implemented in Japan (Sect. 2.3). Next, we discuss two well-known development topics and contrast the development patterns of the two countries (Sect. 2.4). Finally, we discuss two issues characterizing China's development, namely, the rural–urban divide and developmentalism, and the causes of the fundamental differences in the development paths of these two Asian economies.

Last but not the least, we specify and designate the period to be targeted in this chapter. The period after the systemic transformation started was our concern. Accordingly, for Japan, we targeted almost 150 years, from the Meiji restoration in 1868 to the present, with two sub-periods: pre-WWII and post-WWII. For China, we consider a period of almost 70 years from the funding of New China to the Xi Jinping regime (1949–2020), with two sub-periods: the Mao era (pre-reform period) and the Deng era (post-reform period).

2.2 Comparison of Development Processes

Economic development has been defined in various ways, but its textbook definition seems to have fundamentally changed, probably since the late 1980s. Meier surveyed the historical trend of development economics, describing the evolution of development economics over the past 50 years (from the 1950s to the 1990s) by two generations (Meier, 2001). The first generation of development economics, which flourished during the period roughly between 1950 and 1975, regards economic development as an increase in per capita income. Development economists of this generation, represented by Ragnar Nurkse, Albert Hirschman, Hla Myint, John Fei = Gustav Ranis, and W. W. Rostow, tacitly regarded the market as a failure in the development process. At the same time, they tended to focus on capital formation, because underdevelopment was generally recognized as having occurred due to insufficient physical capital.[1]

However, since environmental protection became an urgent global issue in the 1980s, the notion of economic development has tended to be more inclusive than purely economic. Meier goes on to say that the second generation of development economics emerged around the late 1970s, when the notion of economic development gradually changed. Some economists placed more emphasis on "government failure" and insisted on "getting the price right" or activating market mechanisms in development policies. Some development economists tended to pay more attention to the quality of labor, such as education, health, and technology, rather than physical capital itself, as before. Thus, the development goals they imagined were inclined to be more inclusive and comprehensive rather than purely economic.

Michael Todaro and Stephen Smith, for example, insisted that development in all societies must have the objective of expanding the range of economic and social choices available to individuals and nations, along with the objective of increasing the availability of basic goods and raising levels of living, including more jobs and better education (Todaro & Smith, 2003, p.23). Therefore, the meaning and objectives of economic development have now become more multidimensional. A recent trend in economic development usually included an issue of the natural environment in order to keep the economy sustainable. The concept of capital has now widened to include environmental or natural capital.

The quality of growth, not the quantity of growth, as well as the "social choices," are now placed on the central agenda of economic development. Typically, Amartya Sen emphasizes the enhancement of human capabilities as the most inevitable objective of economic development. According to him, economic development is or must be a process of expanding the entire range of human capabilities necessary for a better life, rather than a single process of income increase or poverty reduction. He stressed the concept of "development as freedom" (Sen, 2000). From his perspective, freedom, including political freedom and democracy, is both an end and a means of development. In our view, Sen's notion of economic development has explored a new stage of the second generation of development economics. It should be called development economics of the third generation in the sense that the politico-economic field of development was cultivated with much broader aspects of human life than in the previous generations.[2]

The above argument implies that there can be numerous multidimensional approaches to the issue of economic development. The concept and means of a "better life," for example, can differ across nations. In particular, when we try to make an international comparison of economic development for countries with politically, socially, culturally, and/or historically different backgrounds, it seems reasonable to approach this issue in at least two ways: either in a narrow and purely economic sense or a broader politico-economic sense.

By economic development in the narrow sense, we mean a development process, given the existing political system, for the sake of achieving economic goals, such as increasing the growth rate, minimizing widespread poverty, ameliorating income distribution, and implementing some measures necessary for these policies.

Whether such goals are realized is reflected in economic outcomes. Economic development in the narrow sense, then, is a process whereby these outcomes are produced by: (a) economic institutions, such as markets, banks, property rights, etc.; (b) economic policies, such as industrial policy, income distribution policy, fiscal policy, etc.; and (c) some environmental factors that are given, and cannot generally be altered by policymakers at all, examples of which are initial conditions, historical path, geographical location, climatic factors, such as droughts and floods, cultures including religions deeply embedded in human life, etc. The elements from (a) to (c) are all closely interrelated and structured as depicted in Fig. 2.1. The political system is treated here as a given and/or a fixed element of environmental factors. Roughly speaking, the above-mentioned "first generation" of development economics can be applied here. Politics is exogenous within this framework and does not play a central and direct role here, although it is important to determine economic goals and policies.

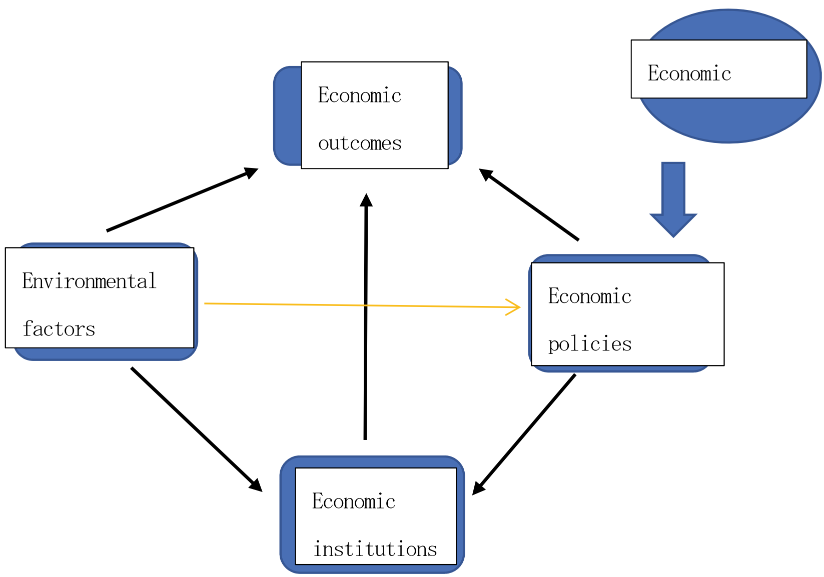

Fig. 2.1 Economic development in the narrow sense (*Source* Author's creation)

By economic development in the broad sense, however, we mean a development process whereby the overall social system, including non-economic systems, is transformed during development, in which economic outcomes are created not only by purely economic forces but also by non-economic elements such as political systems, people's beliefs, and the entire environment surrounding the social system. In this sense, the development goals are also multifaceted. They include not only economic goals, such as GDP growth, but also political and social goals, for example, the expansion of political freedom and reinforcement of national security. These goals are officially or tacitly made by the political rulers of the country concerned, as in the case of a narrow sense of economic development (see Fig. 2.2). In this case, the political system is seen as independent but closely related to economic outcomes.

The national goals of economic development for Japan since the Meiji Restoration in 1868 until the end of the Pacific War in 1945 and for China since the beginning of the normal planned economy in 1952 until today were almost the same, namely, an increase in national welfare and strengthening of military power. To achieve these goals, the two

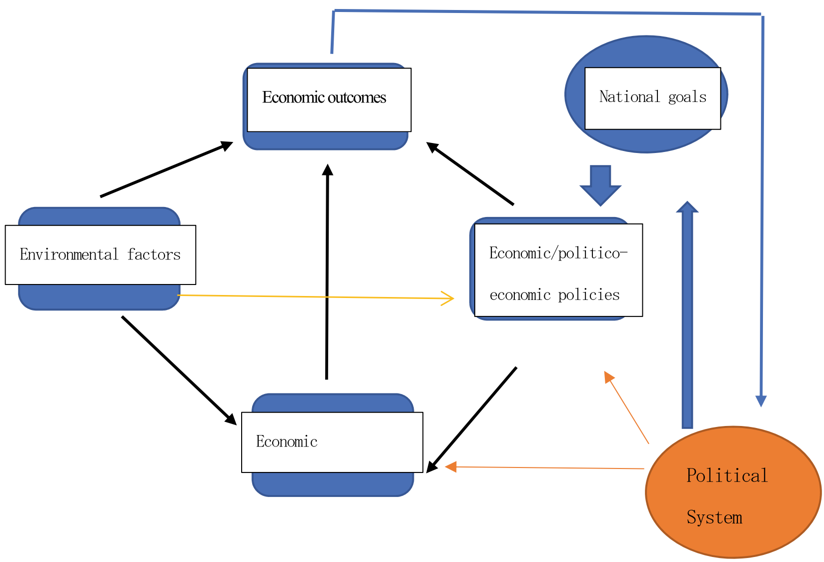

Fig. 2.2 Economic development in the broad sense (*Source* Author's creation)

countries made great efforts to industrialize their economies, albeit in different ways. Capitalist Japan tried to activate private enterprises under the market mechanism, while Maoist China was involved in expanding first the "socialist" sectors based on the planning mechanism; afterward, post-Mao China developed private plus public sectors, as well as markets, in the reform and opening-up era.

The notion of economic development in our broad sense, therefore, may certainly be too broad and ambiguous to apply to the real-world economy and history. We then concentrate on the politico-economic aspects of development. We believe that it is useful to illustrate such aspects when considering the actual development process in the real world. Any development goals and policies are, of course, colored by political motives to some extent since they are set out under certain political leadership. They may build on popular votes through democratic procedures either directly or indirectly. Alternatively, they may be decided only by a single dictator or an autocratic regime. Any institution, too, is usually created by certain political interests; economic institutions, as exemplified by state-owned enterprises (SOEs), are generally rooted in political interests.

It should be noted that the political system in this broad sense is endogenous rather than exogenous, unlike in the narrow sense. It usually reflects economic outcomes through popular votes or trust in the decisions made by political leaders. If economic performance satisfies popular demand, political leaders are said to be trusted by the people, and their regime can be stabilized. If, however, the economy cannot grow while inflation is rampant, such leaders would lose popular support even in an autocratic regime, and as a result, would finally have to resign or be expelled by the people.

If economic development in the broad sense can reflect historical experiences in most developed countries, then it may be interpreted as equivalent to the so-called "modernization" process. They share universal values, such as democracy, human rights, the rule of law, and political freedom, along with rising incomes and the elimination of nationwide poverty. However, this view is not in fact shared by the Communist Party of China (CPC, hereinafter the Party) leaders, who regard such values as those of "Western origin," inappropriate for the Chinese real conditions (*guoqing*). They instead believe that they can effectively develop their economy rather in an autocratic way, seeking reinforcement of national prestige in the world order, or building of the new "Chinese Kingdom" as their political goal in place of those universal values. They assert that any economic outcome is made possible solely by social stability, which in turn requires strong political leadership, rather than through a time-consuming, complicated, and often conflicting coordination mechanism in a democratic way. Economic development in the narrow sense, they firmly believe, is nothing but an effective means of realizing these essential national goals.

When it comes to China's development process, the political system exemplified by the party-ruled authoritarian regime is dominating the overall Chinese society, directly and indirectly. This regime sets national goals and norms strictly, thereby affecting every corner of every economic institution, whether public or private. Actions and activities that are essentially economic in capitalist countries are often subject to non-economic forces under this political regime in China. A typical example is the mobility of the rural population and labor, as we will observe below. Although it has recently become more relaxed, it has been rigidly controlled by the government.

China's basic political system has been fixed. The party-dominated political system has not changed substantially since 1949. However, it had to sometimes alter some essential parts of its political system, particularly after the reform and opening-up policies were adopted in the late 1970s. This was a reasonable reflection of the bad and often tragic economic outcomes during the Maoist era. In this sense, even the political system in China could be treated as an endogenous variable, as Fig. 2.2 shows, at least from a long-term perspective.

International comparisons of economic outcomes in a narrow sense are relatively simple, as certain tools of comparison are selected. Country A can be said, for example, to be growing faster than country B when a common comparative tool of Gross Domestic Product (GDP) measured in US dollars is applied to these two countries equally. It is difficult to examine why and how such a difference in outcomes appears, for example, how and what economic policies brought about such outcomes, why some institutions are effective in generating the result, and whether a certain environmental factor is significant in producing a certain amount of growth rate of each country.

What is more difficult or ambiguous is to compare the two countries' development in the broad sense, because the outcomes to be compared are different between the two countries. Take the example of a "better life," one of the typical objectives of economic development in the broad sense. In this chapter, we do not evaluate whether or to what extent an economy has achieved its national goals and/or economic objectives, nor do we discuss how superior it is to another economy in terms of accomplishing economic outcomes and national goals. Our main purpose here is to contrast the development processes and outcomes between Japan and China and to clarify the fundamental distinctions between their development processes.

Keeping this purpose in mind and based on the analytical framework illustrated in Figs. 2.1 and 2.2, let us now try to compare the economic development of the two countries from various angles as well as from a historical perspective.

2.3 Several Particularities of China's Economic Development Policies and Institutions

There have been several features of China's development policies and/or institutions since 1952, with particularities that cannot be found in the modern economic history of Japan.

2.3.1 One-Child Policy

China formally adopted this policy from 1979 until 2016 but had already started it in the early 1970s in certain regions. To control exploding childbirths, the government forced every urban couple to have only one child and fined them heavily if they did not obey this rule. In rural areas, the policy was loosely implemented in that certain regions permitted rural couples to have two children.[3] However, tragic cases of this policy had often taken place in the countryside because local cadres forced pregnant women to fulfill the annual planned target of births set by their political leaders. This policy not only led to a strong deterrence to the population increase, but also resulted in an extremely biased sex ratio due to the popular preference for boys, particularly in rural areas.

No such policy has ever been implemented in Japan; however, birth control was strongly recommended in the early 1950s, when its birth rate jumped upward as an aftermath of the end of World War II. The birth control program Japan adopted at that time was not mandatory and faded away along with the arrival of the high-speed growth period in the mid-1950s, when labor shortages gradually increased. The difference in the population policies of Japan and China during their periods of economic development reflects the nature of the population pressure in these two countries. Given the higher man/land ratio and the lower agricultural technologies, China may have been falling into the Malthusian trap before it entered a period of high growth rate,[4] so it had to employ a stricter population control policy to maintain a high savings ratio by reducing the aggregate consumption demand. At the same time, it maintained far more powerful control measures to decrease population growth compared to Japan, under much stronger political regimes and with much harsher ideological constraints. It must be noted that, as a result of this population policy, China created a certain number of "underground babies,"[5] who were born "illegally" without official permission for childbirth.

2.3.2 Agricultural Collectivization and People's Communes

Both Japan and China carried out full-scale land reforms, although the objectives and characteristics of this movement were completely different.[6] One of the differences lies in the aftermath of land reform. China conducted nationwide agricultural collectivization campaigns after the land reform was completed. Most peasants were thrown into the "high tide" of the socialist campaign, which was extended finally to organize them into "People's Communes." Mao's dream was to realize a communist society in which private property was abolished, and everyone could acquire anything he or she needed. In his eyes, People's Communes were viewed as an effective step toward constructing such a communist society, exemplified by communal mess halls where all members, in some cases even non-members incidentally coming to the commune from other villages, could eat as freely as they wanted.

However, Japanese farmers were not involved in such agricultural movements mobilized by the state. Whether before or after the land reform, they were independent individual farmers, whose nationwide organizations called "agricultural cooperatives (*nokyo*)" were not compulsory in nature, unlike the Chinese collectives. The de-collectivization drive in China in the post-Mao era showed a dramatic increase in agricultural production and household income, as farmers were allowed to become independent cultivators. They are still not allowed to own land, though, which belonged to the village as a collective property, but they could manage their farming in their own ways as before collectivization.

However, agricultural collectivization has contributed to the growth of production and income in the post-reform countryside. Under the traditional agricultural system before the land reform in China, there was no one who actively invested in building infrastructural facilities, such as irrigation canals and reservoirs. Moreover, the nationalist (Kuomintang) government was too weak in the vast area of the countryside before 1949 to restructure the traditional agricultural system. It had neither the time nor resources to engage in rural affairs when it was at the mercy of repeated wars and calamities.

In the traditional Japanese villages, however, landlords (landowners), particularly self-cultivating ones, played an important role in constructing these facilities, while simultaneously developing new agricultural technologies, such as improving farming methods and inventing new varieties (Tobata, 1964). The government was also highly active in capital formation and technological progress for agricultural development by setting up various experimental stations and investing in infrastructure.

In socialist China, collectives and communes, albeit supported in part by the government, provided farmers with new technologies and agricultural facilities. Chinese peasants were mobilized against such a collectivist background and deeply engaged in the mass construction of agricultural infrastructure without official financial aid or self-reliantly. In other words, they performed the same functions, in effect, as the government publicly carried out and self-cultivating landlords privately had done in Japan.[7]

China's agricultural collectivization did not encounter harsh resistance from peasants, as in the Soviet Union from the late 1920s to the early 1930s. Yet, it did not fully realize the official rule of "voluntary participation and mutual benefit (*ziyuanhuli*)." It proceeded through storm-like campaigns driven by local cadres in response to Mao's appeal. Most peasants were involved in these campaigns, voluntarily or involuntarily, as encouraged by Mao. When he died and Deng Xiaoping's new reform policy started, collectivized agriculture was dismantled and private farming was revived. This reveals that China's agricultural collectivization was promoted politically rather than for economic purposes.

2.3.3 Township and Village Enterprises (TVEs)

Small and self-organized industrial enterprises grew in rural China under the People's Commune System from the late 1960s to the early 1970s. These were called "*shedui qiye*" (brigade and commune-run enterprises). As communes are collective organizations, these enterprises were financially independent of the state and did not rely on the state budget.

They employed workers from among the same commune members to produce goods and materials serving local needs, such as chemical fertilizers, agricultural machinery, cement, and bricks. Their technologies were not advanced, but sufficient for local needs. These enterprises evolved into TVEs in the post-Mao era, even before the commune was formally dismantled. They have flourished all over rural China and become forerunners in the full-fledged marketization drive. Some have grown to become as large as nationwide enterprises, even absorbing foreign capital and/or acquiring state-owned firms.

There is no such counterpart in the developmental history of the Japanese countryside. In certain rural areas, small industrial enterprises, such as those processing agricultural products or subcontracting with big urban factories, have grown and are currently absorbing local labor. However, they are essentially different in nature from the TVEs in China. First, they are not as widespread as in rural China, since they are not deeply connected with rural institutions, unlike the Chinese communes. Second, they are not necessarily funded, owned, or managed by farmers themselves, even though some are established by *nokyos*.[8] Third, they were created through the market mechanism, and do not function as a driving force to marketize the overall economy, while TVEs played an important role in boosting the market economy, especially in rural areas.

2.3.4 State-Owned Enterprises (SOEs)

As a typical socialist country, the core enterprises of China's economy are state-owned. When China started its planned economy in the early 1950s, it transformed existing private firms into public ones in the name of "socialist transformations (*shehuizhuyi gaizao*)," following the Soviet development model. Private enterprises, as symbols of capitalist elements, were not allowed to work. The owners of these enterprises were forced to sell their own capital to the state in return for fixed rents. Worse still, some of them were often criticized as hateful "capitalists" during political movements, which had often been launched like the Cultural Revolution. In the Mao era, Chinese enterprises were ideologically ranked in order: SOE the highest, collectives the second, and private firms the lowest.

In post-reform China, there are no such legal ranking orders. A variety of private firms, domestic or foreign, rural or urban, have grown up, acting as major players in the Chinese economy. However, SOEs remain the core of the national economy. The energy, steel, telecommunications, transportation sectors, and military industries are all predominantly state-owned, whereas private firms produce almost two-thirds of the industrial output.

In Japan, however, SOEs were not the main players, except at the initial stage of economic development. Modern steel companies, textile factories, and coal mines were first established as state enterprises during the Meiji era, and were sold to private capitalists after the beginning of their operations. In the post-war period, the main dynamic engine of economic activities was run by private companies. Even the national railway, postal service, and telecommunications, which had long been state-owned as exceptional cases of public corporations, were finally privatized in the 1980s and the 2000s.

The difference in the roles and functions of SOEs between Japan and China is obviously associated with or originates from the distinction in their ideologies. Capitalist Japan regarded private property as the only dynamic driver for economic development, while socialist China ideologically believed in the superiority of public ownership over private proprietorship. The former regards liberty as the most fundamental principle for human behavior, while the latter believes equity or equality is the most essential basis for human life, albeit in principle rather than in practice.[9] China's actual strategy undoubtedly did not hinge on any such equity principle. Deng Xiaoping recommended, without any hesitation, in the early 1980s that the government adopt a policy to widen further income disparities to motivate every person and region.[10] This policy works quite effectively by stimulating the market mechanism that he decided to bring in as a significant economic strategy in post-reform China.

Another basis of socialist principles is planning, while capitalism is, needless to say, market-based. Socialist planning was asserted to be more effective for public ownership than for private proprietorship. Although Deng introduced into China a unique system called the "socialist market economy," the Party still symbolizes public, particularly state ownership, as an inevitable essence of socialism. It goes without saying that, apart from ideological reasons, the Party regards public ownership in practice as an effective tool to control the entire economy in its own manner.

2.3.5 Special Economic Zones (SEZs)

China established four SEZs as soon as it opened its doors to the outside world. The original idea of SEZs was learned from the experience of export processing zones (EPZs) in Taiwan and other Asian countries. China yearned for foreign currencies at that time, so it decided to promote inbound investment by foreign capitalists and accelerate exports to earn foreign exchanges. These SEZs were separated from the interior regions to guarantee that foreign capital would operate freely, according to their style. They were also introduced to obtain new technologies and a progressive but capitalist way of management. Besides the SEZs, China has established a dozen technological development zones in coastal areas with objectives highly similar to those of the SEZs.

Foreign Direct Investment (FDI) was not absorbed into the SEZs alone. All other parts of China were also quite active in attracting foreign capitalists, providing them with favorable incentives, such as tax exemptions. However, it is undeniable that this institution was a remarkable trigger for inducing a tremendous amount of foreign capital to the Chinese mainland.[11]

Such special zones for FDI have never appeared in any part of Japan during the economic development process. The Meiji government did not welcome foreign capital, although it intended to import modern technologies from Western countries. In the post-war period, the Showa government was not active in encouraging foreign enterprises to invest in the domestic economy. The necessary funds for capital formation were procured from domestic channels against the background of a high rate of national savings, although a minimal portion of domestic investments was from international aid. Some of the required technologies were imported from the market through external economic channels. In some sense, the Japanese development process may be characterized as "self-reliant," both in domestic investment and technological progress, as China had stressed during the Maoist era. The Japanese economy is not as open as contemporary China. In fact, its foreign trade dependence ratio (external trade/GDP) is far from that of China's today. Why Japan has been able to achieve this self-reliance policy is an interesting issue that deserves further investigation.

After all, China's particularities in economic development are more or less originating from its political motives and power, as well as institutions, unlike the case of Japan's development, although some policies and institutions were accelerated by market forces in the post-reform era. The economy cannot be independent of politics at any rate and in any country, but this is especially the case for China, as demonstrated more clearly in the following sections. Thus, it is necessary to examine China's experiences from the perspective of its economic development in the broad sense, as illustrated in Fig. 2.2.

2.4 Two Special Topics of Development Economics

In this section, we discuss two special topics of development economics that can provide us with clues for an in-depth comparative analysis of development histories between the two countries. Of course, there are many topics to be taken up in this regard, but the following two topics, which have often been referred to in academic journals, seem to typically characterize the differences in the development trajectories of both economies: the flying geese pattern (FGP) model and the Lewisian turning point model. These models are interlinked, especially when we look at the development of East Asian economies, as John Fei, Kazushi Ohkawa, and Gustav Ranis discovered (Fei et al., 1986). They found that Taiwan and Korea followed the same pattern of development, with time lags as Japan passed. Likewise, we may be able to observe whether China has followed Japan's development path, based on the above two models.

2.4.1 Flying Geese Pattern of Economic Development

There are several catch-up theories and models in development economics. Rostow's stage theory can also be classified as one such theory, in the sense that the less developed economies as latecomers are trying to catch up with the more developed ones, developing on the same path that their forerunners have passed. However, the most influential catch-up model is Gerschenkron's "advantage of economic backwardness." Alexander Gerschenkron discovered a historical trend that a less developed economy could catch up with, or even overtakes, the more advanced one by utilizing the advantage of economic backwardness where economically backward countries can import new technologies at low costs, or even for free, from an advanced country that had invented and utilized those technologies (Gerschenkron, 1962).[12]

Kaname Akamatsu presented a new catch-up model of the FGP based on Japan's development records since the Meiji era (Akamatsu, 1962).[13] This model consists of the following three types: (1) intra-industry type: product development within a particular developing country, with a single industry growing over three time-series paths, that is, imports, followed by domestic production, and finally exports; (2) inter-industry type: sequential appearance and development of industries in a particular developing country, with industries being diversified and upgraded from consumer goods to capital goods and/or from simple to more sophisticated products; and (3) international type: subsequent relocation process of industries from more advanced to less advanced countries during the latter's catching-up process (Nakagane, 2012).

Akamatsu's FGP model originally focused on types (1) and (2), while type (3) was introduced as an implication derived from those two types. Theoretically, as well as practically, these three types can be independent of each other. Discussing the relevance of this model depends on which type we focus primarily on. For example, if both intra-industry and inter-industry types cannot be applied well to an economy, whereas the international type alone can be adapted to the economy, it seems reasonable to judge that the FGP model cannot be fully relevant to its economic development.[14]

Many scholars have applied this model to the empirical analysis of development experiences, especially in East Asia. For example, Dowling and Cheang (2000) applied it to Asian economies until the end of the 1990s to demonstrate that it was quite useful in explaining their development process. Ginzburg and Simonazzi (2005) analyzed the development patterns of electronics in East Asia to confirm the explicability of this model. Most other authors seem to support this model in adapting to the actual development process.

As the theory of comparative advantage is based on the Heckscher–Ohlin theorem, the FGP model describes the dynamic changes in factor endowment that occur as a result of economic development, as types (2) and (3) illustrate directly.[15]

It has often been said that four flocks of geese fly over the Asian development sky. As the above-mentioned international type of this model implies, the flock flying first is Japan, followed by the NIE flock of geese (Taiwan, Korea, Hong Kong, and Singapore), followed by Thailand and Malaysia catching up with them, and the last flock of geese is composed of other relatively underdeveloped ASEAN countries.

How can we characterize China's development in the context of the FGP model? Has China followed the development path shown in such catch-up models? China was originally described as flying with the last group of Asian geese, but its rapid growth since the 1990s has made it acquire a much higher-ranking status. If China did not follow the path of the FGP model as Akamatsu had stylized, is it an extraordinary case, or is the model itself defective today?

Assuming that the FGP theory can be applied to both Japan and China's economic development at any rate, how do they differ vis-a-vis the original model? To answer these questions, it is convenient to measure the shift in the comparative advantages of products/industries in both countries. There is no direct way to calculate the comparative advantage exactly, but a simple and popular measure is to calculate international competitiveness coefficients (ICC)[16] and/or Balassa's revealed comparative advantage (RCA) indexes, or related but more comprehensive "relative revealed comparative trade advantage" (RTA)[17] indexes. By calculating the ICC, RCA, and RTA of any item of products (or industry) of each country, we can judge to a certain extent, albeit very roughly, where the country is situated in terms of the FGP of the product (or industry) concerned. Then, the relevance of the FGP model can be judged in this way.[18] As the value of external trade fluctuates year by year, not necessarily by changes in economic forces, such as factor endowment,[19] the long-run trend of those values should be interpreted as indicating the direction of the comparative advantage.

We now calculate how China's ICC and RTA values changed from 1995 to 2020 for industrial goods compared to Japan. Table 2.1 illustrates the RTA indexes of three industrial products of both countries: textiles (yarn and fabric) as a typical example of labor-intensive goods; office equipment and computers as representing technology-intensive goods; and steel as an example of capital-intensive goods. We can confirm from this table that: (a) in the case of office equipment and computers, Japan's comparative advantage has been lost since the early 2000s, while China is still maintaining its advantage; (b) in the case of steel products, Japan's level of comparative advantage is always higher than that of China's, but it has been declining gradually, while China has been gaining the advantage from around 2010; and (c) in the case of textiles and fabric, Japan has already lost its comparative advantage, while China is now maintaining a relatively high level of international competitiveness.

Table 2.1 Comparison of RTA indexes: Japan vs. China (1995–2020)

	Textile		*Office equipment*		*Steel*	
Period	*China*	*Japan*	*China*	*Japan*	*China*	*Japan*
1995–2000	−0.221	−0.04	0.299	0.282	−0.934	0.953
2001–2005	0.917	−0.005	1.455	−0.145	−1.144	1.173
2006–2010	1.764	−0.085	2.242	−0.123	0.303	1.31
2011–2015	2.138	−0.161	2.232	−0.236	0.628	1.69
2016–2020	2.369	−0.336	1.496	−0.42	0.447	1.303

Note Period average
Source Author's creation based on the data from Global Note https://www.globalnote.jp/category/9/66/, originally from OECD statistics

Next, let us see how the Chinese "goose" has been flying over the Asian sky. We calculated the five-year moving average of ICCs of four countries, namely, Japan, Korea, Vietnam, and China, for industrial products of office equipment and computers (see Fig. 2.3). We can observe from this figure that China has been flying as a goose, but it is not the last goose in the development sky. This has certainly led the industry to become internationally competitive. Moreover, this figure implies that the international competitiveness or exportability of industrial products does not necessarily respond to the level of per capita income. Economically underdeveloped countries like Vietnam are in a position to be above more developed countries like Korea in terms of the competitiveness of technologically sophisticated goods, such as computers. This suggests that the ICC, RCA, and RTA of an economy cannot necessarily reflect its real comparative advantage, or possibly that trade competitiveness is determined by factors other than factor endowment.

We skipped the calculations of ICCs and RTA indexes for other categories of industrial products, but it is not difficult to confirm that China's international trade competitiveness and comparative advantage have been rising for many other products, especially since the beginning of the twenty-first century.[20]

What, then, are the features of China's development process in the context of the FGP model, if the ICC or RCA and RTA indexes can represent the level of comparative advantage, even though very roughly? First, the above findings indicate that China is now exporting an extremely wide range of products, from typically labor-intensive goods such as

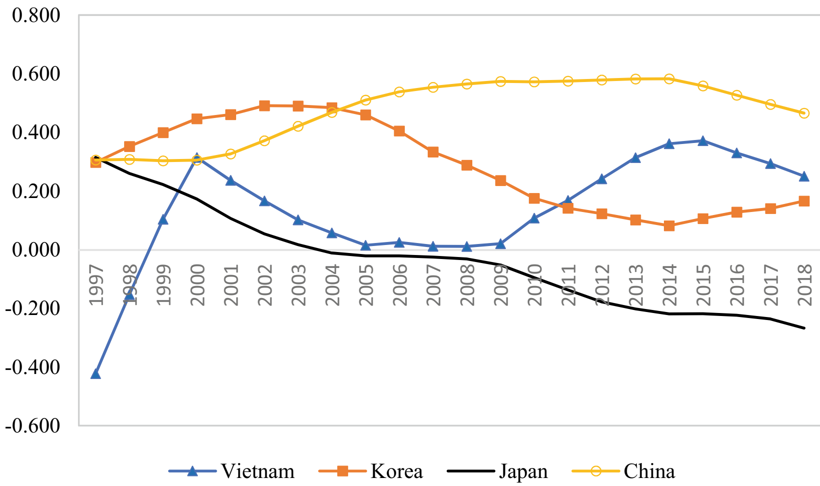

Fig. 2.3 Changes in ICCs of office equipment and computers: Vietnam, Korea, Japan, and China (five-year moving averages) (1997–2018) (*Note* Five-year moving average. *Source* Author's creation based on the data from Global Note: https://www.globalnote.jp/category/9/66/, originally from OECD statistics)

textiles and fabric and miscellaneous goods like sundries and novelties, to capital-intensive goods like steel and technologically sophisticated products such as office equipment and computers. This seems to suggest that the original FGP model, in particular type (2), does not apply strictly or exactly to China's development experiences, because against the typical sequencing orders inherent in the model, the comparative advantage does not move from labor-intensive to capital-intensive, then to technology-intensive products. Thus, the original model does not fully characterize the real features of China's development process.

This may be explained logically by the fact that China is too large to be treated as a single geographical unit because it contains a variety of regions, according to a variety of factor endowment structures within the country, as a world with various nations, from the poor to the rich. Hence, the more developed regions, such as coastal provinces, tend to produce and export relatively capital/technology-intensive goods, while the less developed regions, such as inland provinces, tend to produce and export relatively labor-intensive goods. Therefore, China, as a national unit, can be advantageous both in capital/technology- and labor-intensive products simultaneously. In other words, the FGP model should not treat China as a single monotonic unit.

As the Chinese economy develops, labor-intensive industries, such as textiles and garments, are inclined to move from more developed to less developed regions, or generally from coastal to inland areas, in search of relatively cheap labor. Thus, we can say that the original FGP model can be applied more appropriately to intra-national rather than international development sequence, as pointed out by Ang (2018).[21]

Second, the sequences do not necessarily start from imports, like type (1) of the original FGP model presupposes. Certain kinds of goods start their stage of domestic production without the prior stage of import, and some goods start their stage of export at the same time as domestic production. A typical example is the mobile phone. China started its domestic production of this item in the mid-1990s, introducing as well as learning the necessary technology. As soon as its domestic production started soaring, China began to export various, at first cheap, then more sophisticated phones to the world market.

FDI must have been deeply involved in this new FGP development pattern. An extremely large portion of China's domestic market attracted foreign capital with new technologies, which contributed to the expanding markets for new products in competition with domestic capital. We should take it for granted that the original FGP model presented by Akamatsu did not consider the roles of FDI at all, because international capital flows were not as substantial as today when he first published his seminal work so it must be revised now when we attempt to apply it to the present globalized world.

Third, although the original FGP or other catch-up models did not expect that latecomers in the development race could overtake forerunners in producing the more advanced goods, China's experiences demonstrated obviously that "leapfrogging" could take place often during an early stage of economic development through some sort of mechanism. Huawei and other state-of-the-art companies that have grown rapidly in the post-reform era are known to be at the forefront of the global technology competition, exemplified by the invention as well as application of 5G and AI technologies, even though China's average income is still lower than its competitors, such as the US, EU countries, and Japan. China's technological progress is reflected by the rapid increase in the patents approved and registered by the US government.[22]

What propelled such a high rate of technological progress and accelerated the leapfrogging process in post-reform China? Several factors should be considered in this regard.

1. FDI: As noted above, foreign capital that has rushed into mainland China after the opening-up policy brought in new advanced technologies, first to SEZs and then to the other parts of the mainland. FDI has also triggered domestic private enterprises to improve their technological progress. Kojima (2000) recommends that a "follower goose" invites the "pro-trade FDI" from a "lead goose," since this type of foreign investment could enhance the former's exportability of products. Corresponding to its factor endowment, on the one hand, it promotes the latter's upgrading of the industrial structure toward the less labor-intensive products on the other hand. However, China's reality seems to have proceeded contrary to his recommendations, because it has absorbed technologically progressive FDI inflows.
2. Burgeoning Private Enterprises: The reform policy to encourage markets enabled a substantial number of private enterprises to rise suddenly, some of which were eager to imitate and invent new products and technologies. Their activities naturally stimulated SOEs to explore modern technologies.
3. Government Incentive Policies: The government had already selectively started in the 1990s to incentivize foreign capitalists to bring in new technologies. They were often allowed to invest in China and access domestic markets, only if they agreed to provide it with advanced production technologies.[23] The government, of course, has pursued the promotion of enterprises and research institutions, public or private, to develop modern technologies by subsidizing them based on industrial policies, which we will discuss below.
4. Architecture: Since the 1990s, when worldwide technological innovations, typically IT-related, developed extensively and rapidly, product architectures have changed to a great extent. Relatively modular types of products, such as computers and Internet-related items, have been expanding, resulting in the spread and development of new products and technologies.
5. Globalization and Industrial Agglomeration: Modular products can be easily manufactured based on extensive globalization and agglomeration. For example, a vast number of personal computer

> suppliers are agglomerated in the southern part of Guangdong Province. Moreover, some parts of computers, such as IC tips, are supplied by global chains. New products and technologies have emerged against this background.

It goes without saying that a model or theory is different from reality. The historical situation of the days when this model was born is totally different from that of today: when a globalized economy is developed following extensive FDI, the IT revolution is sweeping the world, and global value chains are spreading, promoting de-verticalization and fragmentation of production processes. China is situated at the intersection of these new trends; therefore, it seems reasonable to argue that the FGP paradigm must be revised, at least when trying to adapt it to Chinese circumstances. Inderjit Kaur insists that "looking at East Asia, despite the transformed context of production activity, the regional hierarchy of value-added remains substantially unchanged; in that sense, the geese continue to fly" (Kaur, 2014). However, his insistence is centered on the international type (3) of the FGP model, that is, catch-up industrialization ordering among developing economies.

The original FGP model does not necessarily fully apply to Japan's experiences of post-war economic development. None of the products or industries necessarily follow the course depicted by the model's type (1). However, compared to the Chinese case, this model can explain relatively well the long-run history of the development path since the Meiji Restoration that Japan has passed.

Political elements are deeply rooted in the particularities of the FGP in China. We have pointed out that the vastness of the mainland, and the consequent huge disparities among regions, is closely related to the structure of China's comparative advantage. Both geographical and climatic conditions, as depicted in Figs. 2.1 and 2.2, naturally affect the income levels and factor endowments of any region. However, regional economic outcomes are generally strongly or weakly influenced by political elements, such as competition among political leaders, particularly in China. Regional investment in China has often been determined by the central leadership for the sake of developing certain specific regions, such as by the "Third Front" strategy adopted in the 1960s under Mao's strong political leadership. "Develop the West" campaign promoted in the late 1990s can be another example to show political preference in investment arrangements. Moreover, the industrial policy discussed in the next section is one of the most powerful navigators to transform FGP structures to a great extent in China.

The FGP in modern Japanese economic history, however, whether in the pre-war or post-war era, was not influenced so strongly by political forces as in China, but was determined fundamentally by a market mechanism with private initiatives. As we will reveal below, industrial policies that the Japanese government tried to implement in the post-war economy were not as effective as has been presupposed worldwide.

2.4.2 Lewisian Turning Point

The two economies in question shared a similar industrial structure at their initial stages of development: agriculture dominated the economy with surplus labor, to the extent that its wage rate is lower than the marginal productivity of labor; there also exists a dual structure in which the cities are separated from the countryside. Did they follow the development pattern of the well-known Arthur Lewis model of dualism? If so, have they passed the "turning point" in the Lewisian sense in a similar way? As far as the Japanese case is concerned, Ryoshin Minami clearly demonstrated in his oft-cited work that the economy passed the turning point around 1960, several years after the long-run high rate of growth started, based on several criteria for judging whether an economy arrived at the Lewisian turning point (Minami, 1968, 1970).[24]

The Lewisian turning point signifies the disappearance of surplus labor in the agricultural sector. It is, then, a point at which the dual structure disappears with the result that the two sectors, urban and rural, or industrial and agricultural, begin to work under a single and unified economic principle, that is, profit maximization.

What about the Chinese case? The reforms and the opening-up policy were employed in 1978, when China's rural surplus labor began to move to the cities, absorbed in industrial and service sectors, especially in the coastal areas, in the name of migrant workers (*nongmingong*). The flow of this rural labor was regarded as "unlimited" until the end of the twentieth century. However, a shortage of labor became apparent around 2004, while wages began to rise rapidly and incessantly. This phenomenon has given rise to a heated debate over whether China has passed the turning point in the Lewisian sense. On the one hand, an increase in wages appears to be a clear and significant symptom of a shortage of rural labor. It was said that the Chinese economy had already entered a new stage of labor shortage. Ross Garnaut and Yiping Huang point out, for example, "China's economic development has reached an important turning point--the ending of the so-called unlimited labor supply" (Garnaut & Huang, 2006, p. 25). The same situation occurred again in 2010, which is called the second incident of migrant worker shortage.

On the other hand, this fact cannot be considerable evidence of the turning point if Minami's criteria are applied rigidly, since the marginal productivity of agricultural labor was still lower than the "subsistence wage rate" in the countryside (Minami & Ma, 2009, 2014). Minami and Ma demonstrated that a vast amount of surplus labor still existed in rural China, although they admitted that the economy was approaching the turning point in the Lewisian sense.

In China, too, this issue has been taken up widely, and many scholars have joined in the debate as to whether the economy has arrived at a turning point. Tang Xi and Ren Zhijiang, for example, argued that China has passed the point in the sense that its agricultural labor force has decreased to a great extent, so that the economy had reached a "shortage point," although it has not yet reached the "commercialization point," a la Fei and Ranis (Tang & Ren, 2018).[25] However, Li Hao opposes this view by pointing out the existence of redundant rural labor, as well as the widening disparities in the average income between the two sectors (Li, 2012).

What prevents them from making a clear-cut judgment concerning China's turning point is, in our view, the income disparity between the two sectors. In the case of Japan, the rural/urban income disparities disappeared several years after the economy passed the turning point around 1960 (Nakagane, 2013), while a huge inter-sectoral income gap still exists in China today, albeit somewhat reduced (see Fig. 2.4). The Lewis model implies that the income gap between the two sectors must disappear, at least theoretically, after the turning point is reached since the dual structure of the labor market no longer exists in the economy. Fig. 2.4 clearly indicates that China's agricultural labor force has been shrinking, implying a tremendous amount of surplus labor that was transferred to the non-agricultural sector, whereas the ratio of urban/rural income was still as large as 2.56, even in 2020. Thus, it may be safe to say that China has never arrived at a turning point in the strict Lewisian sense.

How can we explain this paradoxical fact convincingly that the wages of migrant workers are increasing incessantly and an enormous number of

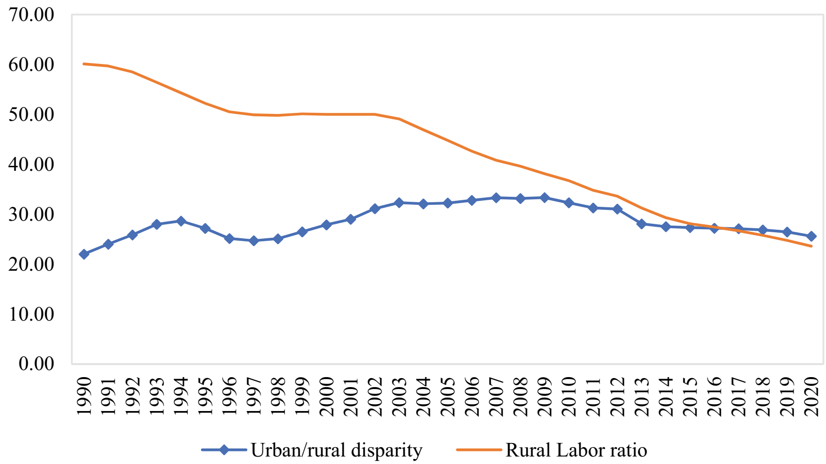

Fig. 2.4 Urban–rural income inequality and share of rural labor in China (1990–2020) (*Note* Urban/rural inequality = Urban average revenue per capita / Rural average revenue multiplied by 10; Rural labor ratio = percentage of rural labor force to the total labor force. *Source* Author's creation based on the data from *Statistical Yearbook of China*, various years)

rural workers are moving to the cities regularly, while wide inter-sectoral disparities in incomes remain? The following are the possible explanations for this question:

1. China is a vast territory with large interregional differences and a high population, as noted above. The development theory of the Lewisian type may be more suitable for countries that are relatively homogeneous without serious interregional differences or small in population size. Otherwise, it may take a longer time for such inter-sectoral income disparities to disappear, even after the turning point, than for homogeneous or small countries.
2. The original Lewis model may be too simple to apply to the real economy because it does not consider the structural differences within the urban labor market. The original model assumed uniformity in the urban sector. If we assume alternatively that the urban labor market consists of two subsectors of labor, skilled and

unskilled, the above question can be answered with this intra-sectoral dualism. The wage level of urban unskilled labor increases, while the wage gap between skilled and unskilled workers widens within this labor market.

3. Certain political and institutional factors prevent the model from working properly in the Chinese economic development arena. As discussed in the next section, there are some institutional and political barriers in contemporary China that have prevented rural people from moving freely to cities. In other words, the model can only be applied to countries without such barriers, allowing citizens to move unhindered, regardless of location and industry.[26]

In summary, it may be safe to conclude that the Lewis model must be revised to a great extent when adapting to the Chinese scenario because the political system strongly controls the entire societal dual structure. The turning point, then, is not simply an economic matter but a politico-economic issue for China, unlike Japan. The dual structure of the labor market was generated and maintained politically in China, now dominating even the social divide between the rural and urban sectors, which we will refer to in the next section.

2.5 Behind China's Development Characteristics: Politics in Command

We focused on the particularities and uniqueness of China's economic development compared to Japanese experiences. What is the dominant cause that generates distinctions in the development processes of Japan and China? In other words, what lies behind the dominance of Chinese development characteristics vis-à-vis Japanese development history? Let us reply to this question and seek common clues to characterize China's development process from two perspectives: the rural–urban divide and developmentalism.

2.5.1 Rural–Urban Divide: Two Types

China's dualistic pattern of the development process, as argued above, is essentially different from that in Japanese economic history. In Japan, domestic labor mobility from rural areas has never been legally or virtually controlled by the state, since the Meiji Restoration. Rural people moved to cities if they could not find suitable work in the countryside to search for jobs in the non-agricultural sectors. Farmland was inherited by the first (eldest) son under the traditional rule of patrimonialism, as younger sons below the eldest often had to leave the countryside unless a portion of the inherited land was divided among them. Hiroshi Yoshikawa proves that such rural labor, accompanied by a huge flow of rural population, contributed to a high rate of growth during the post-war era, establishing new households in the cities, which in turn expanded aggregate consumption of electrical appliances and other consumer goods (Yoshikawa, 1992).

However, in socialist China, rural-to-urban labor mobility has long been strictly subject to government control under the household registration (*hukou*) system, although it has been relaxed gradually in certain regions, particularly since full-fledged marketization began in the 1990s. In other words, the Chinese dualism of economic development has been, and is even now, colored by two divides: economic, political, and social. Chinese peasants under the *hukou* system have been, and are still even now logically, ranked as "second-class citizens (*erdeng gongmin*)," in that they cannot enjoy social benefits of the same quality and the same level as their urban counterparts can do. They are discriminated against in areas of social security, medical care, and education, in particular. This fact implies that they can be socially and politically divided from urban citizens holding non-agricultural *hukou* even if the rural–urban income gap is inclined to be reduced today.[27]

What produced this dual structure of the rural–urban divide in China? The most fundamental reason for this special type of social divide stems from the historical legacy of the Maoist era. Newly born communist regimes after WWII had learned their industrial policy, such as the "heavy industry oriented" strategy, from the Soviet Union, which had set up an institutional basis to squeeze its "primitive accumulation" out of the rural sector. Thus, the Chinese government abolished the market mechanism in 1953 and collectivized agriculture in 1955–1956, thereby allowing the state to gain control over grain supply at a low cost, and enabling it to acquire the source for industrial investment. By collectivizing agriculture, the Maoist government was able to dominate peasants in agricultural production and procurement, and by introducing household regulations, it became possible to control their mobility.[28] Peasants with agricultural *hukou* were prohibited from living in cities legally without official permission.[29] Moreover, this status was inherited by children from their parents. The social rural–urban divide was established in this way, which has continued to rule over rural China even today. "One country, two societies" regime was thus made possible to operate on the Chinese mainland (Whyte, 2010). Marin King-Whyte describes the social rural–urban divide as a "caste-like division that did not exist before 1949" (ibid.: p. 5). There was certainly a social and informal divide in Nationalist China, too, but it was within rural as well as urban areas, rather than between rural and urban citizens.

This turning point signifies the emergence of a new stage of economic development. It not only transforms the economic structure but also changes the general atmosphere of the entire society. What is to be noted in this regard is the improvement in the social status of peasants and their families. Previously, when labor was abundant in the countryside, the rural sector was regarded as "backward," since its average income was extremely low. The people in this sector were generally inclined to sell themselves short. Many of them who moved to the cities as "unskilled workers" had to engage in low-ranking, diligent, and cheap labor, at least at the outset. However, after an economy passes the turning point, it enters a new stage of labor shortage, and, as a result, the wages of these new urban entrants increase, and their social status gradually improves. In other words, the turning point accompanies the disappearance of the social rural–urban divide, concomitantly with equalization of incomes between the two sectors.

Lewisian dualism seems to imply a lengthy process of social modernization of an economy, although Arthur Lewis did not directly touch upon this issue in a clear-cut way in his seminal work (Lewis, 1954). The turning point is a symbolic social incident that indicates a fundamental transition from a pre-modern to modern society. It is when the market mechanism prevails over the entire economy, at the same time unifying two separate societies, based on a single principle of governance, that is, the market mechanism. The fact that there still exists a social rural–urban divide in China obviously illustrates that this country has not become "modernized" yet in our common sense. China is now halfway to a modern society, not only economically but also socially. Someday, when it decides to abolish the long-standing agricultural *hukou* system, it will be able to have reached a new stage of development in the sense that the social rural–urban divide will have finally disappeared and even peasants can enjoy the same benefits, including free population mobility, as city dwellers can do. In this stage, urban privileges and rural discrimination are completely dismantled.

It is often pointed out that if the government removes the existing control of household registration, Chinese cities, particularly big cities like Beijing and Shanghai, could be swamped by waves of rural migrants, leading to serious deterioration of the civil public order and housing environment. It may be natural to foresee that huge slums would spread, housing a large number of squatters, as observed in many other developing countries, such as the Philippines or Brazil. Therefore, it has been insisted that a radical relaxation of this regulation would harm the sound nationwide urbanization process, without sacrificing urban residents. This view is very persuasive at first sight, but undeniably neglects the problem of the social burdens rural people will continue to bear until the divide is completely resolved in the unforeseeable future.

Thus far, the Lewisian turning point hypothesis has been taken up solely as an economic issue. When it is applied to the Chinese economy and discussed whether it has passed the point, we have been inclined to focus only on some economic criteria to judge, such as those presented by Minami. It seems, however, that we cannot thoroughly grasp the real features of China's dualism using this approach alone. This is more complicated than in the case of Japan. As we have argued above, it is characterized not only by a purely economic divide but also by a socio-political divide. What must be asked is how these two divides have constructed today's dual structure of Chinese society.

However, in Japan, there is a strong political group within the Liberal Democratic Party that represents the voices of the rural electorate. Throughout the 1950s and the 1960s, when the procurement price of rice was deliberated annually by a governmental council, the central body of nationwide agricultural cooperatives, *nokyo*, mobilized their members to exert pressure on this organization, which was usually supported by many LDP representatives. It is ironic, however, that such politically set prices resulted in a structural imbalance between supply and demand for rice, leading to a decline in Japanese agriculture, in particular rice farming. The *nokyo* today has no such strong political power as before, but the LDP government cannot neglect the various interests it displays in the Japanese political scene.

The difference in the rural–urban divide between Japan and China is also related to the judicial systems in these countries. In Japan, as a democratic country, any policy or regulation to divide people socially is strictly prohibited by law, although a variety of social discrimination still exists. If a certain social group is officially discriminated against, for example, by the government, the group or its representative files a suit against the government. However, in China, the court cannot accept this sort of suit since it is not independent of the government and is totally controlled by the Party. There is no substantial legal way in China to dissolve the social divide for victims, namely, holders of agricultural *hukou*s or farmers/peasants, because they are not protected by the rule of law.

We believe, then, that the issue of the rural–urban divide and the turning point should be analyzed from the economic development perspective in the narrow sense, but when we look at it in the Chinese case, it must be dealt with in terms of economic development in the broad sense. The divide in China was and is still a product of political decisions made by the top leadership.

2.5.2 Developmentalism

During the Cold War era, world order was divided into two blocs of economic systems: capitalist and socialist. The former believes in the tenet of the free market plus democracy, while the latter follows the doctrine of planning and dictatorship. However, during the same era, a third system, different from either pure capitalism or socialism, emerged from among developing countries, called "developmentalism," exemplified by Korea under Pak Chunghee and Taiwan under Chiang Kaishek. This regime was a combination of a market economy and political autocracy or authoritarianism.

Both Japan and post-reform China have been seeking in some sense a similar strategy for economic development, that is, a "development first" policy. Except for political systems and ideologies, they share the same or similar characteristics as developmentalist policies and institutions.

Developmentalism can be defined in several ways. Yasusuke Murakami defined it as follows: based on private ownership and market economy, that is, capitalist system, it is a system built for the sake of achieving industrialization, or sustained growth of per capita production, allowing the government to intervene in the market from a long-run point of view; it is a politico-economic system constructed with the nation as a unit.

Suehiro (1998) defined it as a policy to mobilize and control physical and human resources in order to strengthen national power through economic growth driven by industrialization. It is also a system that takes precedence of national and state interests over private, family, or community interests. He regards it as an ideology fostered by national leaders in developing countries that focuses primarily on economic growth. In his view, the momentum of developmentalism is the ideology of growth.

Developmental states have one common feature: a strong bureaucracy that supports developmentalist leadership by planning and managing industrial policy. No industrial policy can be implemented without uncorrupt and efficient bureaucratic personnel. Japanese bureaucrats are said to be such personnel and are proud of implementing industrial policies.

One may say that the Chinese system is socialist, so that it cannot be counted on as a developmental state, but in the post-reform era, it could be called "state capitalist," as Ian Bremmer has described (Bremmer, 2011). Except for the political system, it has transformed its economic system to a great extent from socialist to capitalist.

Let us compare the economic development of Japan and China from the perspective of developmentalist processes. Japanese developmentalism differs from that of the Chinese in the following aspects.

1. **Attitude toward the World Economy: Closed vs. Global**

   As noted above, post-war Japan had long been closed to foreign capital. In 1950, the Japanese government promulgated two laws, the foreign currency management law and the foreign capital management law, which allowed the government, particularly the Ministry of Trade and Industry (MITI), to control foreign trade and investment. They were long used as measures to implement industrial policy, even after Japan began to liberalize its trade in the early 1960s, and to liberalize its capital in the early 1970s, although they were initially set to be abolished eventually. The external trade ratio has not been high, but it has been accumulating a tremendous amount of trade surplus, while Japan has changed from a capital-deficit to a capital-surplus economy. As a result, it did not rely on foreign capital.

   However, post-reform China has been actively involved in the world economy. China's entry into the WTO in 2001 accelerated its linkage with the global market. Its external trade ratio has been rising and is far higher than that of Japan. At the same time, it has been keen to invite foreign capital, regardless of type, to activate its domestic economy by providing technologically advanced

FDI with more incentives, as discussed above. In the 1980s and the 1990s, China absorbed a vast amount of foreign capital to promote its export drives. Most foreign enterprises that invested in SEZs were motivated to export goods they manufactured. Thus, FDI is linked to external trade, contributing to the accumulated trade surplus in China. As long as China's domestic market has been expanding as a result of its long-run high-income growth, more foreign capital has been attracted to its market, which in turn has accelerated its growth.

2. **Major Players: Private vs. Public**

   Most Japanese enterprises are private, regardless of their size, while in China, SOEs are one of the main engines of economic growth even today. Notably, in the "pillar industries," such as energy, steel, automobile, shipbuilding, transportation and telecommunication, banking and other financial services, etc., the share of production and/or services by SOEs' is still extremely high. To date, there has been no move toward SOE privatization. However, private enterprises have also been expanding, as China's economy grows, and the share of consumption in its GDP rises. It is obvious that China's developmentalism has been "walking on two legs," that is, the public and private sectors.

3. **Distribution Policy: Equal vs. Unequal**

   Income distribution is far more equalized in Japan than in China. Unlike its Chinese counterpart, the rural–urban divide vanished after the turning point in Japanese economic history. Even among city dwellers, income disparity is far less in Japan than it is in China. This sharp contrast is due to the difference in income distribution policies in these two economies. Besides the rural–urban divide, there are other causes that make Japan distinct from China in terms of income distribution.

   A typical example of this is the tax system. China's tax system is less effective in reducing income disparities than Japan's. First, it is more dependent on indirect taxes. In 2017, the share of income tax in total tax revenue was 34% in Japan, compared to 7% in China.

   Second, the capture rate of income was low in China, as has been criticized by some economists, who assert that its "gray income (*huise shouru*)" amounts to a tremendous scale.[30]

Third, China has not promulgated an inheritance tax or property tax; therefore, the richer classes can grant a great number of properties to their children. However, the existing wealth of rich people is said to be almost equalized after three generations in Japan, due to the rigid inheritance as well as property tax system.

4. **Industrial Policy: Specific vs. Comprehensive**

As soon as China decided to open the door in the late 1970s, it sent delegations several times to Japan to learn its "successful" industrial policies in the post-war era. They seem to recognize that Japan's success in economic development stems from well-known industrial policies. Japan was the best teacher for China at that time because political leaders tried to seek the best mix of regulations or governmental guidance and market mechanisms in making economic policies.

However, Japan's industrial policies were different from those of China's, at least in terms of coverage. The former was specific, whereas the latter was more comprehensive. In post-war Japan, industrial policies were initiated by the GHQ (the US Army's General Headquarters) to promote the two pillar industries, namely, coal mining and steel production, to support national economic recovery by providing them with subsidies from the budget. This policy was called "*keisha seisan houshiki* (prioritized production method), in the sense that major resources were invested primarily in two specific industries. The economic philosophy behind this policy was inherited by the government, the MITI, in the name of industrial policy, after Japan became independent in 1950. The target industries changed, from steel to petrochemical, then to automobile, although coal remained to be the most important energy industry until the end of the 1950s.

Compared to the Japanese industrial policy experiences, China's strategy for industrial development has been more comprehensive, from light industries, such as electric appliances, to heavy industries, such as energy and steel. Governments, whether central or regional, have engaged in this policy. Too many industries and enterprises, whether private or public, run in competition, supported and driven by regional governments. If one province succeeded in developing an industry, the other provinces emulated it by establishing and/or promoting the same industry. This sort of interregional competition not only generated strong dynamics in the Chinese economy but also created similar industrial structures across provinces.

In contrast to Japan, where such policies have been gradually fading away since the 1980s, China has more actively planned and implemented new industrial policy, typically the "Made in China 2025" project launched in 2015, and set specific targets that ten high-end industries have to meet by 2025. This sharp contrast in industrial policies between Japan and China seems to reflect the difference in the strength of their policymaking, which is incorporated into the power of governmental control, as mentioned below.

5. **Governmental Control: Weak vs. Strong, Indirect vs. Direct**

It became a popular story worldwide that the Japanese miracle of post-war recovery and high growth rate was realized by the government under strong leadership, particularly by the MITI's bureaucrats. Chalmers Johnson emphasized their role in Japan's remarkable economic performance in the post-war era (Johnson, 1982). He maintained that the MITI played an essential role in generating high performance by planning and implementing effective industrial policies.

The popular saying was that these bureaucrats had used indirect, but quite powerful, means called "administrative guidance (*gyosei shido*)," to make private enterprises obey their controls. This indicates the nature of Japanese industrial policies, namely indirectness, compared to the Chinese type of strongly direct ones. In China, industrial policies are much easier to reflect in enterprise activities because a major part of these enterprises is state-owned, and the Party substantially controls even private enterprises, either within or above the enterprises.

However, the effectiveness of these policies is questionable. As far as Japan's industrial policies are concerned, many Japanese economists doubt their effectiveness. Komiya et al. (eds.) (1984) analyzed the history, character, and effectiveness of Japanese industrial policies from many aspects and concluded that they were ineffective. An example of this is the policy toward the automobile industry. Just when Japan was going to liberalize the domestic market, the MITI attempted to merge many domestic automobile manufacturers and consolidate them into two companies to enable them to compete with imported cars. However, the ministry confronted tough resistance from relatively smaller companies, so it had to abandon this idea, with the result that the Japanese automobile industry grew to such an extent as to occupy a part of the American automobile market.

China's industrial policies were not always successful, in that the targeted industries were not necessarily subject to government regulations (Marukawa, 1997). Interregional competition was so hard in China that regional enterprises in certain industries operated despite central controls. However, undeniably, China's developmental administration is still far more powerful in guiding or controlling industrial enterprises than its Japanese counterpart, particularly after the economy entered a new stage of high-speed growth under the so-called "socialist market economy," or more correctly "capitalist economy with Chinese characteristics."

6. **Role of Local Governments: Specific vs. Broad**

   Oi (1995) characterized the Chinese local economy in terms of "state corporatism." Local governments in China, from prefecture, township to village, act just like corporations for the sake of maximizing their "profits" in which budget revenues as well cadres' income are included. TVEs can be regarded as branches that provide corporations with valuable revenue. Japanese local governments, however, do not play such roles, since they function merely as administrative units to provide people with necessary administrative services. Jean Oi defined China as a new variety of developmental state.

Overall, how should we describe the character of China's developmentalism in contrast to Japan's? Gao contrasted China with Japan in terms of developmentalism, saying that China's developmentalism is "neoliberal," in the sense that it is more open to the globalized world, while Japan's is a "classical" one (Gao, 2013).

At first sight, these two types of developmentalism appear to share common features, both in motives to realize national goals and in state interventions in economic activities, even in the private sector. However, several aspects differentiate their developmental policies, as observed above. More importantly, there exists a deep cleavage between the two types of developmentalism since politics and ideology are deeply embedded in China. If the politico-economic systems of the two countries are fundamentally different, developmentalism cannot be the same.

China's developmentalism may be characterized as "autocratic or authoritarian," rather than "neoliberal," as its entire social system is ruled by "developmental dictatorship," akin to the system of Park Chunghee's Korea or Chiang Kaishek's Taiwan.[31]

2.6 Conclusions

We analyzed several aspects of economic development in China in comparison with Japan from a long-run perspective. Although there are China-specific aspects, we can find similar phenomena that the two countries have experienced during the development process, such as the turning point in the Lewisian sense, the flying geese's pattern of development, and the developmental policies employed. We have taken it for granted that China, particularly post-reform China, has been proceeding on the development path that Japan had passed before, as the "fourth goose" flying over the Asian development sky.[32] This assertion may be true to a certain degree, as long as we regard development in the narrow sense. However, when we look at China's development from a broader perspective, we find essential differences between the two countries, reflecting their politico-economic and ideological backgrounds. China's rural–urban divide, for example, was created and has long been maintained politically, while Japan's divide was nothing but an economic result from an imperfect labor market due to economic underdevelopment. Developmentalism mirrors the political nature of the social system exactly. Unlike their counterparts in a democratic country, Chinese leaders are allowed to mobilize any national resources, theoretically or practically, to achieve their national goals. This is possible only by developmental dictatorship.

More importantly, the political system has now become deeply engaged in the overall social system, not only as an exogenous factor but also as an endogenous player in contemporary China. A typical example showing this fact is the building up of trinity among the Party, the state or the government, and the SOEs. Political leaders who make various economic decisions often move from the Party to the government apparatus, and then to the SOEs or state organizations. Governments and SOEs may become popular ladders for their political careers. Economic outcomes, particularly growth rates, are important measures to evaluate performance, whether in regional governments or state enterprises.

Joshua Ramo wrote an article entitled "Beijing Consensus" and admired the Chinese style of development and transition (Ramo, 2004). Around 2008–2010, many Chinese scholars joined in a debate on an issue of "China Model (*zhongguo moshi*)," and argued about its practical efficacy. Some stressed the value of its universality and insisted that it could be a good prescription for the economic development of the third world. Although the understanding of this model was not necessarily common among scholars, some asserted that the Chinese way of combining market mechanisms with strong political regimes, namely, dictatorship, was the most effective and efficient strategy for developing countries. Lanteigne regards the Beijing Consensus as a model beyond developmentalism (Lanteigne, 2013), but the "China Model," as has been implemented by the political leadership, is unequivocally a sort of autocratic developmentalist model.

This type of developmentalism emerged and has become increasingly influential in the world today, together with the historically remarkable long-run economic growth that China has demonstrated. However, orthodox developmentalism that Japan had first carried out since the Meiji Restoration, followed by Korea and Taiwan in the 1960s and 1970s, was replaced gradually first by the neoliberal ideology, which was advocated by International Monetary Fund (IMF) and World Bank economists in the name of "Washington Consensus," then by a new development thinking, such as Sen's capabilities approach and environmentalists' philosophy.

Where is China's autocratic developmentalist model located in an array of development models? There is no doubt that this model is far from new development thinking. It is also different from the first generation of development economics, but should be regarded as an extension of classical development thinking, though strongly dominated by the political system.

Nowadays, it may be the days when autocratic, therefore, politics-in-command economics is in competition with market-in-command economics. Naturally, this competition reflects a severe gap in value judgment between China and "the other side of the river." The Sino-Japanese comparison of economic development seems to have told us about the present trend of development economics in the real world.

Notes

1. Marxist development theories were very few at that time. Maurice Dobb, a British Marxist historian, insisted on the necessity of the planned economy for development. Neo-Marxist development economics, called "dependency theory," appeared in the 1970s and 1980s, represented by A.G. Frank and Samir Amin, for instance, is out of our consideration in this chapter.
2. He is not the first writer to point out the importance of political aspects in development theory. From a different angle, Gunnar Myrdal stressed the quality of the political system in economic development, criticizing the "soft state," i.e., corrupt state, which retards underdeveloped countries from getting rid of poverty (Myrdal, 1968).
3. This policy is noted to have had some serious side effects. As boys were generally preferred in the countryside, female fetuses were often aborted, making the rural sex ratio extremely unbalanced.
4. In the late 1950s, Ma Yinchu, president of Peking University, was blamed for publicizing a "new population theory" to constrain China's population growth, to the effect that he was criticized as a Malthusian, not a Marxist. Mao's insistence was that human beings had two hands, not just a mouth, so a larger population produces more. Ma was fired from university presidency, but redeemed his honor after the death of Mao. They say that "wrongly criticizing one man brought about population increase by as many as three hundred million."
5. They were not registered in the household register book (huji), called "black children."
6. China's land reform is often dubbed "land revolution," which had a political purpose, too: to overthrow landowners and rich peasants to establish the communist stronghold in the countryside. Meanwhile, this revolution not only confiscated their land, but also killed millions of landowners and rich peasants. Japan's land reform, however, was simply for the sake of redistributing arable land in order to motivate former poor tenant farmers in farming and this reform was implemented quite peacefully.
7. Even if Chinese landlords could survive after the land reform, it is uncertain whether they could perform productive functions for agricultural development like the cultivating landowners in Japan.
8. Japanese agricultural cooperatives themselves are distinct from the Chinese ones, since even urban dwellers without cultivated land, and those engaged in non-agricultural jobs, can become *nokyo* members with limited qualifications.
9. Marxists declare that public ownership is superior to private one, which cannot deal with the scale economy resulting from technological progress.

They recognize mistakenly that ownership is monotonically related to economic scale.

10. He recommended that every people and region become prosperous first (xianfu). As a result, income disparities, both among the population and among regions, have been widening far more than Japan.
11. We should consider that the SEZ had also a political objective: to successfully restore the sovereignty of Hong Kong in 1997, because it had to, in essence, carry out a capitalist system within a socialist environment.
12. The success in the rapid growth of the less developed countries is not only derived from importing new technologies brought in from their forerunners. They also developed and utilized new economic institutions for the rapid growth, such as banks in Germany and the state in Russia.
13. The original FGP model had been published in Japanese in the 1930s. See Kojima (2000) for more details.
14. As for the relevancy of this model to China's development process, see Nakagane (2006).
15. A similar catch-up theory was presented by Raymond Vernon, who suggested that a product had a particular life-cycle, from production to export and finally to import (Vernon 1966). Vernon's product lifecycle theory is different from the FGP theory, in that it essentially builds on product level, not on industry level, but it can tell us about the same possible course of development process in the international field of competition as the FGP theory indicates.
16. ICC index is defined as (Eij − Mij)/(Eij + Mij), where Eij is *i* country's exports of item *x* to *j* country, while Mij is *i* country's imports of the item from *j* country. The number of this measure lies between − 1 (when E = 0) and 1 (when M = 0).
17. Balassa's RCA index measures the relative weight of a country's exports *x* compared to the world average. Specifically, it can be obtained usually by calculating (Eij/E*j*)/ (Eiw/E*w*) − 1, where E*j* is *j* country's exports, *w* designates world, and E*w* is world total. If this ratio is > 0, it indicates that country *j* has a comparative advantage in the item/industry concerned. Since such values of RCA reflect only exports, they may be biased indicators, so a more comprehensive RCA index, namely revealed comparative trade advantage (RTA) index can be obtained by subtracting from the RCA a "revealed comparative disadvantage RCDA," which measures relative import weights, (Mij/M*j*)/(Miw/M*w*).
18. It goes without saying that as the formulas of these two indicators demonstrate, they do not directly measure the real level of comparative advantage of the product (*i*) for the country (*j*); these measures are only indirectly indicate a direction of comparative advantage.

19. Its trend assumes that every trade is carried out under an orthodox principle of international commodity/service exchanges, i.e., the Ricardian comparative advantage theory. Real external trade, however, is often subject to changes in certain environmental conditions depicted in Fig. 2.1 or 2.2, such as international warfare, global political conflicts, freight shortages, etc., irrespective of the unchanged domestic factor endowments. Moreover, these two measures are not necessarily corresponding with each other exactly.
20. Besides the above three industrial products, we calculated ICCs and RTA indexes of other major products, such as TVs and telecommunication equipment, automobiles, railroad equipment and cars, electric appliances, chemicals, etc. Except for automobiles and chemicals, China is now rapidly catching up with Japan.
21. Besides relocating factories to the inland regions, many Chinese enterprises in the coastal areas have been moving to foreign countries, such as Vietnam and Myanmar, in search of cheaper labor.
22. China's share of the US patent registrations and approvals was only 0.6% in 2004, but it jumped to 11.4% in 2020.
23. This is called a policy of "exchange of technology for markets."
24. Specifically, the criteria he adopted are the trend of marginal productivity and the wage rate of agricultural labor, the elasticity of labor supply of the non-agricultural sector, etc.
25. John Fei and Gustav Ranis described in their model of sectoral dualism (Fei & Ranis, 1964). They argue that a surplus labor economy passes three stages: first, the initial stage in which agricultural labor's marginal productivity equals zero; second stage, after the "shortage point" on which agricultural labor begins to be reduced as it moves to the modern sector; the third stage, after the "commercialization point" on which both sector's marginal productivity of labor, and therefore the wage rate, become equivalent. The commercialization point is essentially the same with the Lewsian turning point in question.
26. Remember that the model assumes an "unlimited supply" of rural labor to the modern sector.
27. Under the previous election law, one vote by a peasant was counted as only a quarter of an urban citizen's vote in the election of people's representatives. This rule demonstrates that people were not equal before the law in China. The rule was revised afterward by new election laws, which finally provided the peasants with the same right in elections as urban *hukou* holders enjoyed.
28. China learned this system from the Soviet Union, which had implemented a policy to control the mobility of Kolhoz (Soviet agricultural collectives) members by issuing "domestic passports" to them.

29. There was no law to strictly control people's mobility at that time. Regulations issued by the government or the Party acted as a regulator in place of laws.
30. Gray income, or hidden and corrupt income, is not necessarily the same as illegal income, such as earnings through drug trafficking and prostitution. It consists of a variety of incomes that cannot be captured by the authorities due to inadequate tax laws and insufficient administration.
31. It is undeniable that political dictatorship, along with a capitalist economic system, enabled Korea and Taiwan during the Cold War era to make their developmental policies function effectively to realize their common goals, rapid industrialization, to win their communist rivals.
32. The first goose is Japan, followed by the second geese of Asian NIEs, then by the third geese represented by several ASEAN countries. Needless to say, the development sky has changed today, as ranking of these geese is different today from the past.

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CHAPTER 3

Trade, FDI, and Economic Growth

Hideo Ohashi

3.1 Introduction

Economic growth is the combined product of vigorous entrepreneurship, accumulation of human capital, and competitive market mechanism. The liberalization of trade and capital improves economic welfare through the efficiency of resource allocation and the benefits of trade. Although there is sometimes a high evaluation of the government's industrial policy, it basically plays only a complementary role.[1] This is because there are many companies and industries that can grow regardless of industrial policy, and rapid liberalization and excessive government intervention can be an impediment to industrial development.

After the reform and opening-up, the Chinese economy, while promoting market-oriented economic reforms, achieved industrialization through the opening-up to the outside world, leveraging the export promotion and introduction of export-oriented foreign direct investment

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_3

(FDI), and got on the track of sustained economic growth. Export-oriented industrialization is a common growth pattern in postwar East Asia, but there are subtle differences in the growth patterns of East Asian countries and regions, ranging from the liberalization of the entire economic system as a precondition to mere export promotion measures.

The purpose of this chapter is to derive the characteristics of China's opening-up to the outside world and to examine its relationship with economic growth through a comparison with Japan's experience as the prototype of high growth through export-oriented industrialization. There have been a number of studies on the impact of the external sector (trade and FDI) on economic growth and industrial development in Japan and China, respectively.[2] However, comparative studies of economic growth and industrial development in Japan and China, which have different economic systems, are extremely rare.[3] Furthermore, comparative studies focusing on trade and FDI are even rarer. This chapter will compare Japan and China from a macroeconomic perspective, focusing on trade and FDI, and review economic growth in both countries.

3.2 Analysis Perspective and Target

In conducting a comparative study of the external economies of Japan and China, we will compare the experiences of the two countries based on the development stages of the balance of payments, which have been inherited by many studies since Crowther (1957). As a framework for analysis, two stages of development, the catch-up stage and the grow-up stage, are set up based on turning to current account surpluses, i.e., clearing the two-gap constraint on savings and foreign currency (Table 3.1).

Before proceeding with the comparative study, it is necessary to briefly review the catch-up stage and the grow-up stage of Japan and China. First, looking at Japan's balance of payments, after the turmoil of the two oil crises in the 1970s, a current account surplus was established in the 1980s. Subsequently, due in part to the strong yen, outward investment by Japanese firms surged and took root, and by the beginning of the 2010s, the Japanese economy had become structurally dependent on investment income (Fig. 3.1). Therefore, Japan's catch-up stage corresponds to the period from the mid-1950s to the end of the 1960s, before the suspension of the convertibility of gold to the U.S. dollar, known

Table 3.1 Development stages of the balance of payments

	I *Young debtor*	*II* *Mature debtor*	*III* *Debt reducer*	*IV* *Young creditor*	*V* *Mature creditor*	*VI* *Asset liquidator*
Current Account	−	−	+	+	+	−
Goods and Service Trade	−	+	+	+	−	−
Direct Investment	−	−	−	+	+	+
Net External Assets	−	−	−	+	+	+

Note China is on the stage of "Debt Reducer" while Japan is in the transition from "Young Creditor" to "Mature Creditor"
Source Author's creation based on Naikakufu (2020, p. 140)

as the Nixon Shock in Japan, in 1971 and the first oil crisis in 1973–1974. This was a period of high growth, when postwar reconstruction was achieved through increased demand generated by the Korean War, and the country enjoyed the *Jimmu*, *Iwato*, Olympic, and *Izanagi* economic booms.[4]

The next stage is the grow-up stage, which corresponds to the period from the 1980s to the early 1990s. During this period, the Japanese economy overcame the recession that followed the oil crises by expanding exports. However, the export expansion led to the escalation of trade friction between Japan and the United States. The Plaza Accord in 1985 induced a strong yen, which calmed the Japan–U.S. trade friction, but a strong yen recession hit the Japanese economy. Monetary easing as a countermeasure led to the bubble economy, and because of the collapse of the bubble economy, the Japanese economy fell into long-term stagnation.

In the mid-1990s, China's balance of payments achieved a turnaround in its current account surplus due to increased exports (Fig. 3.2), and at the beginning of the twenty-first century, China's aggressive efforts to attract export-oriented FDI were successful, resulting in "twin large surpluses" in its current account and capital account. At this time, China's outward direct investment also began to take off, but due to the unexpectedly large outflow of capital, outward investment came to a halt in the late 2010s. Therefore, China's catch-up stage is from the early 1980s

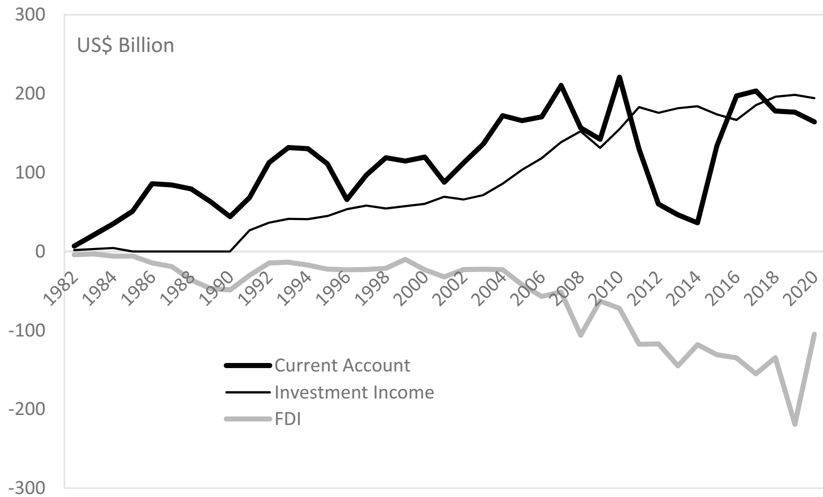

Fig. 3.1 Japan's balance of payments (*Note* Based on IMF Balance of Payments Manual, 5th edition. *Source* Author's creation based on the data from IMF, *Balance of Payment Statistics*)

to the end of the 1990s, when China turned to reform and opening-up and established a socialist market economy by the mid-1990s, or more specifically, until it joined the World Trade Organization (WTO) in 2001.

The growth-up stage, on the other hand, is from the early 2000s to today, that is, after China joined the WTO. Suffering from excess liquidity due to the rapid increase in exports and inward investment, China stepped into *zouchuqu*, or going outward. However, with the intensification of trade frictions between China and the U.S. accompanying the surge in exports to the U.S., and the intensification of competition with the U.S. for technological supremacy, China has been trying to shift its development mode to domestic demand- and consumption-led growth and innovation-driven growth.[5]

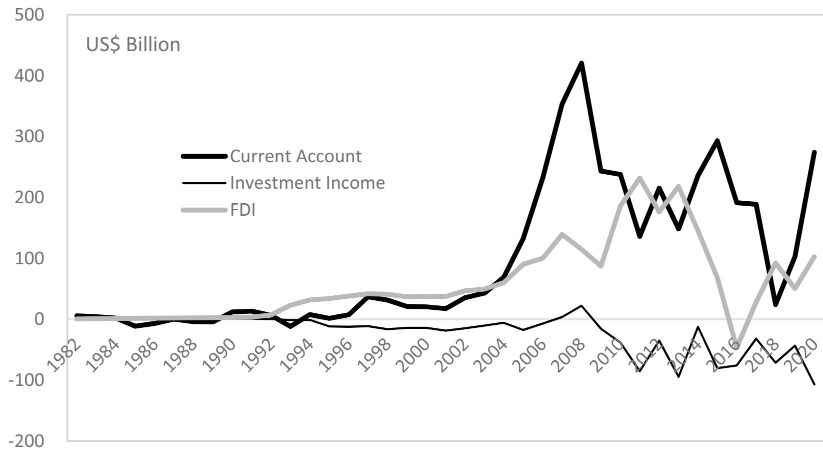

Fig. 3.2 China's balance of payments (*Note* Based on IMF Balance of Payments Manual, 5th edition. *Source* Author's creation based on the data from *China Statistical Yearbook*)

3.3 Catch-Up Stage: Earning Foreign Exchange and Increasing Surplus of Current Account Balance

3.3.1 Japan: Overcoming the Constraint of the Balance of Payments and Utilizing Industrial Heritage in Prewar Period

After World War II, the Japanese economy faced a shortage of foreign currency. Even in the pursuit of higher growth, the shortage of foreign currency became the limit to growth. Overcoming this "balance of payments ceiling" became the immediate goal of economic growth. Therefore, even after joining the IMF in 1952 and the GATT in 1955, foreign currency quotas and import restrictions were implemented in Japan.

The Japanese economy achieved postwar recovery with the increased demand generated by the Korean War, and the *1956 Economic White Paper* declared that it is no longer postwar. As a result of the economic recovery, there was a shared recognition that liberalization of trade and exchange was inevitable in the near future, and as early as June

1960, the Japanese government announced the "Outline of the Trade and Exchange Liberalization Plan" to prepare for the anticipated liberalization of trade and exchange rates. Subsequently, Japan became a GATT Article XI country in February 1963 and an IMF Article VIII country in April 1964,[6] and a balance of payments surplus was firmly established.

At this stage, Japan's foreign currency earning industries were basically dependent on the accumulation and legacy from the prewar period. These included textiles, general merchandise, light machinery (watches, cameras, radios, sewing machines), and steel and shipbuilding, which were also military industries. As for new industries, there was rapid growth in home appliances, and a domestic market for them was formed. As the production capacity of home appliances expanded rapidly, production continued to increase without an increase in imports. However, during this period, the Japanese government adopted a protectionist policy to deal with trade and exchange liberalization. In other words, the gradual liberalization bought the necessary time for capital investment. As a result, liberalization was significantly delayed in some industrial products and industries, such as passenger cars (1965), automobile engines (1971), and computers (1975).

The 1950 Foreign Capital Law took the stance that foreign capital could be introduced into Japan as long as it would help the Japanese economy to become self-reliant, develop soundly, and improve its balance of payments. This law remained in force until the revision of the Foreign Exchange Law in December 1979 and was seen as a symbol of the closed nature of the Japanese market. On the other hand, the introduction of technology was actively encouraged. The introduction of technology started with reverse engineering by Japanese companies, after which the foreign currency earned was used for technology introduction.

Japan's capital liberalization was carried out in stages under "external pressure": after joining the OECD in April 1964, capital liberalization was indeed phased in from the first to the fifth round, 1967–1973. The liberalization of key industries (integrated circuits, pharmaceuticals and agrochemicals, computers, and information processing) took until 1974–1976. Meanwhile, in Japan, joint ventures and cross-shareholdings were promoted in preparation for the intensification of competition and corporate acquisitions that would accompany liberalization.

3.3.2 China: Opening to the Outside World and Market Transition

Prior to the reform and opening-up, the role of foreign trade in China was to use limited foreign currency to secure imports of goods that were key to economic construction. Under the economic equilibrium principle, imports were aimed at alleviating bottlenecks caused by domestic supply capacity constraints, while exports were positioned as a means to finance imports. Since the founding of the People's Republic of China (PRC), the foreign trade system has been built on this policy, and by the time the socialist transformation was completed in 1956, a state monopoly on foreign trade had been established.

The reform of the foreign trade system after the reform and opening-up began with the dismantling of this monopoly system.[7] In addition, under the rigid price system, the cost of earning foreign currency for exports, the cost in Renminbi (RMB) of earning one U.S. dollar in exports, was at a level higher than the official exchange rate, and foreign trade companies had huge financial deficits. The reduction of subsidies for this deficit was one of the aims of the reform of the foreign trade system. The deficit in the foreign trade sector is mainly due to exports. Looking at the profit and loss of the export sector in RMB terms, all the sectors except the low-priced input goods sector, i.e., petroleum, coal, and building materials, were in the red. During the reform and opening-up period, emphasis was placed on promoting exports and earning foreign currency, but most of the exporting sectors found themselves in a dilemma: the more they exported, the larger the deficit in RMB terms. To solve this dilemma, China took steps to devalue the RMB and reform trade goods prices.

In 1981, China introduced a de facto dual exchange rate system by establishing an internal settlement rate that applied to trade in goods. From the mid-1980s, foreign exchange adjustment centers were established to provide foreign exchange between enterprises with ample foreign currency and those with insufficient foreign currency, and the dual exchange rate between the exchange rate of the foreign exchange adjustment centers and the official exchange rate continued until 1994, when the exchange rate was unified. In the early years of the reform and opening-up, China had three price systems: official government prices, government-guided prices, and market-adjusted prices. By the early 1990s, not only retail goods, but also agricultural products and many prices of manufactured goods had become market-adjusted prices.

The reform of trade goods prices became the most effective measure to reduce the deficit of foreign trade companies.

Immediately after the reform and opening-up, exports and foreign currency acquisition were encouraged in China. However, it was not possible to grow exports without promoting market-oriented reforms as described above, and in order to expand foreign trade, it was essential to further promote market-oriented economic reforms. Foreign trade became the factor that most effectively promoted the transformation of the Chinese economy into a market economy.

With the progress of market-oriented reforms, China's exports also expanded dramatically. According to Naughton (1996), China's foreign trade regime in the catch-up stage defined in this chapter forms a dual structure: an OT (ordinary trade) regime protected by high tariffs and quantitative restrictions, and an EP (export promotion) regime where tariffs are not imposed under bonded conditions. The success of China's export sector can be attributed to the rapid development of the EP regime, especially the increase in processing trade and direct investment.

China's processing trade is a transaction in which parts and materials provided by foreign companies are processed in factories in China according to the specifications of the foreign companies. Imports of parts and materials brought into China are exempt from customs duties, but 100% of the assembled and processed products must be exported. The Chinese side receives the processing fee in foreign currency. This type of processing trade is also seen in export processing zones and bonded factories in other countries, but in China it has been expanded nationwide. As a result, from the mid-1990s to the mid-2000s, processing trade accounted for more than half of China's exports and has dramatically expanded China's exports (Ohashi, 2014).

Processing trade has brought not only capital and technology, which were in short supply in China at the time, but also sales channels, and has enabled China, with its heavy industry, to industrialize with a focus on manufacturing, mainly consumer goods. Processing trade has created enormous employment opportunities and promoted inter-industry and inter-regional labor migration in China.[8] With the development of processing trade, the domestic sourcing rate and domestic value-added rate also increased. Processing trade, which specializes in the assembly and processing of final goods, has created huge downstream demand, and contributed to the upgrading of domestic industries through backward linkage effects.

In China, foreign-invested enterprises have become the main players in this processing trade. From the 2000s to the early 2010s, foreign-invested enterprises accounted for more than half of China's exports. Most of them entered China for the purpose of export production, and the bonded system for processing trade was a major incentive to enter China. As many empirical studies have pointed out, FDI makes a significant contribution to the economic growth of the host country in terms of production expansion, job creation, capital formation, foreign currency acquisition, and the transfer of technology and management know-how. According to Enright (2017), which emphasizes the role of FDI in China's economic development, the impact of the establishment, operations, and supply chains of foreign-invested enterprises amounted to 33% of GDP and 27% of employment in China for the five-year averages from 2009 to 2013.

The reason why China, which had been suffering from a trade deficit until the 1980s, has continued to be in the black since the 1990s is simply because the export-oriented foreign-invested enterprises that earned a surplus through processing trade and set up operations in China expanded their exports. In this way, China became the world's largest exporter, one of the world's leading recipients of FDI, and the "factory of the world".

3.3.3 Comparison: Differences in Initial Conditions and Use of Foreign Capital

Looking at the initial conditions for economic growth, Japan had completed its postwar reconstruction and was on the fast track to high growth. Based on the experience of the market economy, which had reached a certain level before the war, and through a series of postwar reforms, the institutional capacity for economic growth was well in place. However, even accelerating economic growth was hampered by the "balance of payments ceiling".

After the founding of the PRC, the country was in a state of economic devastation due to repeated political upheavals from the Great Leap Forward to the Cultural Revolution. Although various systems were put in place for the construction of a socialist state, the rigidly planned economy, combined with political turmoil, resulted in a long period of economic stagnation. Even after turning to the reform and opening-up, it was necessary to promote a "dual market transition."[9] In addition to the transition from a traditional customary economy to a market economy as in other developing countries, China needed to achieve a transition from a planned command economy to a market economy, that is, a transition to a de-planned economy. In each transition process, China has to face the "middle-income trap"[10] and the "regime transition trap"[11] (Fig. 3.3).

Without natural resources, Japan's foreign trade also took the form of processing trade. However, unlike China's processing trade, this is a form of trade in which raw materials are imported, intermediate goods are made from them, and then processed into final goods for export. Compared to China's processing trade, higher added value can be expected, but the heavy dependence on foreign countries for raw materials, such as during the oil crisis, made the country vulnerable. Japan has been extremely cautious about introducing foreign capital but has been enthusiastic about introducing technology. This was because global capital movement was not as active as it is today, and the Japanese manufacturing industry had the ability to catch up simply by introducing software technology.

On the other hand, China's processing trade is a form of importing input goods and intermediate goods, assembling and processing them using China's abundant labor force, finishing them into final goods, and exporting them. The value added must be limited, but by joining the

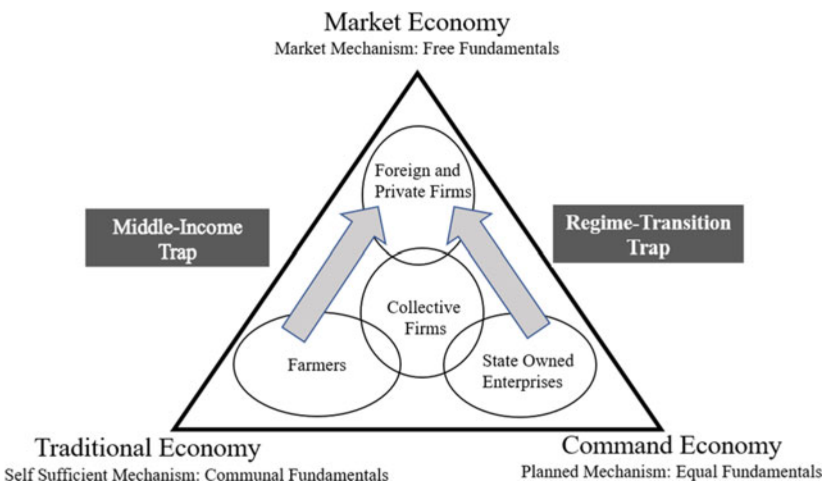

Fig. 3.3 China's dual transition to the market economy (*Source* Author's creation based on Ohashi [2019, p. 17])

global value chain, the benefits of trade can be effectively obtained. It was China's bold policy of introducing foreign capital that made it possible for this processing trade to proceed efficiently. As a result, in the 1990s, the Chinese economy became much more dependent on foreign capital, and a growth pattern that could be called the FDI/trade nexus was seen: FDI increased exports, export expansion increased the growth rate, and foreign capital focused on the high growth rate went to China, resulting in another increase in exports.

3.4 Grow-Up Stage: Coping with Excessive Savings and External Imbalances

3.4.1 Japan: Export-Led Growth and Trade Frictions with the United States

1. **Japan's export-led growth**

The high growth of the Japanese economy ended with the first oil crisis of 1973–1974. In emerging from the recession that followed the outbreak of the oil crises in the 1970s, the impact of exports in creating effective demand was extremely large. Exports achieved double-digit growth in 1980–1981, and the growth contribution of external demand remained positive during 1980–1985. There was still a limit to Japan's ability to recover on its own through domestic demand. At the same time, economic stimulus measures in the United States and other developed countries during the oil crises, as well as the weakening of the yen against the U.S. dollar, provided a tailwind for the increase in Japan's exports.

In terms of specific industries, after the oil crises, heavy and large-scale industries such as steel and shipbuilding, which had supported Japan's rapid economic growth, fell on hard times. However, thanks to the energy-saving technologies developed during the oil crises and the use of microelectronics (ME), automobiles, and home appliances have emerged as industries that drive the Japanese economy.

With the oil crises, the U.S. economy, which had been widely receptive to Japanese exports, began to show signs of recession, and the Japanese economy faced new difficulties. In 1971, the U.S. fell from a trade surplus to a deficit for the first time in a century, and the Nixon administration decided to suspend the exchange of gold for dollars; in 1985, the U.S. fell from a creditor nation to a debtor nation for the first time in 70 years, and the Reagan administration adopted a new trade policy centered on Section 301 of the Trade Act of 1974, which allows for countermeasures and retaliation in trade. During this period, East Asian countries, including Japan, which had continued to achieve high growth by leveraging their exports to the U.S., enjoyed a further increase in exports to the U.S. because of Reaganomics' tax cuts, while the U.S. faced an expansion of its "twin deficits".

Trade frictions between Japan and the U.S. were seen in the 1950s and 1960s over textiles, in the 1960s over steel, and in the 1960s and 1970s over color TVs. In the 1980s, the focus of trade friction shifted to automobiles, machine tools, and semiconductors, and the scale and severity of the friction became more intense than before. First, the targets of trade frictions became aligned with major and strategic U.S. industries, such as automobiles and semiconductors. Second, as Japan's international competitiveness increased, there was a growing sense of crisis in the U.S. that Japan and the U.S. could turn the tables on each other. Third, the main cause of the macroeconomic imbalance symbolized by low savings and high consumption in the U.S. was also attributed to the expansion of Japanese exports to the U.S. Finally, the U.S.–Japan trade imbalance was also due to the lack of growth in U.S. exports to Japan, which was increasingly criticized because of the closed nature of the Japanese market.

2. **U.S. aggressive unilateralism**

Throughout the 1980s, the U.S., the founder of the GATT system, emphasized aggressive unilateralism in its trade policy. This is evident in the changes in U.S. trade law.[12]

The Reciprocal Trade Agreements Act of 1934 was a trade law that marked a shift from protectionism, symbolized by the Smoot–Hawley Tariff Act under the bloc economy, to unconditional most-favored-nation (MFN) treatment, and was the prototype of GATT principles. The 1962 Trade Expansion Act, which was passed in response to the expiration of the Reciprocal Trade Agreement Act of 1934 in 1963, respected the principles of GATT and the Reciprocal Trade Agreement Act of 1934 under the overwhelming economic power of the U.S. However, it included Section 252, which describes retaliation against unjustifiable, unreasonable, and discriminatory trade practices of foreign countries. The Trade Act of 1974, after the U.S. turned into a trade deficit nation in 1971, emphasized reciprocity and established Section 301, which allows the President to take counter and retaliatory measures to cancel restrictions and subsidies of foreign governments. The 1979 Trade Act, which was under "trade détente" after the GATT Tokyo Round agreement, clarified the scope of application and procedures of Section 301.

As the U.S. trade deficit continued to increase, the Trade Act of 1984 expanded the scope of Section 301 to include direct investment, trade in services, and intellectual property rights; expand the definition of unfair, unreasonable, and discriminatory and provided specific examples; and allowed the U.S. government to initiate investigations at its own discretion without a complaint by a private company. In 1985, the Reagan administration's new trade policy made clear its intention to place Section 301 of the Trade Act at the center of its trade policy. This led to the passage of the Omnibus Foreign Trade and Competitiveness Act of 1988. In this legislative process, there was a series of protectionist proposals, including the Gephardt Amendment, which included a mandatory 10% reduction in the surplus of unjustified excessive surplus countries (meaning Japan implicitly) with the U.S. As a result, Super 301 was added as a timed legislation in 1989 and 1990 to conduct investigations into the trade-distorting practices and foreign barriers. At the same time, Special 301 was added, which allows for the imposition of retaliatory measures against infringement of intellectual property rights.

3. **U.S.–Japan trade friction**

In response to the U.S. aggressive unilateralism, Japan responded to this "external pressure" quite obediently. As Japan is dependent on the U.S. for its security, it gave priority to its relationship with the U.S. as an ally.

First, the voluntary export restraint (VER) measures were adopted. Self-imposed export restrictions arose as Japan's export capacity increased, and from the 1970s onward, regulatory measures were successively imposed on textiles, steel, color TVs, automobiles, and machine tools from Japan to the U.S., as well as steel and video tape recorders (VCRs) to the then European Community (EC). A symbolic item of the Japan–U.S. trade friction and export self-imposed restrictions is automobiles: In 1981, Japan's export self-imposed restrictions were introduced with the aim of restricting U.S. imports of automobiles from Japan, setting an annual export limit of 1.68 million vehicles. This quota limit was introduced with the intention of eliminating it in April 1984, three years after it was set. However, due to the widening of the U.S. trade deficit with Japan and strong pressure from U.S. auto manufacturers, the quota restrictions continued to be extended and were finally removed in 1994 (Obi, 2009). Thereafter, the Japanese auto industry responded by moving its production facilities to the U.S. Beginning in the late 1980s, exports of Japanese cars to the U.S. were replaced by the production of Japanese cars in the U.S. (Fig. 3.4).

The next step was the voluntary import expansion (VIE), which led to the signing of the Japan–U.S. Semiconductor Agreement in September 1986. Semiconductors developed in the U.S. are the core devices for industrial development and national defense. In the 1980s, Japan and the U.S. reversed their share of the global market.[13] In the U.S., Japanese semiconductor companies have been accused of industrial espionage in

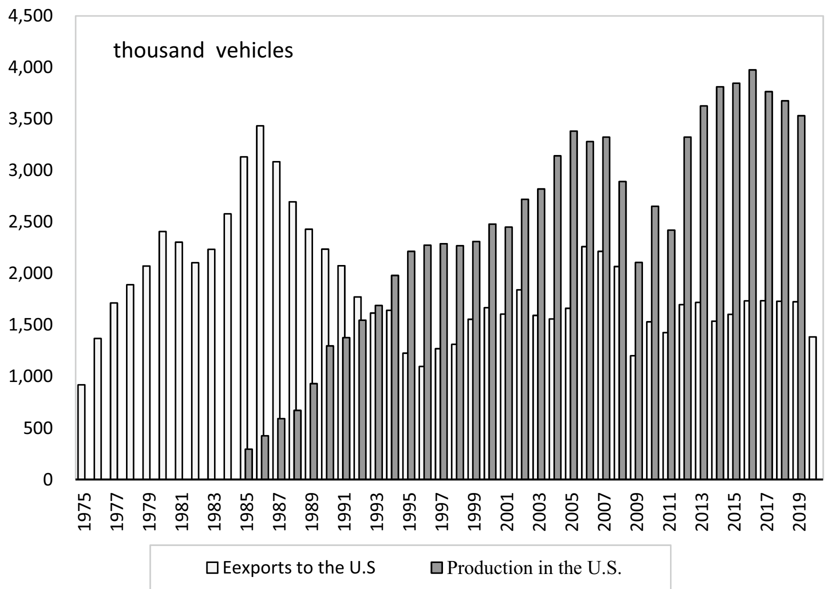

Fig. 3.4 Japanese automobile exports to the U.S. and production in the U.S. (*Source* Authors' creation based on JAMA [2021])

Silicon Valley, of dumping to increase their market share, of having developed with government subsidies and low-interest loans, of being typical of the public–private “Japan Inc.” A series of criticisms followed, such as high barriers for U.S. manufacturers to manufacture and sell their products in Japan (Okimoto et al., 1984).

In 1985, the U.S. Semiconductor Industry Association (SIA) and DRAM manufacturer Micron filed complaints with the USTR and the Department of Commerce, respectively, alleging dumping of Japanese products. In response, the U.S.–Japan Semiconductor Agreement was signed. Under the agreement, it was agreed that the share of foreign-made semiconductors in the Japanese market should be at least 20% within five years as a measure to improve market access, and that they should not be sold at prices below the fair market value (FMV) as an anti-dumping measure.[14] By the time the second agreement, which took effect in 1991, expired in 1996, the U.S. resurgence in the semiconductor industry had been realized while Japan’s semiconductor business was severely damaged by the stranglehold of the market share monitoring system and the FMV rule. As a result of the U.S.–Japan Semiconductor Agreement, which was signed under U.S. aggressive unilateralism, the semiconductor trade was conducted under managed trade and increased the gray measures in the GATT regime, under which the Japanese economy had enjoyed the benefits of free trade.

In September 1985, the G5 Plaza Accord led to the appreciation of the yen, and the Japanese economy fell into a recession with a strong yen. The monetary easing measures adopted to cope with the strong yen recession created the bubble economy. With the bursting of the bubble economy, the Japanese economy entered a tunnel of long-term economic stagnation.[15]

3.4.2 *China: U.S.–China Trade Imbalance and Competition for Technological Supremacy*

1. **China’s growing trade surplus with the U.S.**

The postwar U.S.–China economic relationship was restarted during the Cold War, so even after China turned to the reform and opening-up, the U.S. carefully relaxed export controls and strictly monitored the human rights situation while working to expand the economic relationship. By the time China got on an export-led growth path and joined the WTO in 2001, the trade disputes over trade imbalances, market access, intellectual property rights, and the RMB rate became the focus of U.S.–China relations.

At the root of the trade friction between the U.S. and China is a long-standing, massive trade imbalance, consisting of a U.S. trade deficit with China and a Chinese trade surplus with the U.S. (Fig. 3.5).[16] Until 2018, when the U.S.–China trade war and the COVID-19 had not yet had much of an impact, the U.S. deficit with China and China's surplus with the U.S. were quite asymmetric. For example, according to the customs statistics of the U.S. and China in 2018, the U.S. deficit with China was $419.2 billion, while China's surplus with the U.S. was $323.3 billion, a gap of nearly $100 billion between the two. The reason for the inconsistency in the trade statistics between the U.S. and China is due to differences in the methods used by the two countries to deliver trade goods (Free Alongside Ship: FAS and Customs Value: CV for the U.S., Free on Board: FOB and Cost, Insurance and Freight: CIF for China), the scope of the statistics (e.g., whether Puerto Rico and the U.S. Virgin Islands are included or not), the timing of customs clearance, the country of origin, and the exchange rate (JCCT, 2009, 2012).

In addition to these technical issues, after China's processing trade started in earnest, entrepôt trade via Hong Kong (Hong Kong's re-exports originating in China) began to have a significant impact on the U.S.–China trade balance. Subsequently, the *China's Customs Statistics* gradually improved the reclassification based on final destination, and the form of transit trade via Hong Kong also changed significantly. There has been an increase in the number of products, such as transshipment, that originate in China but are transferred to their final destination without being cleared in Hong Kong, using only Hong Kong's port facilities and settlement functions, and the handling of exports to the U.S. via Hong Kong has become increasingly complex.

2. **China in the global value chain (GVC)**

As the U.S.–China economic relationship deepens, U.S. business with China is also undergoing significant changes. The sales of local subsidiaries of U.S. companies located in China reached $573.383 billion

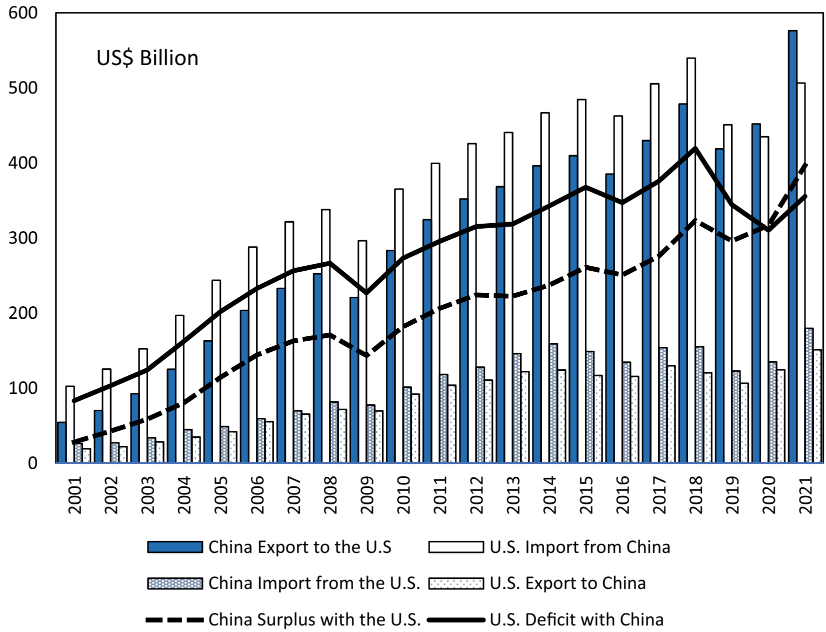

Fig. 3.5 U.S.–China trade balance (*Source* Author's creation based on the data from *U.S. Foreign Trade Highlights* and *China Customs Statistics*)

in 2019, already more than five times the size of U.S. exports to China (BEA, 2021), and the business of U.S. companies with China is shifting from exports to China to production and sales by local subsidiaries in China. In addition, the weight of U.S. intrafirm trade is also high, with 29.4% of U.S. imports from China at its peak in 2010 coming from companies affiliated with China, and the ratio of intrafirm trade thereafter remaining at 23–26% in the latter half of the 2010s (Census, 2022). Thus, a borderless business development is unfolding between the U.S. and China, and the asymmetry in the trade balance is becoming more structured.

Furthermore, looking at value-added trade between the U.S. and China from the perspective of the global value chain (GVC), we can see a different picture from the bilateral trade depicted by customs statistics. One of the pioneering studies on GVC is the case study of Apple's iPhone by Xing and Detert (2010). iPhones are shipped and exported to the U.S. market from factories in China, the country of production of the final goods. According to customs statistics, the U.S. posted a trade deficit with China because it imported the iPhones from China. However, in value-added trade, we focus on the country of origin of the components and parts that make up the iPhone, with component manufacturers from Japan, the U.S., Europe, South Korea, and Taiwan supplying essential components and parts to final assembly plants in China. In contrast, China only provided labor for the iPhone production, and the value added generated in China in the late 2000s was only a few percent of the iPhone shipment value.[17] If we look at the U.S.–China trade balance based on value-added trade statistics, the U.S. deficit with China and China's surplus with the U.S. will shrink considerably. Compared to the U.S. trade balance with China based on customs statistics, the scale of the U.S.–China trade balance (the U.S. deficit with China and China's surplus with the U.S.) will be less than a half of that based on customs statistics in terms of value added.[18]

From the last years of the Bush administration to the Obama administration, the U.S. began to focus on China as a global growth center, while taking individual actions such as the implementation of anti-dumping (AD), countervailing duty (CVD), and safeguard measures. Debates over trade imbalances and the undervaluation of the RMB have been removed from the main agenda of U.S.–China trade negotiations and strategic and economic dialogues,[19] partly due to structural changes in the U.S.–China economic relationship.

3. U.S.–China competition

In the 2010s, Chinese investment in the U.S. also increased rapidly, and the frictions associated with Chinese investment in the U.S. became apparent, as did the period of U.S.–Japan trade friction. China's investment in the U.S. is overwhelmingly M&A and majority control. There are not a few investments by Chinese state-owned enterprises, many of which are aimed at acquiring strategic assets. Moreover, in many cases, the behavioral patterns of Chinese companies buying up U.S. assets did not conform to U.S. business practices and norms, and their contribution to the U.S. economy and society was still limited.

With the advent of the Trump administration, which advocated "America First" and was critical of globalism and multilateralism, the previous policy of engagement with China was rejected, leading to new tensions in U.S.–China economic relations. Under the Trump administration, the transfer and acquisition of U.S. technology and intellectual property by China became a major point of contention, as indicated by the Section 301 of the Trade Act of 1974 Investigation Report released in March 2018 (USTR, 2018).

Behind this, of course, was the persistent complaint that China had not fully implemented the commitments it made when it joined the WTO. There was unceasing antipathy toward the persistence of barriers to competition and the continued implementation of market-distorting policies, such as the implementation of industrial policies targeting specific industries, preferential treatment of state-owned enterprises, provision of subsidies, coercion and theft of technology transfer, setting of proprietary standards, inaction on excess production capacity, and incomplete competition policies. As a result, the perception took hold that China was in a "state capitalist" system that was quite different from that of the U.S.

In addition, the Xi Jinping administration's stance on foreign affairs, which is out of line with the liberal international order established by the U.S. after World War II, has further raised the alarm of the U.S. As China emerged as an economic superpower and modified its posture toward the outside world based on Deng Xiaoping's legacy of *taoguan yanghui* (hiding one's talents and accumulating power within), it began to assert its own "core interests" and develop "great power diplomacy with Chinese characteristics". The U.S.–China relationship has been transformed into one of the great powers vying for global hegemony. At the same time, under the Trump administration, the perception of the general public in the U.S. toward China has also rapidly deteriorated.[20]

The Trump administration, which has been advocating a hard line against China since before the formation of its administration, viewed the U.S.–China economic relationship as a security-encompassing competition for technological supremacy and has imposed sanctions to confront China. The U.S.–China relationship has come to form one of the world's most important, yet highly volatile, bilateral relationships, to the extent that historical empirical evidence points to a "Thucydides trap" (Allison, 2017), i.e., an inevitable clash between a rising emerging power and an existing hegemonic power. The U.S. stance toward China is also followed by the Biden administration.

3.4.3 *Comparison: Trade Frictions with the U.S. and Differences in Responses to Market and Non-Market Economies*

In the grow-up stage, both Japan and China maintained strong economic growth with huge surpluses with the U.S. A country's current account balance reflects its savings-investment balance. Japan's current account surplus in the 1980s reflected Japan's excess savings and the U.S.' deficit. Similarly, China's current account surplus in the 2000s reflects China's excess savings and the U.S.' shortage of savings (Fig. 3.6). Thus, the debates over the global imbalances in the 1980s and 2000s were caused by the current account surpluses of Japan and China and the current account deficits of the U.S., respectively (Fig. 3.7).

In the 1980s, Japan, which had a huge trade surplus with the U.S., was subjected to severe bashing from the U.S. First, Japan's surplus with the U.S. was regarded as the export of unemployment in the U.S. and was harshly criticized not only by industry but also by labor unions. At the same time, the U.S. denounced the closed nature of the Japanese

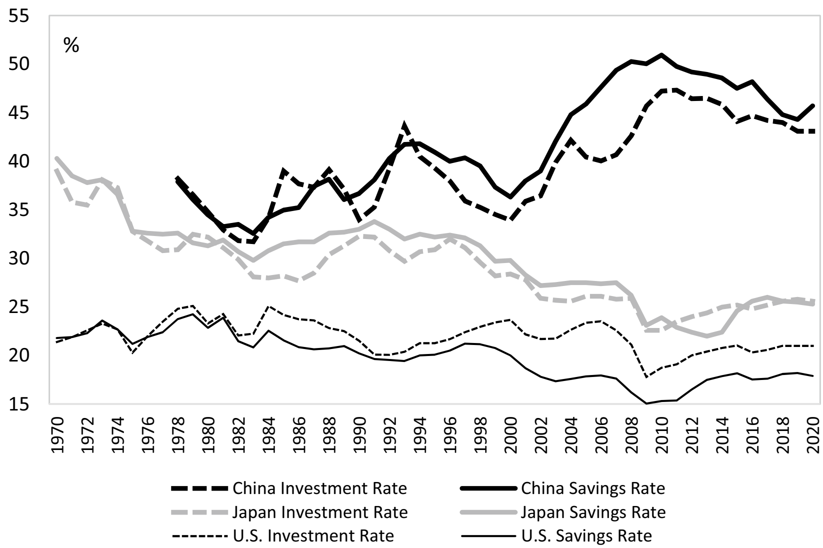

Fig. 3.6 Savings and investment balance of Japan, the U.S., and China (a percentage of GDP) (*Source* Author's creation based on IMF, *International Financial Statistics* and *China Statistical Yearbook*)

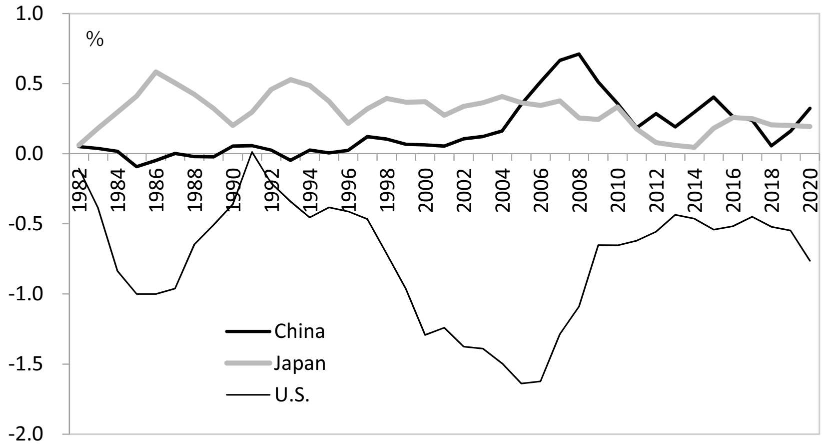

Fig. 3.7 Global imbalance (current account balance as a percentage of world GDP) (*Source* Author's creation based on the data from IMF, *International Financial Statistics* and *China Statistical Yearbook*)

market, criticized unfair trade practices, trade barriers, and the policy agency represented by the Ministry of International Trade and Industry (MITI) behind them, and stepped up its calls for market opening and import expansion. The U.S. raised the issue of the exchange rate, which is the source of Japan's competitiveness, and called for exchange rate adjustments.

The appreciation of the yen gave Japanese companies an advantage in importing goods and made them realize that the overseas assets were undervalued, and they embarked on a massive acquisition of U.S. assets, buying up iconic U.S. buildings and companies, which drew even harsher criticism. In addition, as seen in the case of Toshiba Machine's violation of the COCOM regulations, the actions of Japanese companies that deviated from international norms were subject to severe criticism from a security perspective as well. Such U.S. criticism of Japan has something in common with the U.S.' subsequent harsh stance toward China, which also has a huge trade surplus with the U.S.

However, the U.S. bashing of Japan has since moved in the direction of mitigation and resolution. First, the bursting of the bubble economy severely damaged the Japanese economy, and the U.S. was relieved of its sense of threat from Japan's overtaking the U.S. Prior to this, bilateral trade negotiations between Japan and the U.S., such as the Market-Oriented Sector-Selective (MOSS) talks and the U.S.–Japan Yen-Dollar Committee, had been held frequently. In 1989–1990, the U.S.–Japan Structural Impediments Initiative (SII) was held, which were not limited in scope to individual items and exchange rates but expanded in scope to include the nature of economic systems and culture, such as business practices and distribution structures. Subsequently, there were repeated efforts to deepen mutual understanding, including the follow-up meetings between 1990 and 1992 to check the progress of the measures to improve the economic structure of the two countries that were included in the Final Report of the SII.[21] In addition, with the passage of time, both the U.S. government and companies were able to gradually adapt to Japanese-style business practices. Moreover, it has gradually become clear that Japanese companies in the U.S. are making a significant contribution to the U.S. economy and society, whether in terms of employment, exports, or research and development (R&D). In 2019, Japanese companies in the U.S. have become the largest foreign presence in the country.[22]

In contrast, the current perception of the U.S. toward China is extremely harsh. It has become a target of criticism from the same perspective as Japan in the past. In addition to this, in the case of China, there are more factors involved than criticism of Japan and Japanese companies. First, there is the critical perspective of trade relations with a nation led by the Chinese Communist Party. There is a wariness of state-owned enterprises that are not expected to compete fairly in the marketplace, and there is also concern about non-market economies and non-competitive trade practices. China is also a security threat and, as the Biden administration describes, the only competitor potentially capable of combining its economic, diplomatic, military, and technological power to mount a sustained challenge to a stable and open international system (White House, 2021), forcing the U.S. to place restrictions on the transfer of dual-use technologies. In the economic context, China, like Japan in the past, is a challenger to the U.S. In the case of China, however, there is a greater emphasis on consideration of multiple factors, including ideology, political system, and security, in addition to economic factors.

3.5 A Comparison of China and Japan: The Benefits of Globalization and Global Governance

Through the comparison of export-led growth between China and Japan, we have been able to make the following implications regarding the relationship between trade, FDI, and economic growth in China.

The first concerns the benefits of opening-up to the outside world (trade and FDI). Before World War II, Japan experienced a highly developed market economy and had an accumulation of manufacturing industries. After the war, it belonged to the capitalist camp and had favorable conditions for access to allied countries and the U.S. market. China, on the other hand, was a semi-colonial feudal society before the war, where commercial capital was the mainstay and industrial capital was difficult to develop. After the war, it belonged to the socialist camp, established a planned economy system, and pursued a "self-reliance" path after the Sino-Soviet split. Thus, China's political and economic system is a limiting factor for economic growth and industrial development. Therefore, the shift to the reform and opening-up at the end of the 1970s and the emphasis on trade and FDI contributed to alleviating the unfavorable initial conditions.

The second is the opportunity of globalization and WTO accession. In the catch-up stage, Japan achieved growth through exports and technology introduction, with little use of foreign capital. In the growth-up stage, Japan promoted the transformation of its industrial structure through capital export. In other words, Japan's economic growth experienced a change in its industrial structure that reflected its comparative advantage. In China, on the other hand, inward direct investment as a form of transfer of management resources played a pivotal role in the process of economic growth. Even in the high-tech industries that were not based in China, China was able to effectively utilize the transferred management resources and rapidly catch up. The trajectory of China's economic development has brought about a modification of the "flying-geese pattern of development" of East Asia.[23] The development of international division of labor and fragmentation under the modularization of industrial products, and the accumulation of industries with foreign-invested enterprises at their core, have led to rapid growth leveraged by the FDI–Trade nexus. The modularization of industrial products has enabled an international division of labor called fragmentation by production process. Industrial clusters centered on foreign-affiliated firms formed the FDI–Trade nexus, enabling rapid leapfrog-type growth leveraged by trade and FDI in specific industrial sectors (Ohashi, 2005).

The third issue concerns the involvement in global governance. Historically, Japan has been located on the periphery of the international order centered on China. Even in the process of modernization after the Meiji Restoration, Japan focused on adapting itself to the international order. A similar pattern of external behavior has been seen since World War II, as Japan has striven to adapt to the international regime. On the other hand, China, which has historically been a central power, tends to adopt an "exit, voice, and loyalty" approach to the existing international regime (Hirschman, 1970). Therefore, today, China's independent and self-reliant posture as a major power often clashes with the existing international order. In fact, such traditional factors are unverifiable, but it is likely that the traditional factors of the middle kingdom underlie China's current perception of the international order and international behavior.

Needless to say, rigorous empirical research on individual hypotheses will continue to be required for the above three points.

Notes

1. The World Bank (1993) partially evaluates the industrial policies of Japan and Korea, but at the same time warns that industrial policies cannot be implemented in developing countries with low institutional capacity. However, with the expanding role of governments in the face of repeated financial crises, growing awareness of economic security and the Covid-19 pandemic, new industrial policies that respond to the new era beyond growth and employment expansion are attracting attention in many countries (METI, 2021).
2. The studies in Japan, for example, include Minami (1986) for Japan and Ohashi (2003) for China.
3. One of the few exceptions is Minami (1994), and this comparative study of Japan and China is based on Minami (1986). However, both studies focus on the period of rapid economic growth, the catch-up phase as used in this chapter, in Japan and China.
4. The *Jimmu* boom (1955–1957) was named after Emperor *Jimmu*, who is regarded as the first emperor since the beginning of history. The *Iwato* boom (1958–1961) was named after the founding myth of Japan, as it was a bigger boom (42 months) than the *Jimmu* boom. The Olympic boom (1962–1964) was due to the special demand for construction of the 1964 Tokyo Olympics. The *Izanagi* boom (1966–1970) was even larger than the *Iwato* boom (57 months) and was named after the founding myth.

5. This policy is reflected in the strategy for the development of the dual circulation proposed at the May 2020 meeting of the Standing Committee of the Chinese Communist Party Central Politburo. According to General Secretary Xi Jinping, "We aim to create a new model of economic development in which the domestic circulation takes the lead and the domestic and international dual circulation promote each other" (*Xinhua*, July 21, 2020).
6. Article XI of the GATT stipulates the prohibition of import and export volume restrictions in principle, and Article VIII of the IMF provides for the avoidance of restrictions on payments in current transactions, the avoidance of discriminatory currency measures, and the maintenance of the convertibility of balances in the national currency held by other countries.
7. For the details, see Ohashi (2003, Chapter 2).
8. According to Wei Jianguo, Vice Minister of Commerce at the time of 2007, direct employment in processing trade is 30–40 million (about 20% of the secondary industry), and the number of workers in processing trade-related industries is 50–60 million (*Guoji Shangbao*, July 24, 2007).
9. The idea of "dual market transition" is based on Ishikawa (1990), who attributed the failure of the rapid transition to a market economy in the former Soviet Union and Eastern European countries to the underdevelopment of the market economy.
10. The middle-income countries are forced to rely on independent innovation, but it is not an easy task for them to accelerate economic growth by innovation. Gill and Kharas (2007) called this stagnant phase of economic growth in middle-income countries as the "middle-income trap".
11. The 2011 Social Progressive Series Report of Social Development Research Group represented by Professor Sun Liping at Tsinghua University proposed the concept of "regime transition trap," emphasizing the vested interest groups formed in the market transition process tend to distort and deform the economic and social development to maximize their own profits in China. *Zhongguo Qingnianbao (China Youth Daily)*, January 9, 2012, "Zhongdeng Shouru Xianjing Haishi Zhuanxing Xianjing" (Middle-income Trap or Regime-transition Trap), *Kaifang Shidai (Open Times)*, No. 3, 2012.
12. For the details, see Ohashi (1998, Chapter 7).
13. In 1981, Japanese semiconductor manufacturers held a 70% share of the global 64 K DRAM market (*Fortune*, December 14, 1981).
14. The agreement was contained in a closed-door side letter stating that the Japanese government would recognize the expectations of the U.S. semiconductor industry. However, the U.S. government considered this a promise and imposed sanctions against Japan for breaking its promise.

The undisclosed side letter was first disclosed in the release of diplomatic documents on December 19, 2018 (*Asahi Shimbun*, December 19, 2018).

15. As for the Japanese economy after the bubble economy, see Ito and Hoshi (2020).
16. With respect to various scale estimates of the U.S.–China trade imbalance, see Ohashi (2020, Chapter 3).
17. Of course, the iPhone case may be a rather extreme case in China's foreign trade at the end of the 2000s: according to the 2020 edition of Apple's supplier list, the number of Chinese companies surpassed Taiwanese companies to take the top spot for the first time (*Nikkei*, June 3, 2021). In addition, the ratio of domestic value added to China's total exports, as calculated by the OECD (2021), rose to 82.8% in 2018, reflecting the fact that China has since been equipped with a more full-set industrial structure and rapidly increasing its technological capabilities.
18. Calculated based on OECD (2021).
19. A series of U.S.–China high-level dialogues were called the Strategic Economic Dialogue (SED) under the Bush administration and the Strategic and Economic Dialogue (S&ED) under the Obama administration.
20. For example, according to the China Image Survey conducted regularly by the Pew Research Center (https://www.pewresearch.org), since 2012, Americans' unfavorable perceptions of China have significantly outnumbered favorable ones.
21. The final report set forth a wide range of commitments, from macroeconomics to corporate behavior and business practices, as measures that should be taken by both Japan and the U.S. Japan was asked to make commitments to increase public investment, make more effective use of land, deregulate the Large-Scale Store Law, tighten the anti-monopoly law, improve *keiretsu* (intragroup) transactions, and understand the actual difference between domestic and foreign prices, while the U.S. was asked to make commitments to balance the budget, encourage savings and investment, curb excessive executive compensation, strengthen research and development, promote exports, and train and educate workers (RIITI, 1990).
22. According to BEA (2021), among foreign firms located in the U.S., Japanese firms ranked first in 2019 inproperty, plant, and equipment spending and R&D spending, and second in employment and value added, behind British firms.
23. A "flying-geese pattern of development" is a model for the international division of labor based on dynamic comparative advantage in East Asia, where the production of commoditized goods would continuously move from the more advanced countries to the less advanced ones. The

paradigm was developed in 1930s and presented to world academia by Akamatsu (1961). See also Kojima (2000).

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CHAPTER 4

Digital China: Policy Initiatives, Progress, and Challenges

Asei Ito

4.1 Introduction

The word "Digital China" is the combination of two megatrends—China's economic rise and the digitalization of the global economy. Since its transition to a market economy in 1978, China has emerged as an economic power. In the 2000s, the digitalization of the economy became global in scale, and the 2010s showed the remarkable emergence of corporations with massive numbers of users, such as Alibaba and Tencent in China and Google and Facebook in the US. Schwab (2017) emphasizes that technological innovation is currently taking place not only in specific industries but also in a wide field in parallel. He calls this phenomenon the arrival of "The Fourth Industrial Revolution." In the area of technological competition, which is seen as the core of the current dispute between

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_4

the US and China, a US government report evaluates that in two of nine advanced technology areas (exascale computing and commercial drones), China is ahead of the US, and in three areas such as artificial intelligence (AI), quantum information science, and high-performance computing, the countries are regarded as at the same level (US–China Economic and Security Review Commission, 2017).

Obviously, China has a great potential to be a digital superpower as the country having 1.4 billion population and a large amount of data. As pointed out,

> China's digitalization is a multifaceted problem that may have a ripple effect not only on the economy but also on the censorship and monitoring of its society, as well as overseas expansion (Shi-Kupfer & Ohlberg, 2019).

With this problem in mind, this article focuses on the scale, level, and impact of the digitalization of the Chinese economy. The second section organizes the scale of China's digital economy and the standard of use. It explores the estimation that the digital economy has larger indirect sectors than direct sectors composed of Information and Communication Technology (ICT) industries, and that the scope of policies is gradually expanding from solely industrial policies to social policies as well. Then, based on data from users of internet-based payment technologies, it analyzes how China compares with other countries in this regard. The final section examines the impact of digitalization on the Chinese and Asian economies.

4.2 Digitalization in China

4.2.1 Rise of China's Digital Economy and Policy Initiatives

The growth of the Chinese digital economy has been attracting much interest (McKinsey Global Institute, 2017; Ministry of Economy, Trade and Industry, 2018). It is often said that its large population allowed China to secure a massive number of users with its domestic market alone, as well as network externality, which is a major factor in the development of the internet industry. The number of broadband internet users in China surged in the late 2000s, rising from 298 million people in 2008 to 828.51 million in 2018 (Office of the Central Cyberspace Affairs Commission/Cyberspace Administration of China/China Internet

Network Information Center, 2018).[1] The ratio of young internet users in China is higher than that in the US, with people aged 29 or below accounting for 54% of all users. Smartphones also play a more crucial role in China, where as many as 25% of the internet users access it only from smartphones, compared to only 11% in the US (Boston Consulting, 2017).

Companies that have grown based on China's vast domestic market include major ICT corporations, such as the already-mentioned Alibaba Group and Tencent Holdings, and venture capital firms, namely unicorn companies (privately held companies valued at more than one billion dollars). The Alibaba Group developed China's e-commerce market, while Tencent Holdings expanded around game billing services and social network services. As indicated in Fig. 4.1(A) and (B), the size of China's retail e-commerce market and internet payment grew rapidly in the 2010s. Although Alibaba pioneered the expansion of e-commerce and the internet payment market, the late-comer Tencent managed to seize market share in the mobile payment field with its WeChat Pay, creating fierce competition. Both companies were among the top ten most valuable companies in the world in 2018, and newer companies such as ByteDance and DJI have also quickly gained market share in areas of new services and hardware, creating corporate value.

With all this in mind, what is the percentage of China's digital economy in the country's GDP? Although the definition of the digital economy from the perspective of national income estimation on an international level is still not completely clear, there are two approaches that can be used to calculate its size. The first approach aggregates the size of the ICT industry as the foundation of the digital economy. While the digital economy is supported by telecommunications-related manufacturing and service industries, it also faces various issues. For example, even the field of agriculture, which is included in the primary industry, has seen the growth of precision agriculture, which uses image recognition technology through sensors installed on the farmland. It is also clear that the use of internet of things (IoT) is expanding in factories of industries other than telecommunications manufacturing. This trend makes it important to consider that every industrial field has the input of a "digital" element that contributes to production output. Therefore, the second approach sees the ICT industry as the foundation of the digital economy and considers the degree of digitalization of other sectors in the estimation.

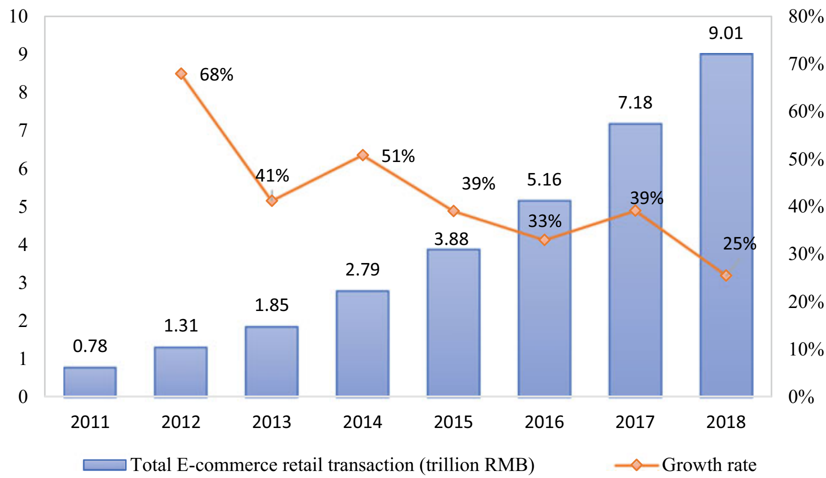

Fig. 4.1 Growth of e-commerce and internet payment in China: (A) Retail e-commerce in China; (B) Internet payment in China (*Source* Ministry of Commerce of the People's Republic of China, Department of Electronic Commerce and Informatization, 2019)

Since the definition of the ICT industry has already been consolidated, it is relatively easy to calculate the ratio of the ICT industry in the economy with the first approach. After the OECD published the data of its member countries in 2011, Herrero and Xu (2018) estimated the size of China's ICT industry in 2012 based on OECD's standards. They calculated that the country's ICT industry is responsible for 4.8% of its GDP and 2.6% of its employment. While these ratios are lower than the OECD's average of 6% and 3.7%, both have increased since 2012.

In contrast, with the second approach, it is necessary to estimate the level of contribution of the capital invested in ICT relative to the output of each industry. The China Academy of Information and Communications Technology (2017), a governmental research institution, estimated the ratio of the digital economy in the GDP from the contribution of ICT capital to the added value of each industry. According to its report, this ratio reached 15.2% in 2008 and 30.3% in 2016, which Herrero and Xu (2018), Miura (2018), and Zhang and Chen (2019) claim is overestimated.

In recent years, the Chinese government has drafted a set of policies related to digitalization that covers a wide range of issues ranging from industrial to social (see Table 4.1). Since the 1990s, China has been developing mid-to-long-term science and technology policies that have promoted the development of strategic emerging industries and underlined the importance of indigenous innovations, particularly starting in the 2000s (Chen & Naughton, 2016). The strategic plan "Made in China 2025," which is at the center of the current trade war between the US and China, is a typical example of modern industrial policy. It aims to increase the ratio of Chinese-domestic core technologies and essential industries through industrial subsidies and industrial investment funds by 2025 (Wübbeke et al., 2016; Zenglein & Holzmann, 2019). The "Internet Plus Action Plan" of 2015 and the "New Generation Artificial Intelligence Development Plan" of 2017 are also close to industrial policies. In contrast, the digitalization-related policies proposed by the Chinese government in recent years include the "Social Credit System Construction Plan (2014–2020)" and the "Digital Village Development Strategic Plan," which clearly cross the barrier of industrial policies to include social governance policies. For example, with the "Digital Village Development Strategic Plan," Chinese authorities intend to develop communications infrastructure in rural areas and thereby strengthen the governance of those communities.

4.2.2 Level of Digital Usage in China

While mobile payment services such as Alipay and WeChat Pay have become very popular in China, it is important to note that similar services are also expanding in other developing countries. In Kenya, for example, a service called M-Pesa has attracted attention. With this system, even people who do not own a bank account are allowed to use mobile money (Mas & Radcliffe, 2011). In Indonesia, a motorcycle taxi service called Go-Jek is already working as part of new infrastructure in cities (Peters, 2019). In some emerging countries, mobile internet services are being adopted at a higher rate than in developed countries, causing a phenomenon that can be referred to as "digital leapfrog."

This section focuses on the personal use of "digitalization," specifically on consumption behavior and payment behavior. The data used is the

Table 4.1 China's central government policies concerning digitalization

Policy name	*Announcement date*	*Institution in charge*	*Outline*
Social credit system construction plan (2014–2020)	14/06/2014	State Council	Establish the fundamental laws and standards concerning social credit by 2020. Develop a system that encourages its citizens to protect social trust in the areas of government work, corporate transactions, financial information, construction and traffic, e-commerce, statistics, and others
Made in china 2025	19/05/2015	State Council	Initiative to elevate domestic corporations to a global level, namely in the areas of semiconductors, machine tools, robotics, and the aerospace industry. It underlines the fusion of manufacturing and the internet. One of its objectives is to increase the ratio of R&D investments to sales in manufacturing companies to at least 1.68% by 2025

Policy name	*Announcement date*	*Institution in charge*	*Outline*
Big data development action plan	31/08/2015	State Council	Collect data concerning trusts, finance, tax revenue, agriculture, import and export, and others within five to ten years to create a new model of social governance. Promote government data release and sharing. Expand and promote the analysis of basic data such as population, corporate information, and natural resource information. Promote the use of industrial and agricultural big data
Internet plus action plan	14/12/2015	Industrial Information Department	Accelerate the fusion between industrialization and informatization, formulate CPS (Cyber-Physical System) and technical standards, and aim for the domestic production of related equipment. Promote connected cars, build a platform for design and development systems, develop outsourcing models

(continued)

Table 4.1 (continued)

Policy name	*Announcement date*	*Institution in charge*	*Outline*
13th five-year plan national informatization	27/12/2016	State Council	Clarify specific targets for 2020, such as the scale of information-related industries, the number of patents for inventions, and the coverage rate of basic infrastructure. It seeks cooperation with related policies such as Big Data, "Internet Plus," Entrepreneurship Policy, and "Made in China 2025."
New generation artificial intelligence development plan	08/07/2017	State Council	Grasp the strategic opportunity for the development of artificial intelligence and create pioneer advantages in this industry. Achieve a global level in applied technology by 2020 and reach an important milestone in basic research and the world's highest level in application by 2025. Achieve the world's highest level in theoretical knowledge, technology, and application by 2030
Connected car industry development plan	27/12/2018	Industrial Information Department	Formulate industrial standards and create a database required to obtain level 3 of autonomous driving or above. It aims to increase the percentage of vehicles equipped with level 2 systems or above to at least 30% of new car sales, and equip at least 60% of the cars with onboard information terminals

Policy name	*Announcement date*	*Institution in charge*	*Outline*
Digital village development strategic plan	16/05/2019	General Office of the Central Committee of the Communist Party of China and State Council	Promote the digitalization of rural economy and society, modernization of agriculture, and revitalization of villages. Increase the penetration rate of the fourth-generation mobile communication network to 98% by 2020 and promote the digitalization of government services to reduce poverty. Promote the application of the fifth-generation mobile communication technology by 2025 and reduce the digital gap between urban and rural areas. Drastically reduce this gap by 2035 and modernize agricultural villages and the capacity of governance of rural areas

Source Author's creation

Global Findex Database provided by the World Bank.[2] This data represents the personal use of financial services in various countries in 2011, 2014, and 2017, which were estimated from individual answers.[3]

We will now examine the variable “internet payment,” which was collected in 2014 and 2017.[4] Figure 4.2 is a chart that depicts the ratio of people at the country level that have experience with internet payment on the vertical axis and GDP per capita on the horizontal axis. An overall growing trend can be observed, as well as a correlation between the improvement of economic development level and the use of digital technologies. The chart also indicates that the ratio of users increased globally between 2014 and 2017, and it is especially high in Nordic countries such as Finland (FIN), Denmark (DNK), and Norway (NOR).

In addition, the values of “internet payment” are shown to vary among countries with similar levels of economic development. For example, with a GDP per capita of around 8,000 dollars on the horizontal axis in 2017,

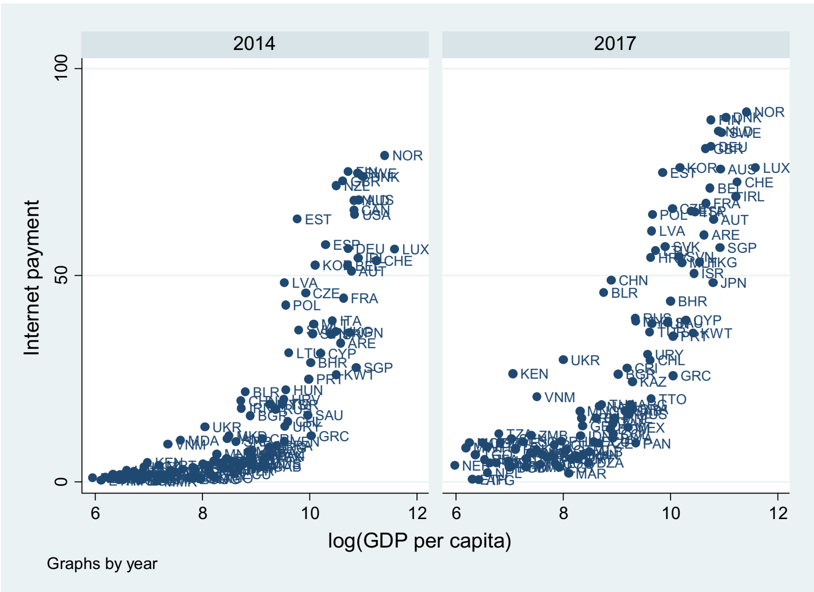

Fig. 4.2 GDP per capita and use ratio of internet payment (data from 2014 and 2017) (*Source* Chart created from the World Bank’s Global Findex Database and World Development Indicators)

China (CHN) is positioned as a middle-income level country, but the use rate of payment through the internet is relatively high. Meanwhile, Japan's (JPN) GDP per capita is around 40,000 dollars, but its ratio of internet payment is lower than other countries with the same level of economic development. Countries such as South Korea (KOR) and Estonia (EST) are more digitally advanced than Japan despite having a lower GDP per capita. In terms of GDP per capita, Kenya (KEN) is positioned as a low-income country, but its level of digital payment ratio on the vertical axis is very high. Hence, from the indicator of internet payment, we can conclude that China is not the only emerging country that stands out among other nations.

In considering the digitalization process in China, especially the mechanism of dissemination of services centered on mobile payment, it is necessary to examine the role of private IT companies such as Alibaba and Tencent. In the case of bicycle-sharing businesses and other areas of the shared economy, a pattern arises in which business development is led by private companies (Komagata, 2018). Even in the case of Alipay, active business development took place in a gray zone, with economic policy authorities using "*Xianfang Houguan* (be lenient at the initial stage of market formation and regulate it later)" as a keyword, which indicated they recognized the importance of a competitive environment.[5] This was an indication that quasi-regulatory sandbox policies were adopted, and it is noteworthy that the government took a supportive stance on the spread of new digital services.

Another topic concerning the digitalization of Chinese society is the theory of digital Leninism and surveillance society. Previous studies have pointed out that in China's economic system, the intervention of the State and the Chinese Communist Party can be observed alongside characteristics of State Capitalism. The theory of "digital Leninism," which appeared recently, claims that the authoritarian regime intends to build a surveillance society using IT (Heilmann, 2016). Human Rights Watch (2019) has also raised concerns over the monitoring of ethnic minorities in the Uyghur Autonomous Region through a smartphone application.[6] Moreover, the Chinese government is also planning a higher-level approach that goes beyond simple monitoring and induces prosocial behavior using social credit (Kajitani & Takaguchi, 2019).

To analyze the relationship between the authoritarian regime and digitalization, Fig. 4.3 indicates the scale of freedom of political speech and transparency on the horizontal axis and "internet payment" on the vertical axis.[7] The maximum value of 100 on the horizontal axis indicates freedom in terms of government choice, speech, association, and news reports, while 0 indicates a lack of freedom. At the top right of the chart are countries that are politically free and have high levels of use of digital technology. For both 2014 and 2017, this position is occupied by Nordic countries such as Norway (NOR), Sweden (SWE), and Denmark (DNK). While a clear growing trend can be observed in 2014, in 2017, the chart takes a slight shape of a U or a J. Countries that are located at the left-center of this chart are considered to be under an authoritarian political regime with a certain degree of progress in the use of digital technology. Countries in this location are the United Arab Emirates (ARE), China (CHN), Belarus (BLR), Bahrain (BHR), Saudi Arabia (SAU), and Russia (RUS). It is important to note that the use of digital technology in payment developed globally in the 2010s. Although it is not possible to determine the causal relationship between these variables from a snapshot of 2014 and 2017, it is worth considering that digitalization did not slow down even in authoritarian countries, as the chart changed from a roughly growing trend to a J-shaped distribution.

Therefore, China currently has two major characteristics: its digitalization process is ahead of its level of economic development and, at the same time, digitalization coexists with an authoritarian regime. Hence, it is necessary to evaluate the "digital China" from the aspect of the social implementation of digital technology led by private ICT companies, as well as the perspective of digital authoritarianism.

4.3 Impact of Digital China

4.3.1 The Future of Work in China

Next, let us examine how China's digitalization impacts the Chinese economy and the global economy.

The first topic is digitalization's impact on employment in China. Digitalization, and the development of artificial intelligence in particular, is expected to not only automate tasks of routine jobs but also parts of non-routine jobs. Based on data from 702 occupations in the US, Frey and Osborne (2013) estimated that 47% of the jobs in the country have a high risk of being automated (i.e., have a probability of automation of 70% or above) in the next 10 to 20 years (hereinafter, their estimation is referred to as "FO estimation"). Meanwhile, Arntz et al. (2016) claim

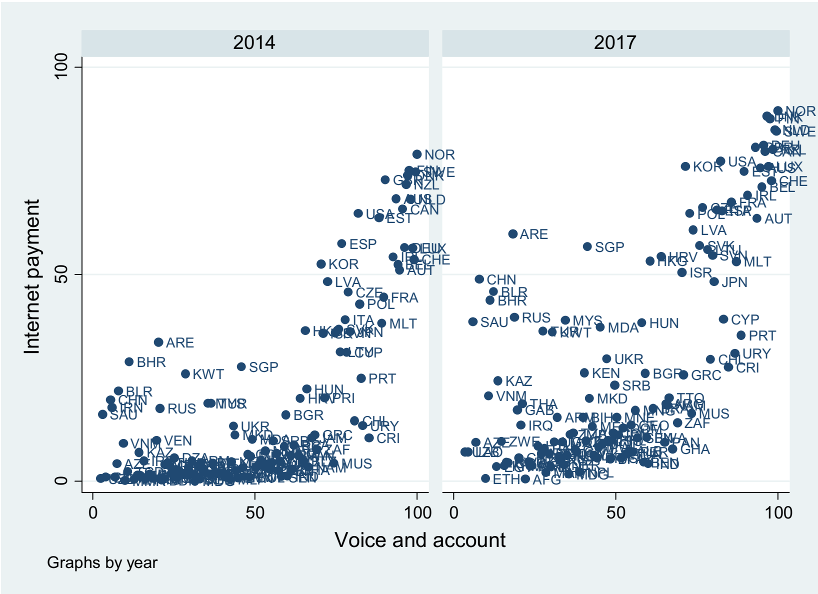

Fig. 4.3 Freedom of political speech/transparency and internet payment ratio (data from 2014 and 2017) (*Source* Chart created from the World Bank's Global Findex Database and World Governance Indicators)

that while the FO estimation calculates the probability for each occupation, it does not consider that even within a certain occupation, some tasks can be more easily automated than others. According to their report, on average, 9% of the jobs of OECD countries have a high risk of being automated (have a probability of automation of 70% or higher).

These estimations raise the question of whether artificial intelligence will automate jobs in developing countries as well. Hallward-Driemeier and Nayyar (2017) point out that although the manufacturing industry is expected to remain an important source of job creation in developing countries, with advanced automation in the sector, it will not have the same capacity to create new jobs as before.

It is important to note that the FO estimation predicts the probability of automation of each occupation using employment data from the US. For this reason, its applicability to developing countries, which are drastically different in terms of development stages and resource availability, may be low. For example, when considering a time span of 10 to 20 years, it is very likely that a specific occupation in the US (e.g., a factory worker or a salesperson) has a different probability of being replaced than the same occupation in China. In this context, the possibility of two biases must be considered. The first one is the possibility that the FO estimation may overestimate the probability of the replacement of jobs in China. Technology develops according to the existence of resources; thus, as the labor force is more plentiful than capital in China, the necessity of automating the production line of a factory is low, as is the probability of replacement. At the same time, China's probability of replacement by occupation may be underestimated in the FO estimation because automation is advancing at a faster rate in China than in developed countries. For example, in Hema Fresh, a grocery store that has seen investment from the Alibaba Group, payment is fully conducted through a self-checkout system. Some restaurants in China are more automated than those in the US and Japan; customers can scan a QR code to browse the menu and pay their bills with their smartphones, for example. In other words, although the average capital per worker (capital-labor ratio) in China is considered low, the country is more automated than developed countries in some respects.

Despite the possibility of bias in the use of the FO estimation, Hamaguchi and Kondo (2018) used the probability of automation generated with the FO estimation as a baseline to demonstrate the impact on employment in each region of Japan. We examine which types of occupation in China are more likely to face higher risks of automation by matching the FO estimation to the data from China Family Panel Studies (CFPS) of 2016.[8] It contains data from 36,892 households, including the individual occupation information of 27,096 employees classified according to CFPS's own standard as well as ISCO-88.

Figure 4.4 shows the results obtained by matching the FO estimation (SCO 2010 classification) with the CFPS data.[9] In Fig. 4.4, each point represents an occupation according to CFPS's own standards, the employment share (based on the CFPS survey), and the probability of automation of that occupation according to the FO estimation are respectively indicated on the horizontal and vertical axes.[10] The jobs with a relatively high share in the employment market are divided into occupations with a high and low probability of being replaced, which is also a characteristic of the FO estimation. The occupation shown on the upper right side of the chart, with an employment share of 5.9% and a probability of automation of 92% is Salespersons, and the point with an employment share of 5.2% and probability of automation of 77% represents Horticultural Crops Workers. In contrast, in the lower center of the chart are Self-Employed Persons in Wholesale and Retail and Managers of Production and Marketing, which have a low probability of automation.

It is important to note that Field Crop Workers (CFPS occupation code 50,101) have an employment share of 30.76%, which would make it an outlier number. For this reason, they were omitted from Fig. 4.4. If Field Crop Workers were defined as Farm Labor Contractors in the FO estimation (SOC code 13–1074), they would have a probability of automation of 97%. On the other hand, if we consider the fact that there are many self-employed farmers in China and classify them as First-Line Supervisors of Farming, Fishing, and Forestry Workers (SOC code 49–3041), the probability of automation would be 57%. The Chinese labor market continues to be supported by the agriculture sector, which reflects the nature of developing countries. Therefore, the impact on all employment in China is greatly dependent on the way in which the probability of automation of field crop worker is defined.[11] While the FO estimation

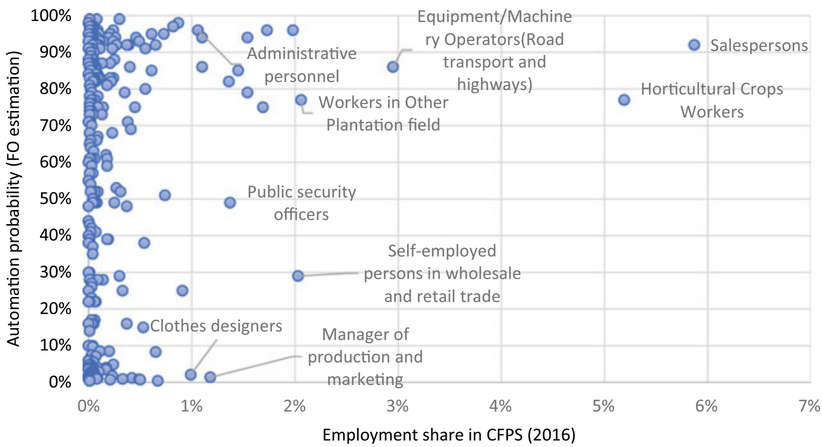

Fig. 4.4 The impact on China's employment estimated with the FO standard (excludes agriculture workers) (*Note* With an employment share of 30.76%, field crop workers (CFPS code 50,101) would be an outlier value and, for this reason, were omitted from this chart (*Source* Calculated by author based on Frey and Osborne (2013) and CFPS data)

may overestimate the probability of automation, as pointed out by Arntz et al. (2016), the projection that the jobs of salespersons in urban areas and field crop workers in rural areas can be easily replaced is reliable.[12]

The FO estimation is also criticized for not considering that new technologies create new jobs. Since employment is a very sensitive theme in China, IT companies such as Alibaba emphasize the effect of job creation.[13] The School of Labor and Human Resources at Renmin University of China (2018), supported by Alibaba's research institute (AliResearch), examined the industry-related effects and concluded that the shopping website Taobao created 1.405 million direct job opportunities and 2.276 million indirect opportunities in 2017. Also, in a survey conducted by the Ali Research-China Development Research Foundation (2018), over 80% of the e-commerce companies said they would maintain or increase employment even after the use of automated business tools. Moreover, the Alibaba Group underlines that the expansion of e-commerce in the rural economy would allow local products to be commercialized both in domestic and foreign markets; it is therefore promoting its Taobao Village Project.[14] The kinds of new occupations that will be created by digitalization in China is another topic that requires investigation.

4.3.2 *Amazon Effect in China*

Now, we examine the ways in which digitalization is affecting the prices of commodities.

So far, there is no consensus regarding how the spread of the digital economy affects the prices of commodities. One hypothesis is that the expansion of e-commerce makes it easier for price information to circulate, which in turn intensifies the competition among stores. In addition, the aggregation of inventory and logistics leads to a compression of sales costs and, consequently, the prices of commodities drop. This is the so-called "Amazon effect." On the other hand, large platform companies may create an oligopoly situation and gain further price bargaining power (Charbonneau et al., 2017). Cavallo (2017), who compiled the online and offline prices of individual products in major economies, found that in China, 87% of products have the same price online and offline, with only 6% of products being cheaper online. Meanwhile, 22% of the products in the US and 45% in Japan are cheaper online. Based on regional data in Japan between 2016 and 2018, Kawada and Hirano (2018) reported that the expansion of internet sales had a negative impact on the local price index.

It is known that the rate of use of e-commerce in China is higher in developed regions, such as Beijing, Shanghai, Guangdong, and Zhejiang. Using the data of provinces in China between 2015 and 2017, let us examine the relationship between the share of e-commerce and the retail price index at the regional level. The horizontal axis of Fig. 4.5 indicates the change in the ratio of e-commerce sales to the total retail sales from the previous year in each province, while the vertical axis represents the respective inflation rates. If the spread of e-commerce caused deflation, a descending relationship should be observed in this chart, but such a relationship is not present. Since a standard approach in consumer price estimation is to examine the impact of the inflation rate and supply–demand balance of the previous year, we made an estimation that included the inflation rate and the economic growth rate of each region in the previous year, but a statistically significant relationship was not verified.

Why has digital deflation not occurred in China? One of the main reasons is that there is no difference between online and offline prices in China, as reported by Cavallo (2017) above, which can be attributed to the characteristics of e-commerce in the country. On China's largest Business to Customer (B2C) e-commerce website Taobao and B2B website 1688.com, developed by the Alibaba Group, retailers are encouraged to differentiate themselves from others. The design of the page of these websites is also very different from Amazon, which allows an instant price comparison of the same products. This is close to the page design adopted by Rakuten in Japan. Kajitani and Takaguchi (2019) point out that Chinese e-commerce websites focus on the negotiations between store owners and customers via online chats. They say that while companies such as Amazon offer "product-centered e-commerce" that makes it easy for users to compare the same product, Taobao practices "human-centered e-commerce," which focuses on communication with retailers. This discussion suggests that China's largest e-commerce website places more emphasis on the dialogue between customers and retailers than price comparison, which can be interpreted as one of the mechanisms that make digital deflation difficult to occur. Since Amazon and Taobao have a strategic difference in their business models, in examining the impact of e-commerce on the Chinese economy, it may be necessary to analyze the "Taobao Effect," which is slightly different from the Amazon Effect.

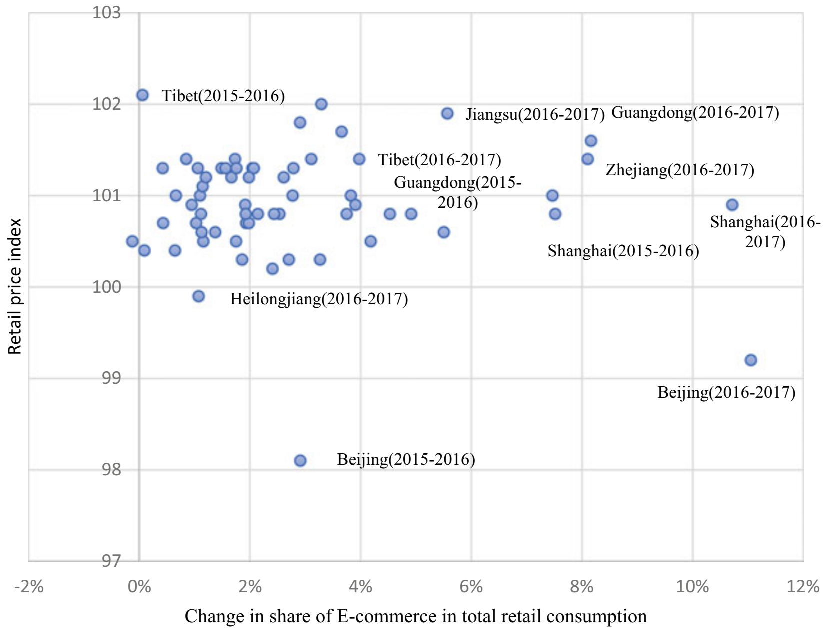

Fig. 4.5 Inflation rate and share of e-commerce in China by province (2015–2017) (*Source* Author's calculation based on China Statistical Yearbook 2016, 2017, and 2018)

4.3.3 *Digital Belt and Road*

The last topic of discussion concerns the impact of China's digital economy on foreign countries. One of the first topics discussed regarding this subject is the sharing of satellite information and the plan to lay optical cables, which are part of the Belt and Road Initiative that started in 2013. The information concerning this plan called the "Digital Belt and Road" or "Digital Silk Road" is already being formulated (Shen, 2018; Stec, 2018). In a keynote speech made in the high-level Belt and Road Forum for International Cooperation held in May 2017 in Beijing, President Xi Jinping stressed the country's intentions to "adhere to innovation-driven development; supporting cooperation in frontier areas such as the digital economy, artificial intelligence, nanotechnology, and quantum computers; promoting big data, cloud computing, and the construction of smart cities; and connecting the digital silk road of the 21th century."[15] In the 4th World Internet Conference held in China in December 2017, the government sectors of China, Egypt, Laos, Saudi Arabia, Servia, Thailand, Turkey, and the UAE jointly announced the "'Belt and Road' Digital Economy International Cooperation Initiative," the concept of which is gradually materializing.[16]

These government's plans, however, are way behind those of Chinese private companies that export ICT products to the whole world, especially low-cost smartphones. In emerging countries in particular, there is a strong demand for smartphones in the price range of 200 and 300 dollars, which have played a crucial role in the global digitalization process. In addition to Huawei, other Chinese corporations such as Oppo, Vivo, Xiaomi, and Tecno have been developing the market of emerging countries.[17] Instead of simply exporting a device, these companies aim to pioneer the market of services in emerging countries by offering native applications and services with their smartphones.

It is also relevant to examine the external investments made by major Chinese ICT companies. Alibaba and Tencent in particular have actively invested in unicorn companies in emerging countries of Southeast Asia (Table 4.2). The largest case in the last few years is the purchase of the Lazada Group, the largest e-commerce company in Southeast Asia, by the Alibaba Group. It is noteworthy that while Alibaba prioritizes strategic investments alone or with a small group of investors, Tencent makes cooperative investments with a larger number of investors. In any case, because of its large population and rapidly developing communication infrastructure, the Southeast Asian market is one of the most sought-after non-developed regions by Chinese corporations.

The Alibaba Group is also actively participating in the development initiatives of the Southeast Asian megaregion. It has, for example, participated in the conception of the digital free-trade zone planned for the suburbs of Malaysia's Kuala Lumpur, as well as the Eastern Economic Corridor plan in Thailand's Bangkok. The company's objective is to gain market share in the region through its main cities.[18] Japanese companies pioneered business development in Southeast Asia from the 1960s and, so far, China's capacity to exert its influence on countries with more liberal economies has been deemed limited (Shiraishi & Hau, 2012). However, the investments made in countries such as Singapore, Malaysia,

Table 4.2 Major venture investments by Chinese IT companies in Southeast Asia

Investment date	*Invested company*	*Country*	*Sector*	*Investment amount (Million USD)*	*Investor(s)*
March 2018	Lazada	Singapore	E-commerce	2,000	Alibaba
February 2018	Go-Jek	Indonesia	Transportation	1,500	Tencent, Temasek, Google Ventures, Blackstone, New World Strategic Investment Limited
December 2018	Tokopedia	Indonesia	E-commerce	1,100	Alibaba, Softbank Vision Fund
August 2017	Tokopedia	Indonesia	E-commerce	1,100	Alibaba
February 2019	Go-Jek	Indonesia	Transportation	1,000	Tencent, Warburg Pincus, Temasek, JD.com, Sequoia Capital, Google, DST Global Solutions, Mituan, Provident Capital, Mitsubishi corporation
June 2017	Lazada	Singapore	E-commerce	1,000	Alibaba
November 2018	Voyager Innovations	Philippines	Fintech	215	Tencent, International Finance Corporation, KKR
April 2016	Sea Limited	Singapore	Game	170	Tencent, Khazanah Nasional Berhad
July 2015	Quantium Solutions	Singapore	Logistics	68	Alibaba
January 2019	Bukalapak	Indonesia	E-commerce	50	GIC, Antfinancial, Mirae Asset-Naver Asia Growth Fund, Emtek Group

Source Author's creation based on data obtained from ITJUZI.COM (https://www.itjuzi.com/)

and Indonesia, indicated in Table 4.2, suggest that the influence of Chinese corporations may be expanding more clearly in the area of the digital economy than in the manufacturing industry.

4.4 Conclusions

In this study, we examined a variety of topics on China's digitalization. Today, major Chinese IT companies have been offering pioneering services led by mobile payment, but the country's position can be assessed more objectively through international comparisons. Compared to other countries with similar levels of economic development, China has achieved a high rate of online payments. At the same time, digitalization is expanding even under China's authoritarian regime, a tendency that is also present in other countries. The Chinese government actively promoting digitalization by various policy initiative not limited to industrial policy, but also societal programs. Digitalization may also have a large impact on the economy through employment and the prices of commodities. In this regard, elderly and rural residents may have a relatively high risk of losing their jobs to future automation. Simultaneously, by considering that China is a middle-income country and that its competitive ICT companies, it is fair to say that the impact of digitalization on the Chinese labor market needs to be examined more deeply, considering country-specific factors. In addition to domestic issues, China has potential to expand its digital economy to other developing countries, especially Southeast Asian countries.

While this paper has examined a number of issues regarding China's digitalization, important structural shifts are taking place after 2018, and the following issues will need to be studied in the future. First, domestically, regulations on platform companies are being tightened based on antitrust laws, financial product regulations, and data security laws. Second, looking outside the country, security concerns are being raised about outward investment by Chinese companies. In addition to economic sanction by United States including entity lists, India has taken steps to ban Chinese smartphone apps in 2020. These structural changes may reflect the increasing state control over the digital economy and platform companies in China.

A long-debated aspect concerning the development pattern of the Chinese economy during its market-opening period is its "Chinese characteristics." Huang (2008), who examined the Chinese economy from the 1980s to the 1990s, proposed an interpretation of Chinese characteristics as a request for dynamic change in the power balance between the state and private citizens. The country had experienced considerable growth led by domestic private companies in the 1980s, but state intervention intensified from the 1990s. The theory that as the "State advances, the private retreats" refers to the power balance between the State and private industry as well as the central and municipal governments. This theory holds that after the global financial crisis in the late 2000s, the expansion of the private economy (one of the characteristics of the opening-up period) stagnated when extensive economic stimulus packages were adopted (Lardy, 2014, 2019).

In terms of this balance between the state and the market, one might say that until the 2010s, China's digitalization was built on an approach that leveraged the ingenuity and vitality of private ICT companies. However, what is emerging, especially after 2020, is a more top-down, state-led approach to regulating and managing the digital economy. In this sense, Digital China is likely to shift from the private, bottom-up, a "wild" development pattern of the 2010s to a more top-down, regulated, and "well-mannered" pattern.

Acknowledgements This article is revised version of a paper entitled "Digital China: The Fourth Industrial Revolution with Chinese Characteristics?" published in *Asia-Pacific Review*, Vol. 26 Issue 2, pp. 50–75. To better fitting this volume, a minor revision has been made by the author. The author appreciates the reprint permission given by the Taylor & Francis.

Notes

1. The expansion in the number of users has been supported mainly by mobile internet users. According to Quest Mobile (2019), the number of users peaked between February and March 2019 at 1.12 billion people, and a net decrease was recorded for the first time in June 2019 to 1.136 billion people.
2. Published on the World Bank project homepage (https://globalfindex.worldbank).
3. For the 2017 data, the survey was conducted in 144 countries and economies, gathering a total of 154,923 samples. The database contains around 1,000 samples from each country and, in China's case, over 3,000 individual answers from each year.

4. The definition of "internet payment" is "The percentage of respondents who report using the internet to pay bills or buy something online in the past 12 months."
5. In fact, this phenomenon of local experiments and the gradual introduction of new services was seen frequently during the period of the Open-Door Policy. It includes many cases, such as the household responsibility system and the entrance of private companies into the automobile industry.
6. See also Mozur (2018) and Buckley and Mozur (2019).
7. The variable "voice and accountability" was obtained from the website of Worldwide Governance Indicators (https://info.worldbank.org/governance/wgi/). Each country is represented with the respective global percentile ranking by year.
8. This data is published on the Peking University Open Research Data Platform (http://opendata.pku.edu.cn/).
9. In the matching process, the method of converting the SCO2010 classification of the FO estimation into the ISCO-88 classification (used in the CFPS data) and connecting was used as a baseline. When the two classifications do not match, the confirmation was made with the help of specific occupation names according to CFPS's own classification.
10. According to Ren et al. (2012), the 2010 data of the CFPS is almost consistent with the distribution of the major job classification in the sixth population census carried out in the same year. However, the CFPS data may have a slightly high ratio of people working in the primary industry and a somewhat lower number of employees in the wholesale/retail and manufacturing industries.
11. Considering China's economic development level, the probability of mechanization of field crop workers, which have the largest employment share (30.76%) in the CFPS survey, was estimated as relatively low. If the probability of 57% of agriculture supervisors (first-line supervisors of farming, fishing, and forestry workers) is adopted, 47% of the entire jobs in the CFPS data have a high risk of being automated (i.e., have a probability of automation of 70% or above according to the FO thesis).
12. Using the individual data of the CFPS, a least-squares estimation can be made that takes the FO estimation by occupation as an explained variable and the respondent's age, gender, years of education, and rural resident dummy as explanatory variables. As a result, the coefficient of years of education was negative, and the rural resident dummy's coefficient was positive. These results were consistent even if the field crop workers, which greatly affected the estimation, were removed from the sample.
13. The Chinese media briefly reported that Alibaba had opened an "unmanned restaurant" in Hangzhou, but later, the store sign that said "unmanned restaurant" was quickly changed to "smart restaurant." The

change from "unmanned" to "smart" appeared to be a move to avoid potential criticism. From a survey conducted in Hangzhou by the author in May 2018.

14. For more about the Taobao Village, see Qi et al. (2019). It is also mentioned in the World Development Report 2019.
15. China Internet Information Center, Article from April 28, 2018: "Rapid Development of 'Belt and Road' Digital Economy" (http://www.china.com.cn/opinion/theory/2018-04/28/content_50992294.htm).
16. China Internet Information Center, Japanese version, Article of December 4, 2017: "'Belt and Road' Digital Economy International Cooperation announced in World Internet Conference" (http://japanese.china.org.cn/politics/txt/2017-12/04/content_50084702_7.htm). For the full paper, see "People's Daily," December 3, 2017: "'Belt and Road' Digital Economy International Cooperation Initiative" (http://media.people.com.cn/n1/2017/1203/c14677-29682583.html).
17. The global share of Huawei, Oppo, Vivo, and Xiaomi combined reached 40.4% in the second quarter of 2019, the highest number ever. From Counterpoint's press release of July 31, 2019: "Combined Global Market Share of Huawei, OPPO, Vivo, Xiaomi and Realme Reaches Highest-Ever Level in Q2 2019" (https://www.counterpointresearch.com/combined-global-market-share-huawei-oppo-vivo-xiaomi-realme-reaches-highest-ever-level-q2-2019/).
18. *The Straits Times*, November 4, 2017: "KL, Alibaba launch Digital Free Trade Zone" (https://www.straitstimes.com/asia/se-asia/kl-alibaba-launch-digital-free-trade-zone). EEC's press release of August 2, 2019, "EEC-Alibaba Group join forces to promote Thai products" (https://www.eeco.or.th/en/pr/news/press-release-eec-alibaba-group-join-forces-promote-thai-products).

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CHAPTER 5

Agricultural Development in China: Comparison with Japanese Experience

Hisatoshi Hoken

5.1 Introduction

Feeding an enormous population has been the greatest challenge for China. Looking back on history, China has overcome the stagnation in food production per capita that occurred during the socialist era and has achieved remarkable development in agriculture since the late 1970s. Technological and institutional transformations under the reform and opening-up period are significant driving forces of continuous agricultural development. Meanwhile, small-scale farm households, whose farmlands tend to be fractionated and spatially dispersed, still mainly operate farm management in China. Thus, Chinese agriculture faces serious inefficiency and diseconomies of scale. Furthermore, with the continuous increase in migrant workers, relatively young and capable workers are prone to leave

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_5

the countryside, causing serious shrinkage and aging in the agricultural labor force.

These characteristics of Chinese agriculture are generally common in East Asian countries. Among these countries, Japan has achieved continuous development in agriculture, but the growth rates of agriculture began to stagnate, and disparities in the productivity of agriculture and manufacturing industries considerably enlarge with economic development since the 1950s. To reform small-scale farming and improve the efficiency of agriculture, the Japanese government has implemented numerous measures to facilitate structural adjustment of agriculture since the 1960s. Moreover, agricultural protection policies through preferential rice prices, high tariffs, and generous public investment in agricultural facilities were implemented, but the policy measures were gradually changed in accordance with the economic circumstances.

The lessons in Japan demonstrate that China should implement appropriate structural adjustments and policy amendments to maintain its development of agriculture. Therefore, the principal objective of this chapter is to summarize agricultural development in China from the socialist era through the present, examining the changes in agricultural institutions and policies. Moreover, this chapter aims to compare the characteristics of agricultural development in China and Japan to deduce the implications for China, focusing on the development paths, technological and institutional transformations, and changes in the agricultural policy cycle.

The overview of Chinese agriculture has been conducted by several researchers, such as Huang et al. (2008), Lohmar et al. (2009), and Naughton (2018). Unlike these studies, the institutional and structural changes in Chinese agriculture examined in this chapter cover a longer period. Moreover, this chapter elucidates the characteristics of agricultural development in China and compares them with those of Japan. The remainder of this chapter proceeds as follows. Section 5.2 divides the process of Chinese agricultural development into three periods to explain the organizational features and agricultural policies. Section 5.3 compares the development path, farmland transaction, and agricultural policy cycle of China and Japan. Section 5.4 summarizes the results of the comparison and provides suggestions for Chinese agriculture.

5.2 Brief History of Agricultural Development in China

5.2.1 *Chinese Agriculture from an International Perspective*

First, I summarize the characteristics of contemporary Chinese agriculture and compare them with those of other selected countries. China is the most populous country in the world, and its total GDP has been the second largest since the early 2010s. China is also the world's largest agricultural country. Table 5.1 indicates that the value added of agriculture, forestry, and fishery of China accounted for $1,021 billion in 2018, and it is overwhelmingly larger than those of the U.S. and EU-28 are. Moreover, in China, the share of agriculture, forestry, and fishery in the total GDP is 7.5%, which is also much higher than that of the U.S. and EU-28. Having a high GDP share in agriculture, in China, 194 million people engage in agriculture, accounting for 25.4% of the total employment.

The total size of arable land and permanent crops in China is 136 million hectares, which is almost the same size as that of the U.S. and EU-28. However, the average size of farmland per agricultural management entity in China is only 0.7 hectares. The size is considerably lower than that of EU-28, the U.S., and Japan. In addition, China is a major importer of primary goods, such as soybean and seafood, amounting to

Table 5.1 Summary of agriculture in selected countries and regions

	Year	*U. S*	*EU-28*	*Japan*	*China*
Value added of agriculture, forestry and fishery (billion U.S. dollars)	2018	167	308	56	1,021
Share of total GDP (%)	2018	0.8	1.6	1.1	7.5
Total employment in agriculture (million)	2019	2	9	2	194
Share of total employment (%)	2019	1.3	3.9	3.4	25.4
Size of arable land and permanent crops (million hectares)	2017	160	117	4	136
Average farmland per agricultural management entity (hectares)	2016–2019	178.5	16.6	3.0	0.7
Total import of agricultural goods (billion U.S. dollars)	2018	130	520	56	156
Total export of agricultural goods (billion U.S. dollars)	2018	141	544	4	68

Source Author's creation based on MAFF (2021, pp. 46–47)

$156 billion in 2018. The total amount of imports is almost the same as that of the U.S. However, the amount of primary products export in China stagnates at $68 billion, which is less than half of its imports.

To examine the technological features of Chinese agriculture more precisely, I select several countries to compare the structures of agriculture in these countries. As presented in Table 5.2, the size of arable land per agricultural labor in China is only 0.2–0.3 hectares, which is much lower than those of the U.S. and Argentina, as well as those of other Asian countries. Moreover, fertilizer consumption per hectare in China was 158 kg per hectare in 1980, which was larger than the world average and much higher than that in other Asian countries, except for Japan. With the diffusion of high-yielding grain varieties and other commercial crops, fertilizer consumption in China rose to 283 kg per hectare in 2000.

The proportion of irrigated land to total arable land in China was 46.9% in 1980, surpassing the world average (15.5%) in 1980. As I will discuss later, this is mainly because the Chinese government initiated large-scale irrigation projects to construct canals and waterways in the early 1950s. However, because of the institutional reforms that have been

Table 5.2 International comparison of agricultural technologies

	Arable land per agricultural labor			*Fertilizer consumption*			*Irrigation*			*Agricultural tractor*		
	(hectare/person)			*(kg/hectare)*			*(%)*			*(number of tractors per1,000 hectares)*		
	1980	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*	*1980*	*1990*	*2000*
World	1.3	1.1	1.0	87	98	98	15.5	17.5	20.7	16	19	19
China	0.2	0.3	0.2	158	220	283	46.9	38.8	45.0	8	7	6
Japan	0.8	1.0	1.6	373	385	325	62.7	59.7	59.0	272	431	460
Argentina	18.7	17.8	19.1	4	6	31	6.0	5.9	5.6	7	10	11
Brazil	2.6	3.3	4.4	93	63	114	3.6	5.3	5.5	12	14	14
India	0.8	0.7	0.6	34	74	103	23.6	28.7	38.0	2	6	12
Indonesia	0.5	0.5	0.4	65	123	122	22.8	21.8	26.8	1	1	5
Thailand	1.0	0.9	0.8	17	60	100	18.3	24.2	35.7	1	3	14
U.S	48.5	51.1	58.0	114	100	107	10.9	11.3	12.9	25	25	27

Source Author' creation based on FAOSTAT archive (https://www.fao.org/faostat/, accessed on April 27, 2010) made since the late 1970s, the size of irrigated areas stagnated and experienced a slight decline in the 1980s. Farm mechanization in China was less developed due to the existence of numerous agricultural labors in rural areas. The number of agricultural tractors in China was only 6–8 units per 1,000 hectares during the 1980s and 1990s, which were relatively lower than the world average. Although the mechanization of Japanese agriculture was extraordinary and reached 272 units per 1,000 hectares in 1980, the number of tractors in other Asian countries was generally much lower than the world average.

These macroeconomic indicators reveal that agriculture in East Asian countries is characterized as land-scarce, labor-intensive, and heavily dependent on human labor, and these features are more prominent in China. After discussing the differences in agricultural structures among countries, I overview the historical changes in Chinese agriculture in the following section.

5.2.2 *Agriculture in the Socialist Era*

In China, the twentieth Century was a period of dramatic revolutions, and rural societies were greatly influenced by numerous political movements. Precise understanding of the historical transformations of rural societies is a prerequisite to understanding the structure of contemporary Chinese agriculture. Thus, I divide these historical processes into three periods (the Socialist era, the period under the reform and opening-up policy, and the period since 2000) to explain the changes in agricultural policies and organizational structures in China.

Since the establishment of the People's Republic of China (PRC) in 1949, grain production steadily increased until the mid-1950s. Nevertheless, the amount of commercial grains available for urban residents was still insufficient to meet the needs of the rapid urbanization and industrialization, and it caused frequent price hikes in urban areas. To ensure equitable and efficient distribution of grain among urban consumers, the Chinese government introduced the "unified purchase and unified supply" system in 1953. Under this system, government departments and agencies monopolized the procurement of agricultural products, mainly grain, from agricultural producers at official prices and distributed them to urban residents (Hoken, 2014).

Moreover, land-owned farm households, which had been created through the land reform, were forced to undergo a fundamental change by the radical agricultural collectivization movement that began in the mid-1950s. During the movement, all farmers and rural residents were forcibly absorbed into rural cooperatives and were obliged to join the People's Commune, which was established in 1958. It encompassed a vast range of rural activities, including industry, agriculture, commerce, schools, and the militia, as well as administrative functions of the township government to control all aspects of rural societies.

Under "The Great Leap Forward" (GLF), collective farming and monopolistic agricultural marketing became radicalized, causing a serious decline in agricultural production and an enormous death of rural residents. Due to the enormous failures, the government began to modify agricultural institutions through more practical approaches. Specifically, the normalization of the People's Commune was advanced with the three-tier structure (commune, brigade, and production team). The production team was also defined as the basic accounting unit, being directly responsible for preparing specific production plans and determining the formula for profit distribution (Hoken, 2022; Naughton, 2018).

Although the People's Commune facilitated the mobilization of rural labors for irrigation construction and land improvement, its evaluation practice had systematic defects. The efforts of agricultural workers were supposed to be evaluated as work points, but the difficulty in assessing labor contributions resulted in excessively egalitarian rewards, which caused a serious deterioration in work motivation. Production teams were also under constant pressure to produce grain, preventing them from pursuing more lucrative cultivations and activities (Hoken, 2022).

Regardless of the policies, Chinese agriculture had not satisfied the augmenting demand for grain. As depicted in Fig. 5.1, the total amount of grain production increased from 170 million tons to 305 million tons from 1963 to 1978. However, throughout the late-socialist era, because of the rapid increase in the total population, grain production per capita did not exceed that of the mid-1950s. Specifically, the amount of grain production per capita exceeded 300 kg for the first time in the mid-1950s and remained at that level thereafter but fell to around 200 kg during the GLF. Although the amount of grain production per capita recovered to 287 kg in 1966, the amounts became stagnant since then, and it was not until 1974 that the grain production per capita exceeded 300 kg.

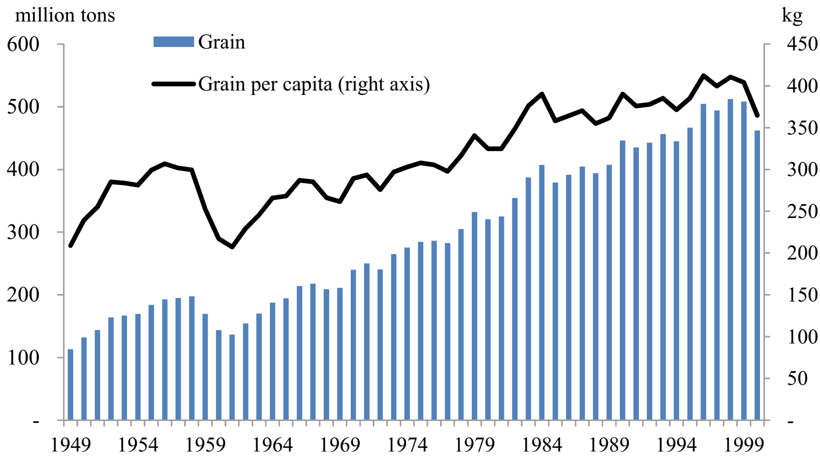

Fig. 5.1 Change in grain production (*Source* Author's creation based on data from the National Bureau of Statistics Department of Comprehensive Statistics [2010] and *China Statistical Yearbook*, various years)

5.2.3 Agriculture Under the Reform and Opening-Up Policy

To overcome the stagnation of agriculture and the inefficiency of collective farming, in December 1978, the Chinese government increased the procurement price of major crops to improve the work incentives of farmers. In addition, the theoretical right to self-management of the production team was reaffirmed by the Chinese government, and it facilitated more active and independent management. Specifically, some production teams initiated experiments with more radical changes, secretly contracting pieces of collective land to individual households to cultivate (Naughton, 2018). Recognizing the success of these experiments, the government formally allowed the contracting of farmland to households, which is known as the household responsibility system (HRS).

HRS returned decision-making authority from communes to rural households and made households the residual claimant of profit after fulfilling the grain quota assigned by the government. Farmers could trade the rest of agricultural products by their selves, improving the motivation to work harder. By the end of 1982, more than 90% of agricultural households returned to household farming, and the People's Communes were dissolved and reorganized as administration units. In addition, policymakers gradually reduced their emphasis on the grain first policy, allowing farm households to cultivate more lucrative commercial crops, such as vegetables, fruits, and tea. Non-government and private traders were also allowed to participate in the agricultural free market (Hoken, 2014; Naughton, 2018).

These reforms facilitated significant growth in agriculture. The annual growth rate of grain production jumped from 2.0% in 1955–1976 to 4.1% in 1976–1984, and the total amount of grain increased from 28.7 million tons to 40.7 million tons from 1976 to 1984. As illustrated in Fig. 5.1, the amount of grain production per capita constantly exceeded 400 kg since the late 1970s, and the amount reached more than 500 kg during the mid-1990s. However, the growth rates of other crops were much faster than that of grain was. Figure 5.2 depicts the changes in the amounts of major agricultural products, where the volume of production in 1978 is indexed as 100. Compared with that in 1978, oilseed and sugarcane productions increased approximately seven and five times in the late 2010s, respectively. Although cotton production experienced modest growth, the growth rates were still higher than those of grain were.

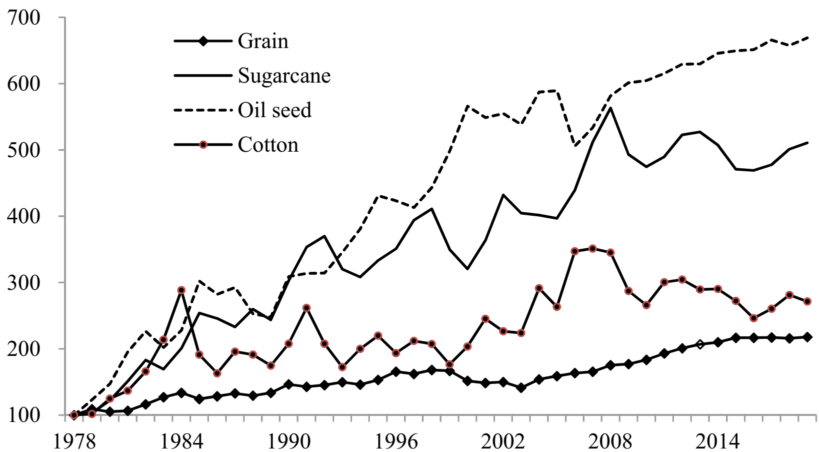

Fig. 5.2 Changes in the production index of major crops (1978 = 100) (*Source* Author's creation based on the data from *Chinas Statistical Yearbook*, various years)

In addition to HRS, the diffusion of new technology also greatly contributed to agricultural development. China succeeded in increasing land productivity of major grains through the green revolution, which refers to an integrated package of modern inputs that dramatically increase agricultural output. The development and diffusion of three key elements—improved seed (high-yield varieties and HYVs), chemical fertilizer, and irrigation—were crucial for the green revolution.

First, intensive research on improved grain seed by central and provincial academics was conducted during the socialist era, and reliable agricultural extension service was established and functioned during that period. Based on the accumulation of research and extension services, the improved grain seed rapidly diffused since the 1970s. Second, the government began to support fertilizer production by local factories. In 1973–1974, the central government decided to import large chemical fertilizer factories to increase the supply of chemical fertilizers. Third, until the late 1970s, the expansion of irrigated land was achieved through irrigation construction projects under the People's Commune, such as canals and storage reservoirs (Naughton, 2018; Stone, 1990; Tajima, 1989).[1] These technological innovations greatly contributed to the continuous growth in grain production.

However, China maintained systematic control over key elements of the agricultural marketing system, especially staple grains. The state procurement price for grains was increased by an average of 20% in 1979, and the price premium for above-quota selling was raised from 30 to 50%. Conversely, the rationing price for urban residents was kept at almost the same level as that in 1978, surpassing the procurement price, so the losses from this backspread were compensated for through budget expenditure. To deal with this problem, the government abolished the mandatory procurement quota for grain and cotton in 1985, and it introduced a less compulsory procurement system. Moreover, procurement quotas on other agricultural products were abolished, and the marketing of agricultural products, except for staple grains, was nearly liberalized (Hoken, 2014).

In the early 1990s, the government established a specialized bureau that procured a specific quantity of grain to construct indirect intervention measures for grain marketing. Large-scale wholesale markets for grain transactions also began to be established in 1990 to facilitate interprovince grain deliveries. Meanwhile, with the increase in the living standard of urban households, grain rationing became less important, and they preferred to purchase better quality grain at the free market. Due to these changes, rationing prices were substantially increased by 140% from 1990 to 1992, and the entire rationing system was abolished shortly thereafter (Zhong, 2004; Zhong & Zhu, 2017).

However, the liberalization of grain marketing caused a considerable rise in grain prices in the early 1990s. Consequently, until the late 1990s, compulsory purchases by the government from farmers were restored to procure a specific volume of grains, but the procurement price was relatively favorable to farmers. Because of these policies, China achieved an increase in grain production from 1995 to 1999, but overproduction, excess stockpile, and huge budgetary losses became serious issues facing the grain policy (Hoken, 2014).

Moreover, until the late 1990s, urban-biased fiscal and investment policies were implemented by local governments. This was mainly because the local governments faced severe competition over interregional economic growth under the fiscal decentralization policies, and the central government had a weak fiscal redistribution ability to reduce the socio-economic disparity between rural and urban areas. Therefore, it placed a heavy financial burden on local authorities and led to increasing and heavily regressive taxes and local levies/fees on rural residents (known as "peasant burden") in the 1990s (Hoken & Sato, 2020).

5.2.4 Changes in Agriculture with Rapid Economic Development Since 2000

To prevent farmers' income level from falling further below that of urban workers, China has adopted pro-rural public policies since the turn of the century. The policies are well captured by the slogan "giving more, taking less, and allowing peasants more opportunities" (*duoyu shaoqu fanghuo*). The slogan means that government should give more support to agriculture and rural villages, lower the direct and indirect tax burden on farming, and undertake policies to improve rural markets.

Policies for "giving more" comprise various public transfer programs for rural households. Focusing on production-related transfers, the range of new subsidies can be classified into three categories (Gale, 2013; Naughton, 2018). The first category includes direct payment and comprehensive subsidy on agricultural inputs, which are distributed from the government budget to farmers directly. The direct payment is a fixed payment to grain farmers to compensate for the abolishment of official procurement prices for major grains. The comprehensive subsidy on agricultural inputs was introduced in 2006 to support grain farmers against the increase in petroleum and fertilizer prices. The second category is subsidies targeting specific inputs or projects, such as improved seeds and agricultural machinery subsidies. The improved seed variety subsidy is intended to reduce the cost of purchasing varieties of seed that are officially specified to be of high quality or have special characteristics.[2] The agricultural machinery subsidy pays up to 30% of the purchase price of eligible agricultural machinery and equipment.

The third category is minimum prices for major commodities, including rice, wheat, corn, soybean, rapeseed, and cotton. To accomplish the liberalization of grain marketing, China introduced a minimum procurement price in 2004, and state agencies pledged to purchase grain at a specific price for the national grain stockpile if market prices fell below that level. Originally, the system was designed to stabilize grain trading prices and protect grain producers through indirect intervention. However, to deal with the abrupt increase in international grain prices during 2007–2008 and to intensify food security, the government pledged to raise minimum prices for rice and wheat yearly, regardless of the decline in international grain prices.

Policies for "taking less" began with the tax-for-fee (*feigaishui*) reform at the beginning of the 2000s and ended with the nationwide abolition of agricultural taxes at the beginning of 2006 (Hoken & Sato, 2020). The first phase of the reform (2000–2003) involved imposing newly defined agricultural taxes in place of local levies and fees, resulting in a reduction in the total "peasant burden." The second phase (2004–2006) first involved a gradual reduction in the agricultural tax and then its complete abolition in January 2006. The agricultural tax had taken 5–7% of agricultural value added in the preceding years. In supplementing the revenues, local government became much more dependent on budgetary transfers from higher levels.

Finally, policies for "allowing peasants more opportunities" were embodied in an agricultural movement called "agricultural industrialization." The purpose of the movement was to support economic organizations that integrate small farmers to achieve economies of scale and increase the quality and safety of agricultural products (MoA eds., 2008). To facilitate the marketization and upgrade of agriculture, revisions of related regulations and laws were vigorously implemented by the central and local governments. Details will be described in the next section.

These coexistences of protection and promotion of agriculture characterize the development of contemporary China, and it appears to be common in East Asian counties, including Japan. The next section compares the development paths, technological and institutional transformations, and changes in the agricultural policy of China and Japan.

5.3 Comparison with Experiences in Japan

5.3.1 Development Path of Agriculture in General

When considering the development path of agriculture, Hayami & Ruttan (1985) proposed a famous theoretical framework. Namely, in East Asian countries, due to the plenty number of labor and scarce land, farmers and governments tried to introduce high-yield seeds, fertilizer, and well-controlled irrigation to improve the productivity of crops. These technologies are suitable and cost-effective for East Asian countries, leading to labor-intensive farming and improving the yield per unit of land. However, in North America and Oceania, due to the large size of farmland and relatively scarce labor in comparison with land, power machinery was developed to substitute for the relatively scarce labor.

To examine the characteristics of technological changes using this framework, Fig. 5.3 depicts the innovation paths of agriculture in China and Japan. The horizontal axis indicates output per worker, that is, labor productively. The vertical axis represents output per unit of land, denoting land productivity and yield. As Hayami & Ruttan (1985) explained, East Asian countries first developed land productivity (illustrated by the vertical movement) and then facilitated improvement in labor-saving technology, which is shown in the rightward development. It is apparent from the figure that the directions of innovation marked a turning point for China in 2005 and for Japan in 1971. Specifically, China experienced clear vertical development until 2005 and accomplished high growth in land productivity by improving the yield of crops and transforming cultivation into more lucrative ones. As explained in Sect. 5.2.1, numerous workers engaged in farming were mainly manual labors. Although the number of small-size tractors increased considerably since the early 1980s, most tractors were mainly used for transportation, and the diffusion of large/medium-sized tractors stagnated until around 2000 (Naughton, 2018; Tajima, 1989).

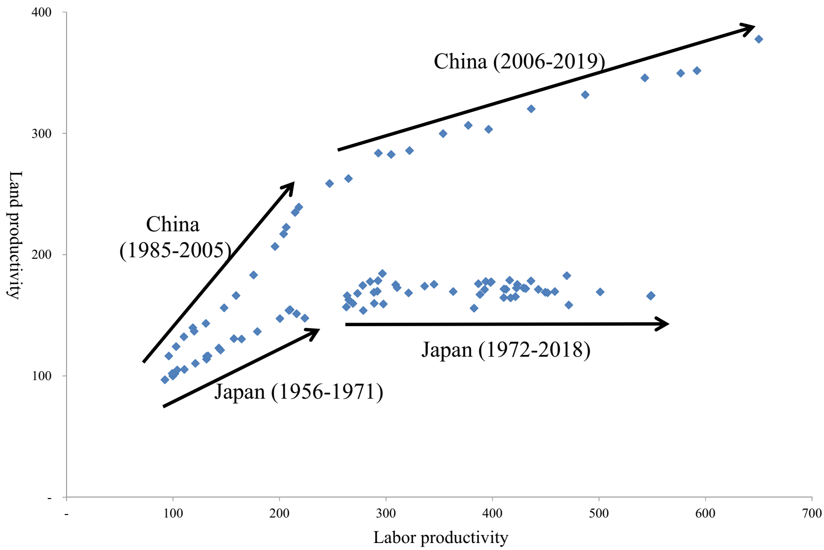

Fig. 5.3 Development path of land and labor productivity (*Note* China: The data about GDP [primary industry], employed person [primary industry], total sown area, and producer price index for farm products are from the *China Statistical Yearbook* various years; Japan: The data about the agricultural income produced are from the "statistics of agricultural income produced" by MAFF [https://www.maff.go.jp/e/index.html, accessed on February 21, 2022]; The data about agricultural and forestry workers are from the "labor force survey" by the Statistical Bureau of Japan [https://www.stat.go.jp/english/, accessed on February 21, 2022]; The data about the cultivated land and planted area are from the "statistics on cultivated land and planted area" by MAFF; The data about the price index of agricultural products are from the "statistics on commodity prices in agriculture" by MAFF; Labor and land productivities are indexed as 1985 = 100 for China and 1956 = 100 for Japan. *Source* Author's creation)

Since the mid-2000s, the development path of China became more horizontal, and the increase in labor productivity became the principal element in facilitating continuous growth in agriculture. Structural changes in the rural labor market were behind the transition of the development path. According to *China Statistical Yearbook*, the total number of labors who engaged in the primary industry gradually declined from 389 million in 1990 to 360 million in 2000. However, the considerable increase in migrant labors during the early 2000s accelerated this trend—the workers in primary industry decreased considerably, reducing to 297 million in 2010 and 187 million in 2019.

Increase in the wage of hired agricultural labors became prevalent since the mid-2000s. According to the *Compilation of Production Cost Data on Agricultural Products*, the real daily wage of hired agricultural labors remained at almost the same level until 2003, approximately 18 yuan per day.[3] However, the wage levels began to increase from 2004, and the growth rates accelerated in 2008. From 2007 to 2012, the real daily wage increased from 31 to 68 yuan. Although the increasing rates of wage became relatively gradual during the 2010s, the real wage reached 81 yuan in 2019.

In response to the emerging need to substitute labor with capital, many farmers began to utilize mechanical services provided by specialized operators for plowing, planting, and harvesting (Wang et al., 2016; Yang et al., 2013). The agricultural machinery subsidy explained in Sect. 5.2.4 also promoted the rapid diffusion of specialized machines. Consequently, from 2000 to 2008, the number of large/medium-size tractors increased from 970,000 to 3 million, and the number reached approximately 6 million in 2015.[4] Following these processes, China adopted more labor-saving technology and developed agricultural mechanization in the mid-2000s.

Compared with China, Japan experienced a relatively balanced technological development from 1956 to 1971. This is mainly because Japan had already achieved high economic growth in the mid-1950s, and the degree of agricultural mechanization was much higher than that of China. Meanwhile, the total number of agricultural and forestry workers in Japan decreased dramatically from 14.9 million in 1953 to 8.4 million in 1970, and the share of agricultural and forestry workers in the total number of workers dropped from 38.0 to 16.5%.

Since the early 1970s, the decrease in agricultural and forestry workers of Japan became relatively moderate, and the number declined from 5.3 million in 1980 and 4.1 million in 1990. Due to the shift of crop variety from quantity to quality oriented, the consumption of chemical fertilizer and pesticide began to decrease gradually. Moreover, the diffusion of agricultural machinery (e.g. riding tractors, combine harvesters, and rice-planting machines) accelerated, establishing the system for automating agricultural production. In Japan, small/medium-size specialized machines were owned by almost all small-scale farmers because of the comprehensive and nationwide supply system (Hokimoto, 1999). Due to these efforts, Japanese agriculture succeeded in continuous horizontal growth of labor productivity, as depicted in Fig. 5.3.

5.3.2 Experiences of Structural Adjustment in Japan

Agricultural production in China and Japan has been conducted mainly by small-scale farmers, and they greatly contributed to the development of their national economies. However, faced with slower growth of agricultural revenue and food consumption, both countries implemented structural adjustment of agriculture. In this subsection, I examine the processes and results of the structural adjustment in Japan and deduce the implications for Chinese agriculture.

The origin of the structural adjustment in Japan is traced back to the enactment of the Agricultural Basic Law in 1961, and the essence of the law was summarized in the slogan of "selective expansion." To reduce the income and welfare gap between farming and non-farming people, the government encouraged a transformation from food production of low-income elasticity to that of high-income elasticity. Moreover, the law intended to facilitate the expansion of the scale of operation by family farms by reducing the number of inefficient farmers and land transactions (Hayami, 1988).

Despite these policy efforts, the agricultural sector could not achieve sufficient growth to diminish the economic gap between farm and non-farm households. Conversely, farmers and agricultural cooperatives (*Nokyo*) intensified political lobbying for the government and politicians to raise prices of agricultural products, mainly focusing on the price of rice. As a result, the price of rice was determined by the production cost of less competitive farmers using an imputed wage for non-farming workers, causing a considerable increase in rice procurement price (Hayami, 1988). The implementation of preferential rice price and the rapid spread of labor-saving technology prevented less competitive small-scale farm households from relinquishing crop cultivations.

Furthermore, the regulations of land tenure also greatly prevented land transactions among farmers. The Agricultural Land Law of 1952 originally restricted ownership of arable land to less than 3 hectares per farm household (12 hectares in Hokkaido). The law strongly favored the rights of the tenant to a permanent usufruct on the leased land, and lease rents were strictly controlled to their advantage, virtually prohibiting the leasing of farmland. In accordance with high-speed economic growth during the 1950s, the law was amended in 1962 to remove the ceiling on land ownership and encourage the leasing of farmland (Hayami, 1988; McDonald, 1997).

To examine the progress of structural adjustment in Japan, Table 5.3 summarizes the changes in agricultural workers and farm households. As presented in the first row of the table, the number of core persons mainly engaged in farming in 1960 was 11.7 million, decreasing dramatically to 2.9 million in 1990. This is closely related to the improvement in non-farming employment opportunities for farmers. Rapid progress in motorization and public transportation system facilitated their non-farming employments within a commutable distance from their residence.

Compared with that of core agricultural workers, the decline in the total number of farm households was relatively gradual, decreasing from 6.1 to 3.8 million households from 1960 to 1990, but the composition of farm households greatly changed. The share of full-time farm households

Table 5.3 Changes in agricultural labor, number of households, and arable land in Japan

	1960	*1970*	*1980*	*1990*	*2000*	*2010*	*2015*
Core persons mainly engaged in farming (million)	11.7	7.1	4.1	2.9	2.4	2.1	1.8
Total farm households (million)	6.1	5.3	4.7	3.8	3.1	2.5	2.2
Commercial farm household (%)	–	–	–	77.5	74.9	64.5	61.7
Full-time farm household (%)	34.3	15.6	13.4	12.3	13.7	17.9	20.6
Primary part-time farm household (%)	33.6	33.7	21.5	13.6	11.2	8.9	7.7
Secondary part-time farm households (%)	32.1	50.7	65.1	51.6	50.0	37.8	33.5
Non-commercial farm households (%)	–	–	–	22.5	25.1	35.5	38.3

Note Core persons mainly engaged in farming denote persons who engage in their own farming as usual work among household members. Commercial farm household denotes a household that cultivates more than 0.3 hectares or sells more than JPY 500,000 of farm products. Full-time farm households denote households in which no member engages in non-farm employment for more than 30 days. Primary (secondary) part-time farm households denote households where at least one member engages in non-farm employment and whose farm income is more (less) than their non-farm income *Source* Author's creation based on data from the *Census of Agriculture and Forestry* and *Statistical Yearbook of MAFF*. (https://www.maff.go.jp/e/index.html, accessed on February 21, 2022).

decreased from 34.4 to 12.3% during the period. By contrast, the share of secondary part-time farm households increased from 32.1 to 65.1% from 1960 to 1980. The share of secondary part-time farm households has become stagnant since 1990 due to the introduction of a new category (non-commercial farm households that conduct farming mainly for self-consumption), but, until 2015, the sum of the share of both secondary part-time and non-commercial farm households was more than 70%. The dominance of part-time farm households and their slow exit from their farming prevented the development of large-scale farming in Japan.

Due to the limitation of official rural household data by the Chinese government, it is difficult to make a comprehensive comparison of farm households of the two countries. However, according to the agricultural censuses, the aging of agricultural workers can be confirmed in both countries.[5] The share of agricultural workers over 65 years in Japan was 17.8% in 1970 and 24.5% in 1980. Thereafter, the share increased much rapidly, reaching 52.9% in 2000 and 63.5% in 2015. This tendency is also applicable to China. The share of agricultural workers over 55 years (56 years for 2016 census) in China increased from 10.4 to 34.1% from 1996 to 2016. Conversely, the share of agricultural workers under 35 years in China declined from 62.7 to 19.1% during that same period.

Meanwhile, the development of a well-functioning land rental market is essential to improving the efficiency of agriculture. In Japan, the Revised Agricultural Land Law was enacted in 1970 to consolidate small-scale farms into sufficiently large-sized farms through the land rental market. Japan also initiated the Agricultural Land Use Improvement Project in 1975, and the project was legalized in 1980. Moreover, the Farmland Exchange Promotion Project was launched in 1970 to facilitate land transactions through a public intermediary institution. Despite these policy efforts, Japanese agriculture could not achieve remarkable successes in land consolidation. This is mainly due to the low profitability of crop cultivation and high expectation on the diversion of farmland to non-agricultural uses (Hayami, 1988; Ito, Nishikori et al., 2016; McDonald, 1997).

Figure 5.4 summarizes the share of leased and abandoned farmlands. The share of leased land in Japan recorded considerably low ratios from 1960 to 1985, accounting for approximately 5%, whereas the share began to increase gradually in the mid-1990s. Conversely, farmland abandonment became a serious issue in Japan.[6] As illustrated in Fig. 5.4, the share of abandoned land to total cultivated land was approximately 3% until the mid-1980s, but the share increased concurrently with leased land from the late 1980s, reaching 14% in 2015. According to Ito, Nishikori et al. (2016), land-holding non-farm households in Japan played a dual role by supplying their holdings to the land rental market and by abandoning their farmland.

In China, to secure land utilization rights of farm households, the land contract duration was extended for an additional 30 years and legalized as an amendment of the Land Management Law in 1998. The Rural Land Contracting Law was also enforced in 2003 to enhance tenure security and transferability of land. Followed by the legalization, a series of policy documents and practical guidance were issued from the mid-2000s to

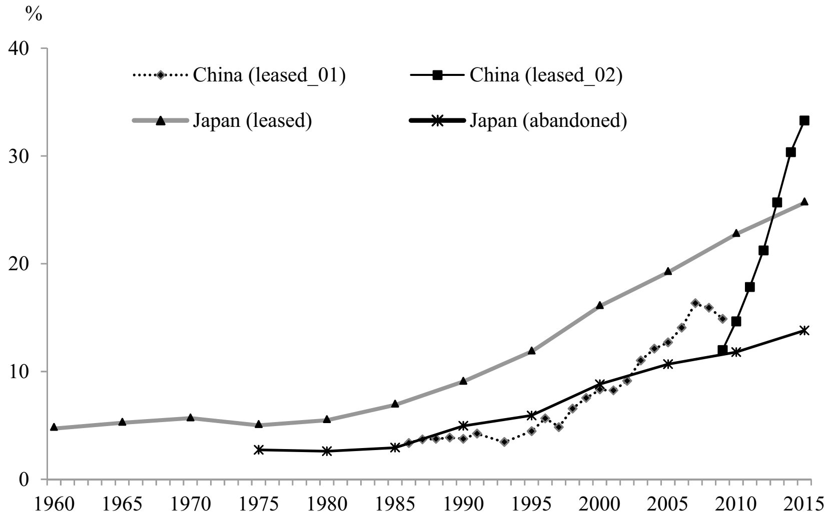

Fig. 5.4 Changes in the share of leased and abandoned farmlands (*Note* China: Data from 1986 to 2009 [leased_01] are from MoA ed. [2001] and [2010], and data from 2008 to 2015 [leasaed_02] are from *China Agricultural Development Report* [various years]; Japan: *Census of Agriculture and Forestry* by MAFF; Share of leased land in China is the total size of leased-out land divided by the total size of contract land; Share of leased land in Japan is the total size of leased-out land divided by the total size of cultivated land; Share of abandoned land is the total size of abandoned land divided by the total size of cultivated land. *Source* Author's creation)

promote land transfer through the rental market. Moreover, policy documents were issued by the central government in 2014 to formalize the three rights separation (ownership right, contractual right, and management right) and legalize existing land transfer practices in the past few decades (Cheng et al., 2019; Ye, 2015).

These legal reinforcements of land contracts greatly promoted land transactions in China. Figure 5.4 depicts that from 2000 to 2015, the share of leased land increased from 8 to 33%. Intermediary institutions, such as rural shareholding cooperatives, which have been generally organized by village committees since the mid-2000s, also play an important role in reducing transaction costs and promoting land transactions (Ito, Bao et al., 2016). However, administrative enforcement by the intermediary institutions restricts and, sometimes, suppresses rural residents' oppositions to land adjustment, causing potential dissatisfactions among rural residents. Thus, it is crucial to conduct institutional and legal adjustments to reconcile the efficiency and fairness of land utilization.

Although the Chinese government has not released statistical data on land abandonment, anecdotal evidence suggests that land abandonment is becoming a serious issue, especially in less developed remote regions (Yan et al., 2016; Zhang et al., 2016). As the aging of agricultural workers and the low profitability of farming are closely related to land abandonment in China, it is necessary to learn lessons of policy measures in Japan to prevent ineffective land utilization.

5.3.3 *Agricultural Policy Cycle*

As Hayami & Godo (2004) hypothesized, the objectives of agricultural policy and its measures change considerably with the development stages. In developing countries, governments tend to employ agricultural exploitation policies to accumulate government revenues to promote the development of domestic manufacturing. When the economy develops, the government begins to reduce the amount of resources taken out of agriculture and puts more government expenditure into it. Developed countries adopt agricultural protection to mitigate serious inequality of labor productivity between agricultural and non-agricultural sectors, which is caused by the high adjustment cost of reallocating workers. However, affluent budgetary support for the agricultural sector causes excess production of food, resulting in further political interventions to support agriculture by implementing affluent production subsidies, favorable procurement prices, and high trade tariffs.

Following the theory, I compare the trends of the agricultural policy cycle of China and Japan based on two datasets. One is the Nominal Rate of Assistance (NRA) compiled by the World Bank (Anderson & Nelgen, 2013). The NRA is an indicator used to compare the price of a commodity in the domestic economy with the international price of the commodity at the border (including the total cost incurred to deliver imported goods, such as insurance and freight). A positive NRA indicates that the sector is being protected, whereas a negative NRA reveals the agriculture sector is being taxed (Huang et al., 2007). The other is the producer Nominal Protection Coefficient (producer NPC) estimated by OECD. The producer NPC is an indicator of the nominal rate of protection for producers, measuring the ratio of the average price received by producers (at the farm gate), including payments per ton of current output, to the border price. Similar to NRA, a positive producer NPC means protection of farmers, whereas a negative implies implicit taxation on agriculture. To compare these two indicators, I subtract 1 from the producer NPC.

Figure 5.5 depicts the changes in the NRA and producer NPC from 1986 to 2020. Because the World Bank stopped releasing the data on NRA after 2010, the coverage periods of the indicators differ. The figure clearly illustrates the agricultural policy cycle in China. The NRAs were negative from 1986 to 1993, suggesting that farmers were exploited by the Chinese government through considerably low purchase prices. However, the degree of exploitation was gradually alleviated, and the NRAs turned positive, but the ratios were approximately zero from 1994 to 2005. This change indicates that China's agricultural price policy became neutral, and China's objective to join the World Trade Organization (WTO) partially affected this change (Naughton, 2018). Although the upsurge of global food prices in 2007–2008 influenced the temporal backlash of the indicators, the NRAs for China reveal gradual but steady positive trends from 2005 to 2010. An almost similar policy cycle can be observed for the producer NPC, but the protective trend continued until 2020. These results indicate that China has pledged to change its neutral stance and has actively gotten involved in the protection of agriculture.

By contrast, Japan had consistently positive numbers throughout the period, and the shapes of both indicators have almost the same trend. However, the degree of agricultural protection in Japan is stronger than

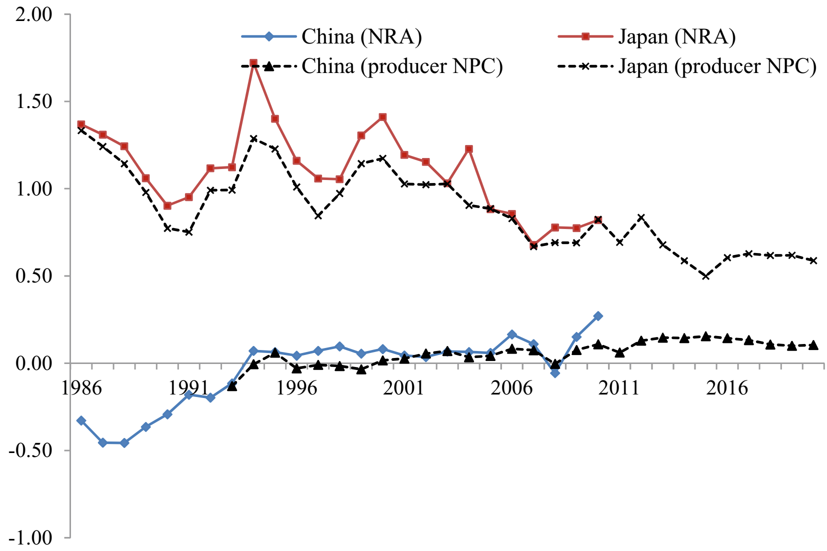

Fig. 5.5 Changes in NRA and producer NPC for China and Japan (*Source* Author's creation. The NRA is from the study of Anderson and Nelgen [2013]. The producer NPC is from the OECD PSE database: https://www.oecd.org/, accessed on August 21, 2021)

that in China, and the gap in the degree of protection began to diminish slightly since the mid-2000s. Although the indicators for Japan rebound during the late 2000s, the producer NPC experienced a gradual downward trend, decreasing from 1.17 in 2000 to 0.59 in 2020. The relaxation of agricultural protection in Japan probably stemmed from the changes in economic policies to revitalize agriculture and rural economy through international trade.

Previously, agricultural policies in Japan mainly focused on price and marketing control, using tariffs for key products to support farm households from the 1950s to the 1990s. Because of the Uruguay Round trade negotiations, Japan agreed to a preferential quota on rice imports and decided to introduce market mechanisms to rice distribution. Following the replacement of the GATT (General Agreement on Tariffs and Trade) with the WTO in 1999, Japan converted non-tariff border measures to tariff rate quotas (TRQs) for 28 commodities, including rice (OECD, 2021). To cope with the globalization of the economy, Japan enforced the Basic Law on Food, Agriculture, and Rural Areas in 1999. It aimed to establish a stable food supply by promoting domestic production and by improving the productivity of agricultural entities. Accordingly, Japan began to introduce direct subsidies for farm entities to stabilize their income, and the accumulation of farmland to core farm entities was promoted by the government to improve their productivities.

Japan also intensified negotiations with other countries to promote international trade and economic partnership and has signed bilateral economic agreements in recent years with several countries (e.g., Mexico, Chile, Australia, and Magnolia).[7] Furthermore, Japan exchanged large-scale trade agreements, including the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) in 2018, the Japan-EU Economic Partnership Agreement in 2019, and the Japan–U.S. Trade Agreement in 2020. These adjustments in agricultural policies and trade relationships have contributed to the gradual decrease in agricultural protection in Japan.

It appears that the experiences of structural adjustment in Japan would be instructive for China on how to balance agricultural protection/promotion with international rules. China officially enforced a policy of grain self-sufficiency in 2008 (more than 95% of grain should be produced domestically), but after joining the WTO, the target became more unrealistic due to massive soybean import from abroad. Therefore, since 2014, the Chinese government redefined grain self-sufficiency as maintaining "absolute" self-sufficiency in staple cereals (wheat and rice) but not in non-food grain. Accordingly, as explained in Sect. 5.2.4, China has continued to raise minimum support prices since 2009, leading to significant price gaps between domestic and international markets (Hoken, 2014; OECD, 2021).

This self-sufficiency policy involves substantial economic costs, such as expenses for supporting price, costs for preserving stockpiled grain, and related subsidies expenditures. Moreover, as part of the WTO membership negotiations, China's subsidies in the "amber box" (including price support payments) are limited to 8.5% of agricultural value added, and a fixed limit of low tariff grain import is allowed. Therefore, China has to reconcile grain self-sufficiency with international rules and implement appropriate agricultural policies.

China has initiated practical measures to promote structural adjustment under international rules. To reduce economic distortion and reinforce price mechanisms, since 2016–2017, the government has abolished the official temporary purchase and storage policy at favorable prices and introduced direct payments based on the area planted for soybeans and corn. China also ratified the Regional Comprehensive Economic Partnership (RCEP) Agreement in 2021 and remains committed toward reducing or abolishing tariffs on selected agro-food products (OECD, 2021). These policies would contribute to the further development of Chinese agriculture.

5.4 Conclusions

The remarkable development of Chinese agriculture since the late 1970s was realized through institutional reforms and the diffusion of new technology. However, the reform of grain marketing frequently caused considerable confusion and fluctuation in their transactions. Moreover, because of the weak fiscal redistribution ability of the central government, a heavy financial burden on local authorities led to heavy taxes and an increase in local levies on rural residents during the 1990s. Therefore, pro-rural public policies have been implemented since the early 2000s. The policies intended to give more support to agriculture and rural villages, reduce the direct and indirect tax burden on farming, and implement policies to improve rural markets.

To deeply understand the structure of Chinese agriculture, this chapter compares the development path and agricultural policies of China and Japan. The results reveal that the development of agriculture has a common trajectory, but the socio-economic conditions and practical policies of Chinese agriculture have unique features. The development path of China's agriculture follows the path of Japan, transforming from land-saving to labor-saving technology and substituting labor with capital. However, contrary to those of Japan, mechanical services for plowing, planting, and harvesting in China are provided by specialized operators using large/medium-size tractors.

Moreover, confronted with rapid aging and a decrease in agricultural workers, policy supports for consolidating farmland through the land rental market and intermediate organizations have been intensified in both countries. The share of leased farmland in China has surpassed that of Japan since around 2010, and administrative enforcement by intermediary institutions has facilitated further transactions in China, but also restricting rural residents' oppositions to land adjustment. Furthermore, since the late 2000s, China has experienced an agricultural policy cycle, and the protection of agriculture has been intensifying by raising minimum support prices for major grains, which is also the case in Japan but to a lesser degree. With the subsidy rule by the WTO, the price gaps between domestic and international markets appear to provoke serious conflict.

China is confronted with an issue of how to balance agricultural protection and promotion with international rules. The experiences of structural adjustment in Japan would be instructive for China to deduce appropriate institutional and policy implications that match the circumstances of Chinese agriculture.

Notes

1. Although the supply of public goods, including irrigation service, was stagnant due to the dissolution of collectives, privately owned and well-managed collectives that use power machinery, such as electric and diesel pumps, emerged in the 1990s (Lohmar et al., 2003).
2. In 2016, three types of subsidies (direct payment, comprehensive subsidy on agricultural inputs, and seed variety subsidy) were integrated into a single area payment scheme called "agricultural support and protection subsidy".
3. The standard work hours for agricultural labor in the *Compilation of Production Cost Data on Agricultural Products* are set at eight hours per day. Wage data are denominated by rural CPI (1998 = 100).
4. The definition of large/medium-size tractor in the *China Statistical Yearbook* has changed since 2016.
5. Data of Japan is from *Census of Agriculture and Forestry and Statistical Yearbook of MAFF*, and data of China is from *China Agricultural Census* (http://www.stats.gov.cn/, accessed on March 9, 2022). Although the *China Agricultural Census* published the summary tables on farm households according to their participations in farming and non-farming employment, the classifications among three waves of the census (1996, 2006, and 2016) are inconsistent.
6. In the agricultural census, abandoned land is defined as owned land that has not been cultivated for more than a year and whose owner does not intend to cultivate it in the next few years. MAFF began to collect the data from 1975.

7. Recent status of FTA/EPA and related initiatives are summarized in the website of the Ministry of Foreign Affairs of Japan (https://www.mofa.go.jp/policy/economy/fta/index.html, accessed on February 17, 2022).

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CHAPTER 6

Financial Development Post-World War II in Japan: Insights for China

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6.1 Introduction

This chapter studies financial development after World War II in Japan. Therefore, financial development is classified into three eras: (1) high economic growth (1955–1975), (2) the financial liberalization (1976–1990), and (3) the financial restructuring (1991–2000). Bank loans were

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_6

focused on industrialization by enterprises belonging to the same business group in high economic growth era (HGE). A new financial instrument was introduced into the money market under financial prosperity, and this led to the bubble economy in the financial liberalization era. Financial restructuring was implemented under the leadership of the Bank of Japan (BOJ) and Ministry of Finance (MOF) after the bubble burst in the final decade of the twentieth Century and afterward. We trace financial development in each era and concentrate our analysis, particularly, on the causes and results of the stock and real estate bubble economy and the consequences of the problematic restructuring policies in the financial system. Japan's financial and macroeconomic development in the postwar boom and bust provides valuable lessons for China, which suffers similar issues of troubled financial markets, risky practice and mounting debt across economic sectors. Therefore, the Japanese experience in asset deflation after the bubble burst should inform Chinese decision-makers of their policy choices in avoiding a financial and economic hard landing.

6.2 Financial Development in the High Economic Growth Era (HGE) (1955–1975)

6.2.1 Three Major Political-Economic Reformations Before High Economic Growth

In the Japanese political-economic system, three major reformations for capital, land, and labor had been facilitating high economic growth: (1) dissolution of zaibatsu organizations, (2) agricultural land reformation, and (3) improvement of laborers' legislative status. Moreover, these changes were originally planned by the now-defunct Imperial General Headquarters (GHQ) to democratize the Japanese political-economic system against the prewar semi-feudal economic system. Furthermore, this was intended to reduce the economic competitiveness of Japanese industries. However, this resulted in expanded domestic effective demand and stimulated Japanese entrepreneurship for high economic growth after 1955.

Zaibatsu, or Japanese holding companies (e.g., Mitsui, Mitsubishi, Sumitomo business groups), had been managing many large mining, manufacturing, commercial companies, and large banks since the Meiji era. These large companies and banks dissolved into various independent companies and banks in compliance with the GHQ's policies after World War II. Stock ownership of zaibatsus was relinquished by GHQ and sold to many relatively small individual investors. Selling stocks held by zaibatsu families contributed to the diversification of stock ownership among individual investors and encouraged the entry of new entrepreneurs into the industry. Diversification of stock ownership and encouragement of entrepreneurship stimulated competition for industrial and financial innovations and facilitated the economic growth policy.

The agricultural land reformation was forced by GHQ for the liberalization of the prewar semi-feudal economic system. GHQ leaders recognized that the semi-feudal agricultural system was key in the warlike Japanese imperialism since the Meiji era. Particularly, major landowners ordered small farmers to fight against Japan's foreign enemies in East Asia and the USA through their military campaign. The large ownership of agricultural land was dissolved into small pieces of estate and sold to the small farmers who worked the hardest and raised farming productivity throughout the country after the reformation. Small farmers not only cultivated the land and provided inexpensive foods for the high economic growth of industries but also accumulated financial wealth as one of the largest individual investors in the financial market.

Labor union legislation was also planned by GHQ to democratize the Japanese political-economic system. Japanese workers aimed to raise their status in civil society and establish fundamental human rights with the legislation. Moreover, they could share entrepreneurship as a business partner with entrepreneurs and participate in the sociopolitical decision-making process. The legislation encourages them to not only organize trade unions but also negotiate wage rates and labor hour limitations with entrepreneurs. The labor movement was initially part of the socialist revolution; however, negotiating for better wages and establishing the standard working conditions every spring gradually became the priority after 1955. The participation of workers in the business through wage negotiation also contributed to the steady business expectation for the entrepreneurs to invest. Wage earners' household savings in bank deposits became the major sources of indirect financial intermediation. Effective demand from wage-earners and small farmers supported Keynesian economic policy during economic growth.[1]

6.2.2 *Banking and Educational Reformations After World War II*

1. Banking Reformation and the Indirect Financial System

Apart from the three major political-economic reformations, the GHQ also mandated banking reformation. Zaibatsu banks were dissolved into independent banks but were soon consolidated into one bank by 1955. However, these banks were once spun off from zaibatsu groups, and not only did they need to restructure their relationships with business firms as independent main banks but they also needed to acquire new borrowers and old clients. Zaibatsu banks and other large city banks needed to bear the “common people money” as a deposit through their branch network. Fuji bank, a former Yasuda bank, was among the most successful banks taking deposits through their nationwide branch network and was called “the people’s bank.” These banks regained their former main bank status by taking current accounts and lending to the working capital of corporations under military control during the War.

Apart from the BOJ, all special banks were abolished, but they were soon rebuilt as private long-term banks. These long-term banks were originally established to finance large industrial equipment and infrastructure (e.g., shipbuilding and electric power stations). Subsequently, they were reformed as private banks after the War and allowed to issue long-term bonds to raise funds for long-term lending. Industrial and long-term banks cooperated with large commercial banks to provide long-term loans to heavy and chemical industries.

Government financial institutions were established to provide funds for the special needs of public infrastructure. Development Bank of Japan specialized in financing the infrastructure of industries, and Export–Import Bank of Japan was created for export–import financing. These banks raised funds from the trust fund managed by the Ministry of Finance, which accumulated funds from the postal saving deposit.

Several banks were then established and rebuilt under postwar banking reformation. Moreover, specific banking businesses were duplicated under indirect financial intermediation, resulting in excess competition among financial institutions (e.g., postal saving bank and local ordinary banks, Small Business Financial Banks and credit unions).

2. Educational Reformation and Encouragement of Saving

The liberal educational reformation for democracy combined with banking reformation contributed to increased bank deposits from the "common people's money." The literacy rate in Japan was the highest around the world, contributing to the considerable success of economic development in Asia since the Meiji Restoration.

Additionally, the introduction of American-style liberal educational reformation contributed to financial development after World War II. Even elementary school children in Japan were required to hold savings accounts in specific banks, and the BOJ encouraged the public to have savings deposits. However, education in proper portfolio management—particularly in the stock market—was not provided.

Liberal education encouraged people to not only participate in democratic elections on various public affairs but also in consuming various goods and services resulting from scientific innovation and free economic choice. Educational reformations toward "Constitutional Freedom and Peace" became both the ultimate purpose and means for the political-economic development after the War in Japan. Resurging from the aftermath of the War and restarting economic development could not begin without liberal education and democratic decision-making for the reconstruction of public infrastructure in the industrial and financial systems.

6.2.3 Financial Development in the High Economic Growth Era

1. Indirect Financial Intermediation

The structure of both excess savings and investment in the household and corporate sectors, respectively, were settled in the flow of funds account during the high economic growth era (HGE) in Japan. Gross national income comparatively increased every few years by about 10% from 1960 to 1975. Moreover, national income more than doubled at the end of the HGE in 1975. Household savings accounted for 8–10% of national annual income, and bank deposits covered more than half of all savings.[2]

Conversely, the corporate sector experienced increased investment (5–7%) relative to national income annually. Moreover, they raised funds for investments through bank loans, comprising more than 80% of total corporate liability. The corporate sector led the HGE through capital investments in equipment (e.g., large-scale new factories and machinery) relative to borrowing from banks. Evidently, this was the golden age of high economic growth for corporations with "over-borrowing" (overdraft) from banks.

The banking sector intermediates between excess savings of households and excess investment in the corporate sector. Banks raised funds through bank deposits from households and transferred funds to the investment of the corporate sector through loans and discount. They were called "indirect financial intermediation" as bankers intermediate between the final debtors of corporations and final creditors of the household. Banks extended loans for working capital to the industrial corporations and absorbed deposits from individual households. The bank loan had often been larger than the bank deposit; thus, this was called an "overloan." Both total deposits and loans of all banks reached 78,990 million and 81,826 million yen, respectively, in 1960, total deposit increased to 855,129 million yen and loans 887,672 million yen.[3] The BOJ extended credit to city banks by discounting the eligible commercial bills and by making prime loans accommodating the claim from the corporations to compensate for the over-loaning of the banks.

2. Main Banking System and Keiretsu-Loans

Large city banks extended loans to the same group of corporations. For example, Mitsubishi Bank restricted loans to corporations within the Mitsubishi group. These were called "keiretsu-loans." The bank earned profit from the interest gap between the higher and lower interest rates of loans and deposits, respectively. Ordinary deposit (demand deposit) had an annual interest rate of 2.5%. Conversely, the average rate of loan and discount by all banks was 7.929% in 1973. Local banks profited by directing call money to large city banks under the division of banking between both city and local banks. Finally, the call rate for overnight loans to city banks from local banks jumped to 8.284% annually besides a loan, and the discount rate of city banks was 7.693% in 1970.

Most large loans were organized by the main banks, which constituted lending consortiums among both commercial (ordinary banks) and long-term banks. The main banking system originated from the military control of loans during the War. In contrast, keiretsu loans originated from zaibatsu banking, wherein the zaibatsu banks extended and managed loans and deposits for corporations within the same zaibatsu group. Large city banks were the designated banks of the military and were forced to organize loan consortiums for wartime supplies during the War. This was the origin of the main banking system.

Postwar city banks replaced the wartime main banking system. Major large city banks reestablished their formerly close relationships with large firms in the postwar main banking system. However, an important difference was found between the postwar main bank and wartime systems: postwar main banks pursued banking profit spontaneously, while wartime main banks were forced to provide loans to munition industries subject to military requirements. Postwar main banks provided large industrial loans as they were liberated from the wartime duty to war finance.

Furthermore, postwar main banks widened banking relationships with new developing industries. For example, Mitsui Bank reorganized the main banking relationship with the Toyota Automobile Company outside the former Mitsui zaibatsu group. Additionally, Sumitomo Bank sought asset management for the National Electric Company (now Panasonic).

The main banks extended keiretsu loans aggressively within the same business group, monitoring the management of the corporation as an agent of depositors and shareholders of the corporation. Moreover, they managed almost all kinds of financial investment from short-term loans for working capital to long-term loans for capital equipment through lending consortiums with long-term banks. The main banking system and keiretsu loan were highly effective for adapting modern mass-production techniques for the development of the heavy and chemical industries during the HGE.

Conversely, the main banking system and keiretsu loans carried high risks. Almost every large city bank fell into an excess liability to the BOJ owing to excess loans to industries (over-loan). Moreover, business corporations also owed excess liability (over-borrowing) to the banks. The closed system of main bank and keiretsu loans repressed the internationalization or globalization of banking and industries. The main banking system could not escape from chain bankruptcy or insolvency during Heisei depression. Regulations to open security market and undeveloped equity finance reduced liquidity in the financial asset market.

6.2.4 Government Financial Institutions and Long-Term Credit Banks

Long-term credit from government financial institutions (e.g., development bank and export–import bank) to large industrial projects also contributed to industrialization in the HGE. These government financial institutions raised funds from the Ministry of Finance's trust fund, which had been trusted with the common people's deposit via the postal savings. Long-term credit was extended for financing large projects including electric power stations, oil-refined chemical products factories, and iron and steel companies. These government financial institutions contributed to the industrialization during the HGE with private long-term credit banks. However, both governmental institutions and private long-term banks had, at last, expired in their missions for industrialization, and then had been restructured or absorbed by megabanks and foreign investment funds after the bubble economy.

6.2.5 Economic and Financial Policies During the HGE

Keynesian economic policy was compatible with the indirect financial intermediary system in the HGE. The easy monetary policy and low-interest rates were effective by the bank rate policy of the BOJ. The BOJ restricted loans to major city banks and discounts only to the most credible commercial bills. The bank rate of the BOJ accommodated loans and discounts to large city banks at 6.25% annually in September 1969. The rate was then lowered to 4.25 in June 1972. The loans by the BOJ made it possible for city banks to extend "over-loans" to the industries. Relatively lower dependency on government bonds was among the promotive factors for easy monetary policy of the BOJ, particularly without financing war expenditure.

The fiscal investment policy by the Ministry of Finance through trust funds from Postal savings and government financial institutions supported financing for heavy industries. These were counterparts to Keynesian fiscal policy through which the government put the investment fund into the construction of the public infrastructure for the economic growth by issuing government bonds.

6.3 Financial Prosperity in the Bubble Economy

6.3.1 Roads to the Bubble Economy in the 1980s

The HGE almost stopped owing to double shocks due to the embargo on gold export by President Nixon of the USA in 1971 and the increase of oil prices by the Organization of the Petroleum Exporting Countries (OPEC) in 1974. The increased oil price and wage rates pushed general commodity prices up to the cost-push inflation, which was sufficient for breaking the general business model for entrepreneurship during the golden age. The floating rate of foreign exchange along with the devaluating US dollar to yen after the Nixon shock was both the cause and result of a surplus on international payments in Japan. Export of commodities and capital from Japan to the USA had increased constantly, and financial asset both inland and abroad was accumulated with mild inflation. Indeed, the Japanese economy recovered from stagnation soon after the second oil shock in 1979 with oil-less innovations in many large industries while the other developed countries were under a long-term slump with simultaneous inflation and unemployment of more than 10% annually. The Japanese growth rate of GDP in the real term had continued around 3–5% from 1970 to 1980 with the exception of −0.2% for 1974.[4]

The Japanese government increased expenditures and raised funds through large-scale issues of government bonds to recover from the 1975–1982 slump. However, the volume of government bonds decreased from 1983 to 1985 owing to the fear of crowd-out of private investment by government expenditure. "Monetarist," liberal economists led by Milton Friedman, criticized the Keynesian monetary and fiscal policy. They criticized the large government expenditure and easy monetary policy. By then, they had taken over economic policy in developed countries including Japan.

Monetarist anti-inflation policy replaced Keynesian policy after the Volker's anti-inflationary campaign of Federal Reserve Board (FRB) in October 1979. The relative volume of government bonds to GDP decreased tremendously from 1983 to 1987 in Japan owing to the privatization of several national enterprises, such as National Railways (now, JR) and National Telephone & Telegram (NTT). Prime Minister Nakasone pursued the policy of privatization and liberalization of economy following the policy of Anglo-American governments. Ronald Regan and Margaret Thatcher (the President of the USA and the Prime Minister of the UK, respectively) had changed their respective economies following the Monetarist policy. Nakasone followed their path. Monetarist policy preferred liberal and anti-regulation policies in the financial sphere, which opened the door to competitive global financial markets for Japan. The way to the bubble economy was swept out for the liberation of financial markets.

6.3.2 Process of the Bubble Economy from 1985 to 1990

We examine the bubble economy according to data in the Flow of Funds Account. Foreign stock investment initially increased eminently after the "Plaza accord" of September 1985. Ministers of Finance of Germany, France, the UK, the USA, and Japan agreed to adopt the international cooperative financial policy to devaluate the US dollar to other currencies including the yen.

Monetarist anti-inflation policy raised interest rates to the highest levels to stop inflation in the early 1980s. The peak interest rate discouraged industrial investment during the depression and induced speculation toward the evaluation of the US dollar, which decreased and increased US exports and imports, respectively. This created large deficits in the international payment of the USA. The US government allotted large expenditures to remedy the depression, creating large deficits in the Treasury Budget. Therefore, the US government had a "twin deficit" as a result—deficit of both budget and international payments. The Japanese government took the cooperative financial policy to devaluate the US dollar and evaluate yen and to increase the import of goods and export of capital to the USA. The exchange rate between the yen and US dollar decreased from 235 to 150 yen in September 1985 to September 1988.[5]

After the Plaza accord, the higher valuation of the yen and higher interest rate decreased domestic industrial investment and increased imports from the USA and foreign investment. The BOJ maintained interest rates below the Federal Fund rate of FRB at a higher level of 5–8% in 1985 to co-operate with the US monetary policy targeting devaluation of the US dollar to yen and remedying the twin deficit.

Foreign investment in the stock and real estate markets increased eminently from 1985 until the "Black Monday," when stock prices plummeted on the New York Stock Exchange in October 1987. The BOJ feared the potential depression owing to the overvaluation of yen, and promptly reduced the interest rate to the lowest level historically, thus inducing the bubble economy. The speculative investment in the domestic stock and real estate markets had been increasing until the collapse of the bubble economy in 1990. The stock price index (Nikkei average) jumped from 7,116 yen in 1980, reaching a peak of 38,915 yen (5 times higher) in 1989. Land prices in the urban area continued to be 12~16% higher annually compared to previous years (from 1987 to 1991) (Fig. 6.1).

The structure of the flow of funds accounts changed drastically from the late 1970s to 1990. Household increased saving surplus proportionally with GDP and maintained the level during 1980s. Conversely, the corporate sectors had been changing investments during the 1980s. Since 1975, after the first oil shock in 1974, the government had been a major investor in the corporate sector by enforcing the recovery policy from depression through fiscal policy. The large volume of government bond issues had increased until 1985, and domestic financial institutions underwrote the bond through their syndicates. Moreover, the government bond's issue rates were normally lower than the market rates owing to regulation on the interest rates by the MOF and BOJ in financial markets. The gap between the issue rate and the market rate caused capital loss for the financial institutions owing to the long position of bond holdings as the market price of the bond has always been lower than its issue price. The profitable long position of the bonds was difficult for the financial institutions in this situation. Financial institutions required MOF

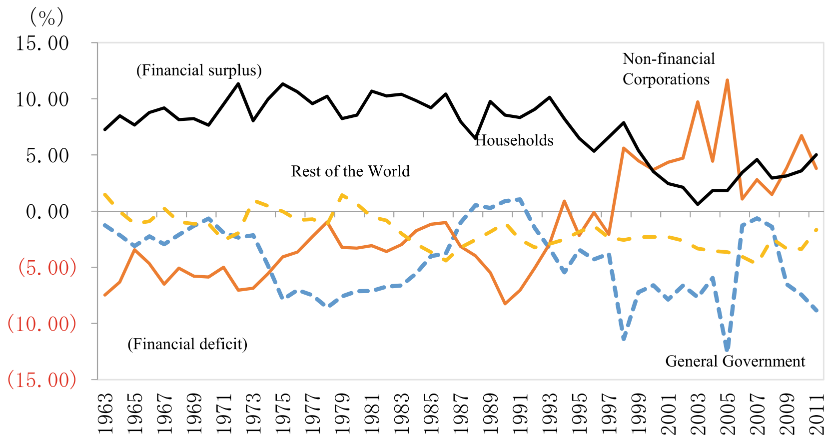

Fig. 6.1 Analysis of changing process in the flow of funds account (*Source* Data are based on the Flow of Funds Accounts Statistics)[6]

and BOJ to change the issue rates of government bonds and introduce the competitive issue process that triggered the general financial innovations. A competitive bid was then introduced into the issuing process of government bonds thereafter. Besides, new market instruments, such as negotiable certificate of deposit (NCD), commercial paper (CP), and money market certificate (MMC), were introduced under the financial liberalization of interest rates in the 1980s.

Liberalization of the international capital movement was another channel for opening financial innovations in the free-open financial market. Foreign investment was replaced with government bonds as the largest investment sector after the transition to the Monetarist policy. The monetarist anti-fiscal policy had reduced government expenditure through the transformation of national enterprises to private management and by suspension of various subsidies such as welfare expenditure and unemployment allowance. The ratio of government deficits to GDP decreased from 3 to 1% in 1982 and 1986, while excess investment in the foreign sector had risen from 1 to 4%.[7] Foreign stock investment of financial institution had increased from early 1980s until the "Black Monday" collapse of New York Stock Exchange in October 1987.

After that collapse, the corporate sector reemerged as the major debtor in the flow of funds account, and the high economic growth of the 1960s seemed to reappear. However, the purposes of the investment made by the corporate sector changed drastically. The ratio of financial and real estate investments had taken the largest share after the mid-1980s while productive manufacturing investment declined. Both financial and real estate investments as well as both stock and real estate investments in the corporate sector increased the stock price and real estate prices simultaneously.

The ratio of bond investment in the corporate sector to total financial assets decreased from 8.9 to 3.3% in March 1982 and 1987, respectively; conversely, the ratio of stock investment increased from 9.9 to 27.2% during the same period. The ratio of stock to total financial assets held by households increased from 6.9% in March 1982 to 12.6% in March 1987 while M + CD decreased from 66.2 to 61.0%.[8] Change in the balance sheets of the corporate sector and households were among the fundamental factors of the general prosperity of securitization in the financial market.

The banking sector increased the real estate loans after the "Black Monday." Both Japanese commercial and ordinary banks have been accustomed to making mortgage loans secured by land despite the decline of non-collateral commercial loans since the revision of the Bank Act in 1927. Rising prices of land encouraged the extension of mortgage loans by banks including the long-term banks. Unprecedented speculations on land, real estate, stocks, and other financial assets were a feature of the bubble economy.

6.3.3 *Analysis of the Stock and the Real Estate Markets in the Bubble Economy*

Let us analyze the process of the dual bubble economy and the bubble burst afterward in stock and real estate markets. Table 6.1 show the movements of the stock price index and real estate price and bank loans.

The urban land price decreased compared to previous years after the 1990 credit crunch, accompanied by panic in the stock market. The price

Table 6.1 Prices of land, stock and bank loan

Price of land (city)		*Average price of stock*		*Bank*		
Year	*%*	*Yen*	*%*	*Deposit*	*Loan*	*Securities*
	1 year ago		1 year ago	1 year ago %	1 year ago %	1 year ago %
1983	4.4	9,893	23.4	7.8	11.1	7.8
1984	3.1	11,542	16.6	7.1	12	8.7
1985	2.3	13,113	13.6	9.9	12.7	13.4
1986	2.5	18,701	47.6	28.7	26.5	16.7
1987	9.4	21,564	15.3	19.5	12.6	12.4
1988	8.4	30,159	39.8	12.4	10.2	14.4
1989	8.2	38,915	29	14.4	10.8	17.3
1990	15.3	23,848	−38.8	8.9	7.5	9.8
1991	2.2	22,983	−4.7	−2.2	4.1	−3.1
1992	−4.7	16,924	−26.4	−3.4	2.4	−1.6
1993	−4.1	17,417	2.9	0.4	1.1	2.2
1994	−2.1	19,723	13.2	1.7	0.1	−0.2
1995	−1.5	19,868	0.7	3.6	1.3	0.7
1996	−2	19,361	−2.6	−0.3	0.4	1.3
1997	−1.3	15,258	−21.2	1.2	1.0	0.4

Source Bank of Japan, Statistics of 1982 and 1997 index of urban real estate compared to a year ago increased from 2.5% in early 1986 and peaked at 15.3% in early 1990. However, this decreased every year from 1992 to 1997. Conversely, the index of stock prices (Nikkei average of each year) rose to a peak of 38,915 yen and then went down to less than 1/2 (15,255 yen) in 1997.[9]

The index of the prices of stock and land could not continue decreasing in the long term if individual and institutional investors had taken reasonable expectations in both markets. Investors are inclined to resist the changes in the market prices to protect themselves from possible losses due to unexpected changes in price. Moreover, they had no other option but to take a short position when they expected price devaluation on their asset, and they had to take a long position when they expected asset price inflation. The prices of stock and land would increase or decrease soon according to their reasonable disinvestment so the stability of the price index would keep itself around the equilibrium level.

The individual and institutional investors had adopted unreasonable behavior in the assets market, especially during the bubble economy and bubble burst aftermath. They had taken a synchronized operation in the capital market. The price index of stock and land increased and decreased simultaneously in the same directions as the market price movement. The bubble and bubble burst were amplified as a result of the unreasonable behavior of these investors. The bankers' loans backed up the movements by mortgage of the land and suspended unreasonable investment.

Irrational price movement induced by the unreasonable behavior of investors and banks had been amplified by the "convoy policy" of the Ministry of Finance. The Japanese government rescued almost every bankrupt bank to save the depositors and pay off the liabilities by pouring public money into the banks since the crisis in 1927. The rescue plans for saving insolvent banks were reinforced during the bubble burst and the Lost Decade. It caused a moral hazard among the bankers who had managed an unbalanced portfolio of various hard and financial assets. If investors including bankers had an efficient portfolio, they would soon recover the equilibrium position of diversification among various assets, and the prices of stock and land would increase and decrease around the equilibrium level.

Furthermore, the Japanese "mythology" on the land asset had amplified the real estate bubble and had inhibited the recovery from the bubble burst. The land had always been a core and risk-free hard asset, and Japanese investors believed that land price could never decrease continuously. The mythology of land, however, faded when the economic bubble burst.

Individual investors had been removed from the stock market after the Lost Decade, and this was one of the major causes of the delay in the stock market's recovery. Devaluations of stock prices and real estate prices were symptoms of asset deflation in the macro economy. The Lost Decade with assets deflation had been wrong circularity between the loss of assets of corporation, the household, and the lack of industrial financial development.

6.3.4 Tobin's Theory and the Bubble Economy

While theoretical background was available to promote rising prices both in the stock and real estate markets, their prices also went down simultaneously in Japan. The general equilibrium theory in the asset market was influential among financial investors who based their decisions on Tobin's Q ratio. According to the theory, the market price of the stock would rise as long as Tobin's Q is less than a unit in the equilibrium point in the asset markets.

Tobin's Q was defined briefly as the ratio of the market price of the corporate stock divided by real asset value reappraised by market prices including real estate.[10] Tobin's Q hardly rose up to a unit as the real estate price rose proportionally with the stock price index. Most investors had been involved in "money illusion" and irrational expectation that stock prices would rise continuously as long as the real estate prices rises. Besides, investors in real estate had expected that the land price would rise as long as the stock price rises. Bank loans had increased both to land speculation and also to stock market investment. Excessive financial prosperity had progressed both in the stock and real estate markets for so long that a financial crisis followed after the bubble burst.

6.4 Financial Restructuring After the Bubble Burst

6.4.1 The Greatest Depression After the Bubble Burst in the Japanese Economy

Stagflation, that is, stagnated inflation, followed after the end of the HGE in 1980s. Monetarist's anti-inflation policy substituted Keynesian easy monetary policy, and the monetary regime changed in favor of the liberal market economy. Financial liberalism encouraged the investment into money and capital market inland and abroad. Financial investments enlarged the government bond market and then the foreign stock market, and eventually the domestic real estate and stock markets. Both stock and real estate prices peaked at unprecedented levels.

Finally, BOJ became precautious of the future catastrophe in the financial markets, and the investors squeezed their investments since the end of 1990. Stock prices fell drastically and real estate prices collapsed discouraging real estate investment. The long-term credit banks could not manage their banking business anymore and they were absorbed by megabanks inland and abroad including by the speculative "condor funds."

The Japanese government interfered in the financial market and persuaded bankers to restructure the banking business and redeem the non-performing financial claim using the public funds. Many large banks became nearly bankrupt, including three long-term banks and famous investment banks such as Yamaichi Security Company and Sanyo Securities Company. This was the beginning of the restructuring era under the greatest financial depression (from 1990 to 2000) in Japanese economic history—the Lost Decade.

6.4.2 Retrospective View of Past Restructuring of the Banking System

Since the Meiji Restoration, the Japanese banking system had experienced several restructuring or regime changes before the restructuring era (1990–2000). In the following paragraphs, we summarize the result of past restructuring to compare with the recent banking reformation[11]:

The first restructuring was introduced by the establishment of the BOJ in 1882. The BOJ had concentrated the currency issue authority and had cooled down hyperinflation by the redemption of national bank notes. Many banks and financial houses including 1867 ordinary banks, had been established relatively free until the peak year of 1900.

The second restructuring of the banking system was instructed by the Ministry of Finance, Inouye, after the Showa Financial panic of 1927. Minimum capital requirement enforced to every solvent banks, and merger and consolidation was recommended to the insolvent banks as "administrative guidance" by the Ministry of Finance. Solvent banks were forced to increase capital and reduce capital cost to extend long-term loans for heavy industries. The number of the banks decreased drastically from 1400 in 1927 to 61 in 1947 owing to the merger and consolidation of local banks.[12] Total government expenditure was up to 680 million yen, 5% of GNP, to rescue many banks.[13]

Postwar banking reformation described before in 1-2-1 could be counted as the third restructuring. The large city banks became competitive in using household deposit for lending for industrialization in the HGE.

6.4.3 Restructure of Banking System in Heisei Depression

The fourth restructuring of the Japanese banking system after the bubble economy was the most difficult problem. The Finance Authority of the Japanese government needed to simultaneously solve the conflict problem to write off non-performing loans and pay off the liability to depositors of banks. The Authority had to rescue many banks from bankruptcy and restructure the banking system on the sound financial foundation.

Two extreme possible options for restructuring were available: nationalization of bankrupt banks and making private banks more competitive, such as in the investment banking environment of the USA. The Japanese government adopted a hybrid policy combining the two.

The largest volume of the government budget was expended on failed banks, while investment banking of commercial banks was allowed through the security affiliates of megabanks by new financial regulation. Three megabanks, Tokyo Mitsubishi UFJ Financial Group, Mitsui Sumitomo Banks, and Mizuho Financial Group were consolidated with security affiliates as a result of the restructuring. Two long-term credit banks were absorbed into Mizuho group.

Even three megabanks did not satisfy the capital requirement of the Bank for International Settlement (BIS) in the Heisei restructuring in contrast to the restructuring after the Showa financial crisis in 1927, which had met the minimum capital requirement as a result of a bank merger.

6.4.4 Consequence of the Write-Off of Non-Performing Loans in Recent Restructure of Banking

The Finance Authority assisted the banks in writing off non-performing loans on their balance sheet with huge expenditures from MOF budget. The ratio of non-performing loans written off amounted to 4.85% of total bank assets, of which 97.6% was funded by the government budget in March 1996.[14] Most banks were prevented from insolvency or bankruptcy by the government rescue plan.

However, the financial structure of the banking system remained intact owing to the write-off. Most banks did not satisfy the capital requirement of BIS, which demanded that international banks maintain a ratio of capital of more than 8% of their total assets. This is comparable to the Showa restructuring in 1927, which enforced every bank to maintain the minimum capital requirements.

The government policy of preventing bank failure and payoff liability to depositors without using deposit insurance caused moral hazard among bankers and depositors. The depositors believed that the government never thought that banks could fail, hence neglected the monitoring of bank management. Bankers continued conservative banking to concentrate their investment on risk-free government bonds. Even mega banks refrained from taking risks to finance venture business. Hence, a more competitive market-oriented indirect financial intermediation such as investment trust was not much developed until twenty-first Century.

6.5 Changing Structure of Flow of Funds Account in Twenty-First Century

6.5.1 Structural Change of the Financial System

Government interference in the financial markets reestablished Keynesian monetary policy as a new combination with quasi-Monetarist monetary policy targeting reflation after the bubble burst. The financial policies were undertaken under the prime minister, Koizumi and Abe, as a hybrid policy between new Monetarist and new Keynesian policies. Monetarist monetary policy based on the "quantity theory of money," which was adopted targeting not anti-inflation but reflation (anti-deflation). Zero-interest rate policy, a Keynesian ultra-easy monetary policy, induced rational expectation of investors to stabilize the foreign exchange rate around the advantageous level for export from industrial companies at, the beginning of Abenomics. Export industries, such as the automobile companies, encouraged profitable export at the advantageous exchange rate of around 115 yen per one dollar and enlarged foreign business, especially in the Chinese market.

However, the growth policy of Abenomics had not been successful as financial innovation hardly worked under the changing structure of the flow of funds account in the early twenty-first Century. The HGE with an excess investment in corporate sector and high savings of the household sector had never come back again. On the contrary, household savings are swallowed by government expenditure on the social welfare under slow economic growth.

Corporations became the saving sector with their accumulated surplus of profit. Especially, monopolistic big corporations became too conservative to invest their surplus in venturous innovations, while medium and small companies were denied loans by bankers who became unsupportive of loans to both new and old businesses. Furthermore, the Japanese information industry has refrained from "dot-com" software innovations, and domestic financial institutions and individual investors have not come back to the stock market. Instead of domestic investors, the foreign institutional investors have assumed responsibility for the Japanese stock markets and led market making in the Tokyo Stock Exchange since the early twenty-first century.

The government became the largest investor in social capital. The government had issued a large volume of bonds to compensate for the budget deficit. They coped with various natural disasters such as the biggest earthquake and accidents of atomic power stations in 2011. The government bond market became the largest financial market in which not only banks and other financial institutions but also industrial corporations and individual investors invest their savings into risk-free investments in their portfolio. The macro economy fell into a liquidity trap wherein households diminished consumption because of decreasing ratio of distribution to labor while corporate sector including financial institutions had held government bond as a risk-free financial investment.

6.5.2 *Stagnation of Financial Development in the Declining Economic Growth*

What makes economic growth slow down and industrial and financial innovation decline after the bubble burst. High economic growth was so successful that almost every macroeconomic sector could increase their income, savings, and investment proportionally. The bubble economy was the result of the financial prosperity of the HGE. However, the success of high economic growth and the bubble economy also caused structural failure in the economic system.[15]

Corporations profited and invested capital in large-scale equipment to adopt foreign advanced technology depending on overdrafts to main banks, which extended the keiretsu loans to the same affiliate group. The main banking system and keiretsu loans turned to risky banking for almost all banks after the Heisei depression. Moreover, excessive liability worsened the financial structure of the industrial corporations after the HGE. The existing infrastructure, equipment, and machinery were worn out and became old-fashioned compared to new equipment, especially in the information industry. Japanese corporations were involved in creating large non-performing investments to fixed capital and owed large debts to banks. Large corporations extended credit to consumers in the automobile industry and in a department store. However, their financial investment did not perform very well after the bubble burst.

Circular stock holding among corporations within the same group had been successful in protecting the management of the corporations from the attack of takeover bids by foreign investors; however, it had turned out to be old-fashioned in the globalization era early in the twenty-first century. Japanese corporations, except for a few companies, had lost the vitality for innovation and leadership that was once there in the East Asian business circle.

Households had once accumulated the largest amount of savings to support the largest corporate debt intermediated by the banking sector. Time deposits and demand deposits were the largest resources to the finance corporate sector; however, the ratio of household saving to GDP was declining after the end of the bubble burst.

Individual investors once increased stock holdings in the bubble economy; however, they dissolved in the competition in the stock market after the Heisei depression. The household savings ratio had been at the lowest level for the younger generation besides their expenditure on education, housing, and other human capital investments. Real wages and real income had declined to owe to a diminishing ratio of the distribution of income for younger workers. A senior generation has been examining profitable investments; however, they cannot find the outlet of pension funds after retirement because of obstruction by the "Zero interest rate policy" of the government. Therefore, individuals in the household have never been active investors in the money and capital market. They cannot manage their investment in highly liquid open security markets, although household accumulated savings of up to 2.0 trillion in 2022.

6.6 The China Story

The financial and macroeconomic developments in China in the last four decades bear many similarities in trajectory with those in Japan in the postwar era: blistering economic development in the form of double-digit GDP growth rate since the 1990s, financial liberalization since the 2000s, and rapid buildup of debt across government, corporate, and household sectors after the global financial crisis (GFC).

6.6.1 The Banking System and "the Great Wall of Debt"

Indirect finance, based on the banking system, dominates financial markets in both Japan and China. Banks play a more prominent role in China than in Japan as the domestic stock market has been heavily distorted by the government since its inauguration in the early 1990s (Bell & Feng, 2009). At the same time, China followed Japan's export-led growth model. The dependence on external demand has been a result of high investment and low consumption, and the banking system in both countries is central in channeling savings to investments.

However, what is unique in China has been the fact the banks-dominated financial system has traditionally been embedded in a much wider system of state capitalism that features state domination and control of the economy. All major banks are owned and controlled by the government, with the asset of the top five state banks having almost half of the total assets of the banking sector (Turner et al., 2012). The state, on the other hand, ensures the banking and financial system fulfills its strategic goals and implements its industrial policy through administered interest rates, capital controls and other measures which have constituted a system of "financial repression." This helps mobilize savings at low costs on the part of the banks, which are then channeled to the state sector. Bank profits are mostly guaranteed through administered interest rate margins. The banking system, in turn, ensures the flow of credit to finance state sector entities and projects, especially the state-owned enterprises (SOEs) and local government infrastructure investment. However, Chinese SOEs run on a soft budget without strong financial discipline. State banks tend to lend to SOEs either on government directives or on the belief that SOE debt will eventually be underwritten by the government. This leads to moral hazard and a de facto systemic bias against private enterprises that are more dynamic, profitable, and efficient than the SOEs. The state bank–SOE nexus has been a structural source of non-performing loans (NPLs) in China as the SOEs as a whole started running at loss in 1990s (Lardy, 1998). By the late 1990s, the banking system was widely seen as insolvent, and Beijing had to recapitalize the banks in the aftermath of the Asian financial crisis (AFC) (Shih, 2004).

While China embarked on its economic reforms and opening up in the late 1970s, the economy took off after it acceded to the World Trade Organization (WTO) in 2001 (Feng, 2006). The entry into the WTO secured China's access to the world market and resulted in an export boom, the latter also facilitated by an undervalued renminbi (Bell & Feng, 2013). The banking system underwent institutional reforms in the early 2000s that saw the big four state banks being subject to a degree of market discipline by their public listing in the stock market, an improvement in their internal corporate governance, and the introduction of foreign strategic investors, many of which were major international banking players (Bell & Feng, 2022). At the same time, the central bank, the People's Bank of China (PBoC), had also strengthened its policy authority within China's macroeconomic management circle, with the deployment of a more modern framework of monetary policy as well as an increasing range of market-based lending facilities (Bell & Feng, 2013).

The GFC, as it turned out, has had a profound impact on financial development in China. Beijing implemented a huge stimulus package of over $600 billion in the immediate aftermath of the crisis. While this largely salvaged the Chinese economy from the destructive impact of the GFC, it led to long-term issues that distorted China's finance and macroeconomy. Most notably, Beijing relied on infrastructural investment, mainly handled by local governments, in propping up aggregate demand (Bell & Feng, 2013). While this approach more or less worked in the post-AFC period, it was expanded on a much larger scale after the

GFC. The massive investment further squeezed private consumption and distorted China's macroeconomic structure. In addition, the stimulus was not financed by the government budget, but mainly by bank credit. Given the directed credit regime in China, these credits largely flew on to local governments and SOEs that lack efficiency, discipline, and accountability. Furthermore, liberal reformers were on the defensive as the rationale of market-oriented reforms was tarnished by the GFC and later the stock market meltdown in 2015–2016. Instead, the Xi Jinping Administration, installed in 2012, has renewed China's model of state capitalism with government preference for SOEs against private enterprises, which further reinforced the trend of growing loans to the state sector.

Another major development in post-GFC finance in China has been the rise of shadow banking. The exponential credit expansion between 2009 and 2010 made the central government wary about the negative consequences, but the investment drive essential to stimulus had to be financed one way or another. Subsequently, China's leadership and the authorities found it convenient to allow the shadow banking sector to expand to help satisfy the demand for liquidity and credits (Bell & Feng, 2022). According to the Financial Stability Board, shadow banking refers to "credit intermediation involving entities and activities *outside* the regular banking system that serves to provide liquidity and credit transformation" (author's emphasis) (Financial Stability Board, 2013, p. 1). In China, however, the major players in shadow banking have been the banks, with non-bank financial institutions (NBFIs) playing a complementary role. The expansion of shadow banking acquiesced if not encouraged by the central bank, at least in the early stage. The PBoC's agenda was to utilize shadow banking to further liberalize the banking system to better serve the private economy. On the supply side, a key source of funds for shadow banking has been wealth management products (WMPs), which are "investment products that provide a return based on the performance of a pool of underlying assets" that can be issued by banks and NBFIs with returns frequently higher than retail deposit rates (Elliot et al., 2015, p. 2.). On the receiver's end, shadow banking products in China are mainly in the form of trust and entrusted loans, banker's acceptance bills, and corporate bonds (Collier, 2017; Hsu, 2015).

As it turned out, various agents, such as households, the private sector, banks and NBFIs, the SOEs, and local governments, embraced informal finance, with a convergence of interests in seeking both more access to credit and higher returns awarded by market-based opportunities. As a result, shadow credit grew rapidly between 2010 and 2016, peaking at RMB103 trillion (or US$15.3 trillion), or almost 125% of GDP, at the end of 2017 (Bell & Feng, 2022).

China's state-directed credit surge, together with new channels of financial liberalization, has supercharged credit growth, shifting the Chinese economy toward a high debt growth path. For instance, bank credits grew from around $10 trillion just prior to the GFC to nearly $25 trillion by 2014. The added new financial assets were equivalent to the entire US banking system (Anderlini, 2014). Looking from a longer time span, the surge in banking assets represents a 23-fold increase from 2000, when banking assets stood at a mere $1.7 trillion, far outstripping growth in the real economy (Bell & Feng, 2022). This phenomenal growth trajectory in banking and credit is unmatched in global history.

What was believed to be a temporary response to external distress turned out to be a persistent mode of economic model that relied on bank credits but delivered ever-decreasing growth rate in GDP in the last decade. As a result, all sectors of the economy, i.e., government, corporate and household, have accumulated mounting debt (see Fig. 6.2). By 2021, total non-financial debt in China reached almost 280% of GDP according to the International Monetary Fund (IMF) (IMF, 2022).

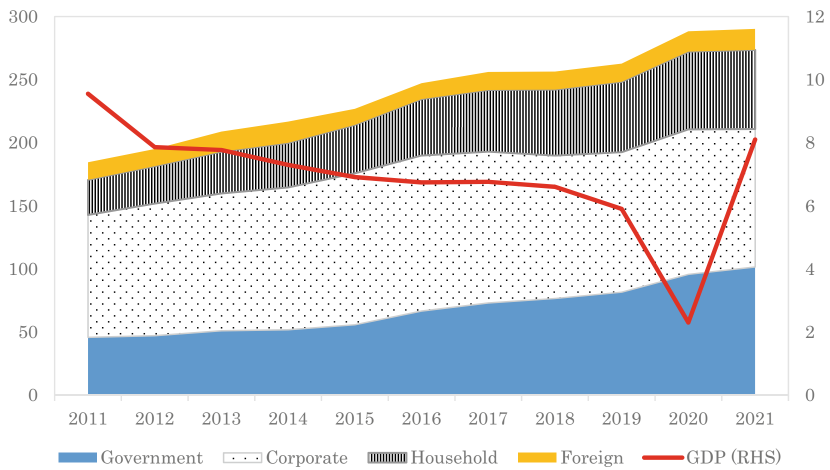

Fig. 6.2 Non-financial debt in China by sectors and GDP Growth (%) (*Source* IMF Article IV Consultation with China, various years)

6.6.2 *The Real Estate Bubble*

A good example to illustrate China's debt-driven growth model has been the rapid expansion of the real estate market, which converged the interests of almost all parties involved in pushing up asset inflation in China and contributed to the rising national debt.

To start with, the property sector has indeed been a strategic industry, or "pillar industry" for the Chinese economy. Property construction alone has been a sizable component of investment. Investment in the real estate sector almost quadrupled, from 4 to almost 15% of GDP between 1997 and 2014, before tailing off more recently, with a slight upsurge in 2018. It is also strongly connected to other industries, both upstream and downstream. The real estate sector was liberalized in the aftermath of the AFC, which helped Beijing fight the economic deflation without having to devalue the renminbi. Since then, however, asset inflation has been a built-in factor in China's macroeconomy.

The real estate sector has been a highly distorted market in China's political economy in that all land in the country is owned by the government, which makes the government an influential player rather than a referee in the market. The fiscal reform in 1994 tipped the balance in favor of the central government, leaving local governments fewer sources of revenue but similar spending obligations (Wong, 1997). Being an extra-budgetary revenue, land sales thus became an increasingly important source of revenue for local governments. In fact, land sales account for up to half of local government revenue during the 2010s. This means local governments have political and fiscal incentives to maintain high land prices by limiting local land supply. At the same time, 40% of winning bidders in land auctions will lose money if there is no increase in house prices.[16] Therefore, high land prices tend to be translated into high property prices.

The liberalization/commercialization of real estate in China has also crafted a lucrative and stable source of profit for the Chinese banks. The share of bank credits to the property sector in total lending almost doubled from around 20% in 2016 to 39% at the end of 2020 (Tang, 2020). If off-balance-sheet lending and loans using real estate as collateral are included, Chinese banks' exposure to the property sector could be as much as 60% of overall credit (Fitch Ratings, 2016). Shadow banking played an important role here. Large SOEs often obtain cheap credits from banks at discount rates, part of which ended up as shadow credit to property developers in the form of structured investment vehicles packaged by banks and NBFIs (Lin et al., 2020). At the same time, given the diminishing returns from manufacturing in recent years, many industrial firms would rather invest in the property sector than in productive activities (Bell & Feng, 2022). These have all contributed to the overheating of the real estate market.

Households and retail investors have been another major force in asset inflation facing limited investment options. Financial repression in China has also led to major distortions in restricting investment opportunities. The main state banks for a long time offered only low deposit rates (negative real interest rates), which is in effect equivalent to a savings tax; The stock market has been a roller coaster, especially during the 2015 crash; Capital controls make it difficult to invest overseas. Therefore, property investment became the main option, which has absorbed both housing demand, financial investment, fierce speculation, and foreign hot money. Combined with the limited land release by local governments and high land prices, this formed the structural foundation for asset inflation in China. Like Japan in the lead-up to the bubble economy, the one-way surge in property prices in the last two decades only reinforced the myth in the market that property prices will always go up and never go down. As a result, mortgage lending ballooned, making up more than half of China's household debt and accounting for almost 60% at the end of 2020 (IMF, 2021). Twenty seven percent of the underlying assets of wealth management products, a key source of supply for the shadow credit system, were based in the construction and property sectors. Total real estate investment accounted for almost 9.8% of China's GDP in 2019.[17]

A persistent property boom has inevitably led to high levels of corporate and household debt relative to GDP. Given its deep and extensive entanglement with the financial system, either an upward spike in asset price inflation or a downward market correction will inevitably carry large risks of financial and social instability. The high valuations in the Chinese property market are clearly unsustainable. One sign of the bubble under stress has been a string of major Chinese property developers that went into financial trouble repaying their debt since late 2021, particularly Evergrande, the largest developer in China, in the wake of Beijing's crackdown on developer finance. Over the years, Evergrande has accumulated around $300 billion worth of debt to banks, contractors, home buyers, investors, and even its employees, and another estimated $156 billion in liabilities off the books (Stevenson & Li, 2021).

The case of the Evergrande points to the dire risks of unsustainable debt to the financial and economic system in a slowing-down economy. According to the IMF, credit-to-GDP ratio of 30% should ring an alarm bell (Chen & Kang, 2018). China's figure of over 100% over a five-year period (standing at 335% of GDP at the end of 2020) could well be a precursor to a financial crisis (Institute of International Finance, 2021). Figure 6.3 provides a comparison of rapid credit growth in China with several other countries that subsequently experienced a financial crisis. Credit growth in Japan before the bubble burst had been comparable to that of the UK before the GFC but lower than that of the US during the same period. However, China's credit-to-GDP ratio has well exceeded that of the US in recent years. Equally remarkable has been the exceptionally long duration of the debt buildup, which dates from the early 1990s, compared with the relatively small scale and duration of corrections during this period (Chen & Kang, 2018).

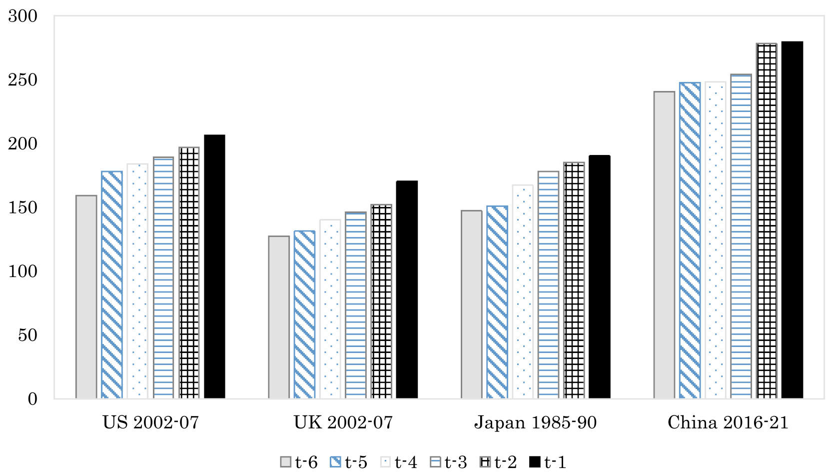

Fig. 6.3 Trends in pre-stress credit/GDP (%) (*Source* Authors' creation based on Bell and Feng [2022])

6.7 Conclusions

Japan before the bubble economy and China in the reform era have had very similar trajectories of financial development. Financial liberalization, on the back of a sustained period of growth under an export-oriented economy, resulted in exorbitant credit and asset markets. Japan's experience dealing with the burst of the bubble and its long-term consequences should present valuable lessons for China in bringing down the credit level.

First, the Japanese government repaired banks' balance sheets with public funds. While this ensured political and social stability, it in effect shifted debt from banks and the corporate sector to the government. It also created a moral hazard among major economic players. China had a similar experience of recapitalizing banks with treasury funds in the late 1990s, but NPLs went back to the same level of distress within four years. However, China's case is more complicated as a large part of the corporate debt is actually that of the SOEs and local governments, which the central government has the ultimate obligation to repay. By doing this, it could again reinforce banks' favoritism toward the SOEs and local governments and encourage reckless lending on the part of the state banks. Government bailout could also entrench the distortion in the yields of financial assets by reinforcing the illusion among investors that essentially risky investments are risk-free with an implicit government guarantee.

Second, the institutional reforms of the banking system in Japan of consolidating the sector into a de facto oligarchy of several megabanks should be notable to China. While the restructuring helped to reduce the general debt level of the banking sector, as discussed earlier, it reduced the competition and efficiency. Moreover, the balance sheets of the megabanks were still not strong enough for both prudential regulation and normal risk-taking lending decisions. The latter has inevitably restricted the banks' capacity in supporting innovation in the real economy.

Third, more fundamentally, Japan's post-bubble experience suggests that it is possible for China to deleverage from a credit boom without a hard landing. However, the price could be prolonged stagflation as banks, corporates and households will need time to repair their balance sheets. For a political system in which high economic growth is baked into the regime's legitimacy, it is going to be a hard choice. However, this is the choice that has to be made other than a sudden disruption of a financial and economic crisis. Beijing's recent announcement of an ambitious 5.5%

of GDP growth target for 2022 will certainly rely on expanded infrastructure investment and therefore lead to ever higher credit levels. This suggests that the Chinese government is not yet ready to accept a serious deleveraging and its painful trade-offs.

Notes

1. On the carrying aspect of postwar financial system from the military control during the war, see Teranishi (1999, pp. 137–158).
2. See, Fig. 6.1.
3. Bank of Japan, Annual Statistical Report of 1982.
4. Bank of Japan statistics of 1982.
5. Bank of Japan, Statistics of 1997.
6. Bank of Japan. The data on the financial surplus or deficit are the ratio to GDP of each year. Data for the year of 1963–1985 are derived from those in 1985, while data for the year 1986–2011 are taken from those of 2012 owing to changes in the data.
7. Bank of Japan, Statistics of 1997.
8. Bank of Japan, Statistics of 1982.
9. Bank of Japan, Statistics of 1997.
10. For the theory of Tobin's q, see Tobin (1971, pp. 322–38).
11. For the past restructuring of banking system from 1868 to 1936, see Moussa and Obata (2009).
12. Bank of Japan (1968b, vol. 24), and Yoshino, T, 1975, History of Bank of Japan, Tokyo: Shunjusha.
13. Bank of Japan (1968b, vol. 24).
14. Horiuchi (1998, p. 24).
15. Schumpeterian vision of the success and failure of capitalism has been agreeable to the post-bubble economy in Japan. See Schumpeter (1942/2008, pp. 61–62).
16. *The Economist*, October 15, 2016.
17. Statistics section of the website of the National Bureau of Statistics, China. Accessed on March 16, 2022.

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CHAPTER 7

Human Capital Agglomeration Effect and Regional Disparity in China

Zhiwei Cen, Yoshimasa Aoki, and Junko Doi

7.1 Introduction

This chapter shows why interregional income inequality in China during 1991–2004 was expanded by Barro regression using Chinese regional macro data and Chinese population census data.

Since the 1990s, China has fully adopted a market economy to revitalize its economy. In the process, restrictions on domestic labor migration were relaxed. China's fluid population in 1990 was 33.84 million, while in 2010, it was 221.43 million (Table 7.1); that is, the fluid population has increased 6.5 times in 20 years. However, despite the relaxation of labor migration restrictions, the interregional income gap

The authors would like to express the gratitude to the GPG Center and Institute for World Affairs of Kyoto Sangyo University for supporting this study.

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_7

between coastal and inland regions in China has widened since the 1990s. Could we think this income gap is caused by the human capital agglomeration effect based on China's internal migration policy, the household registration system (*hukou*)? China's *hukou* system requires that each person be guaranteed long-term employment in the area to obtain urban *hukou*. Workers with high human capital are more likely to get such jobs. Therefore, after the restrictions on labor migration were eased, workers with higher human capital accumulated in coastal areas with high wages, while such workers flowed out of the inland regions. While such labor migration has increased average per capita income in coastal regions, it has delayed economic development in inland regions. As a result, a gap in income levels has emerged between the coastal and inland regions. Thus, the disparity in human capital accumulation due to China's household registration system has caused the widening of income disparities between regions in China since 1990. In this chapter, using Barro regression, we examine the hypothesis that the human capital agglomeration effect causes the widening of income inequality.

The remainder of this chapter is organized as follows. Section 7.2 describes the characteristics and causes of income inequality among Chinese regions since 1990 and the "human capital agglomeration effect" hypothesis that explains these factors. Section 7.3 describes the Barro regression and method for testing when incorporated into the human capital agglomeration effect hypothesis. Section 7.4 presents the data for verification and summarizes the empirical results. Section 7.5 compares the factors contributing to population movement and income inequality during Japan's rapid economic growth with those in China. Finally, Sect. 7.6 summarizes the conclusions and discusses future issues.

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7.2 Income Inequality Between Regions in China Since the 1990s and Relevant Factors

Figure 7.1 shows the evolution of four statistical indicators (Gini coefficient, standard deviation of logarithm indicating σ convergence[1], coefficient of variation, and tile index) that indicate regional differences in the gross regional product (GRP) per capita in China over the period 1978–2020. The figure shows that China's interregional income inequality narrowed from 1978 but increased after 1991.[2] In other words, the evolution of China's interregional income inequality since 1978 has been V-shaped, with 1990 at the bottom. The "rich/middle class vs. poor" hypothesis (Chen, 2000a) and the "club convergence" hypothesis between the eastern and mid-western regions explain this fact.

The rich/middle class vs. poor hypothesis classifies the economy according to income levels. It explains the evolution of income inequality

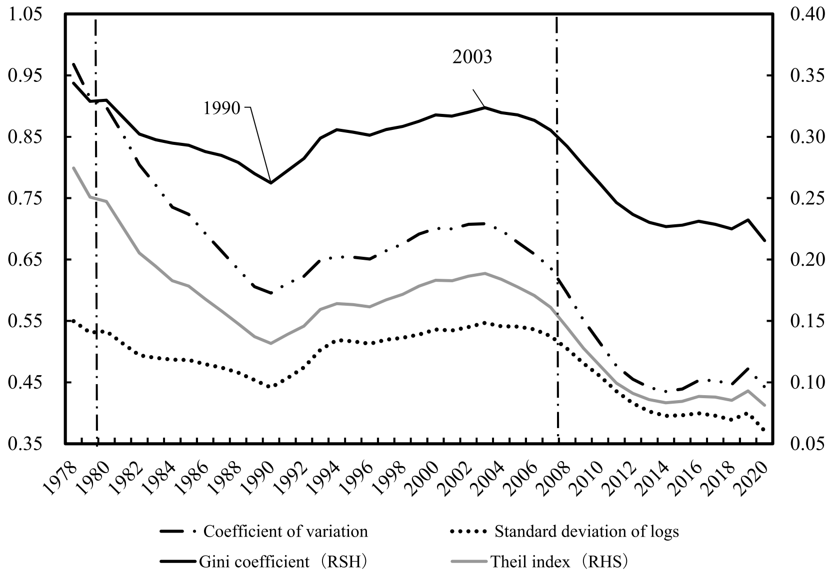

Fig. 7.1 Trends in income disparity between regions in China (1978–2020) (*Source* Authors' creation based on the data from *China Compendium of Statistics 1949–2008* (NBSC) until 2008 and *China Statistical Yearbook*, each year since 2009)

among regions in China based on convergence in income levels. First, the hypothesis points out that in the early stages of economic development, the economy was divided into a small number of rich and a majority of poor. It further pointed out that subsequent economic development would lead to the emergence of a middle class and narrowing the gap between the rich and the poor, creating a so-called "economic convergence."[3] However, further economic development has widened the gap between the rich/middle class and the poor, and convergence is no longer observed.

On the other hand, Cai and Du (2000), who argue for a club convergence hypothesis between the eastern and mid-western regions, show China's interregional income inequality during 1978–1998 by measuring the average tile contribution between each region. They pointed out that China already had two "clubs"—an eastern regional club and a mid-western regional club[4]—and that even if there was economic convergence within the clubs, there was no economic convergence between them. Similarly, Chen (2000b) measured China's economic convergence by decomposing it into convergence within the coastal regions (regions with developing economies) and convergence between coastal and inland regions (regions with lagging economic development). The results indicated that income inequality between coastal and inland regions has been growing almost consistently, although there has been some narrowing of income inequality within coastal regions.

The V-shaped transition in China's interregional income inequality is analyzed based on this fact. The economic convergence explains the reduction in China's interregional income inequality in the 1980s within the coastal regions. This expansion of income inequality is caused by the widening gap between the coastal and inland regions.

However, neither of the above two hypotheses does say a fact that is extremely important when considering China's interregional income disparities. Table 7.1 summarizes the fluid population using Chinese Population Census data for 1982–2020 and shows that labor migration in China has been rapid since 1990.

According to Yan (2004), the inter-provincial migration population in China, which was 10.81 million in the late 1980s, more than tripled to 34 million by the late 1990s. Among these, the outflow of the working population from less economically developed regions to more economically developed regions has been particularly significant, meaning that

Table 7.1 Trends in China's migration population (1982–2020)

Year	*Migration Population (mn people)*	*Increase (mn people)*	*Increase (times)*	*Average growth rate (%)*	*Source*
1982	657				The Third Nationwide Population Census
1990	3,384	2,727	5.2	22.7	The Fourth Nationwide Population Census
1995	6,017	2,633	1.8	12.2	Tabulation on the 1995 1% Population Sampling Survey of China
2000	12,107	6,090	2.0	15.0	The Fifth Nationwide Population Census
2005	14,735	2,628	1.2	4.0	Tabulation on the 1995 1% Population Sampling Survey of China
2010	22,143	7,408	1.5	8.5	The Sixth Nationwide Population Census
2020	37,582	15,439	1.7	5.4	The Seventh Nationwide Population Census

Source Authors' creation based on Cao (2004) for 1982, Yan (2005) for 1990 and 1995, and the Nationwide Population Census since 2000

migrant labor has been in full swing among China's regions since the 1990s.

According to the Harris–Todaro model, if such labor migration occurs, wages will fall in urban areas with advanced economic development due to the influx of labor. In contrast, labor becomes scarce in less developed areas with lower wages, causing wages to rise and income levels to level off among regions. However, as Fig. 7.1 shows, the income disparities between regions in China have widened since the 1990s. The reasons for this are as follows.

Historically, the Chinese government has implemented a social policy—a *hukou* system that prevents workers from easily migrating between regions. This policy clearly distinguishes between urban and rural households. It stipulates that people without *hukou* in a region cannot receive social security or education for their children. In order to obtain *hukou*, which is the registered residency status of a particular individual in another region, a person must be employed long term by a company or government agency in that region. Workers with higher levels of human capital (university graduates or those with a high school education or higher) are more likely to be employed in the long term in urban areas or more developed areas (coastal areas). They are more likely to become residents (obtaining household registration) in these areas.

Meanwhile, most workers who migrated from inland to coastal areas as simple laborers lack high educational qualifications and are unlikely to be employed long term and can only find temporary work. Many migrant workers return to their hometowns for these reasons (Wang, 2006).[5] In other words, owing to the household registration system, workers with higher levels of education (human capital level) are more likely to be employed long term in other areas and, therefore, more likely to take up household registration. Therefore, they are more likely to migrate to other regions. In this sense, workers with low human capital levels are restricted from migrating to other regions. Therefore, high human capital will be concentrated in coastal areas where the economy is developed and high wages are available. Thus, human capital accumulation may impact the economic development of the two regions (coastal and inland). In other words, while workers with high levels of human capital accumulated in the coastal region promote further economic development, the outflow of workers with high levels of human capital in the inland region causes economic development to stagnate (Fig. 7.2).

This can be considered one hypothesis to understand why China's interregional income inequality widened even after 1990 when labor mobility became freer. In this chapter, we test this hypothesis within the analytical framework of Barro et al. (1992, 2004). The results indicate that the economic convergence among the Chinese regions since the 1990s is not absolute but is more likely to be a conditional convergence, that is, economic convergence that considers the above possibilities.

7.3 Empirical Model

7.3.1 Basic Model

Barro et al. (1992, 2004) found that groups of economies in different economic states (e.g., GRP per capita) had a process to achieve the same long-run equilibrium. The groups with lower income (or output) levels grew faster than those with higher income. As a result, the lower-income group's income can approach the higher-income group's per capita income level. If so, we believe that there is a convergence between these

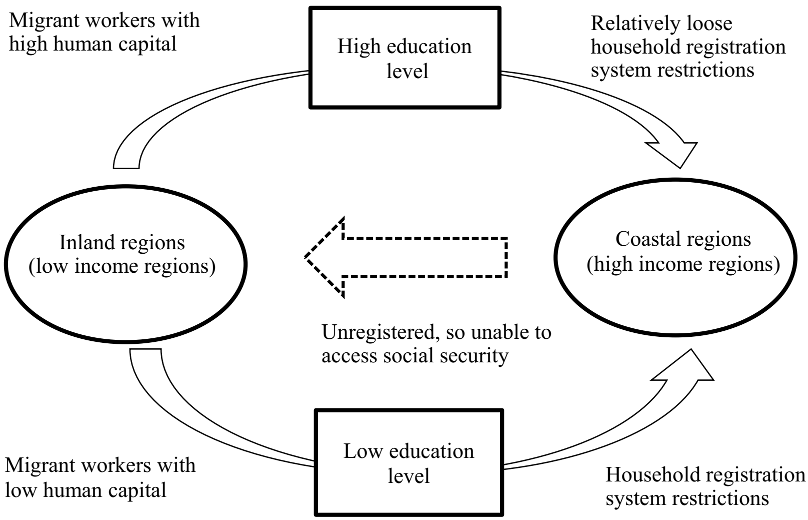

Fig. 7.2 Human capital agglomeration effect hypothesis (*Source* Authors' creation)

economic groups. Applying this concept to the issues of income inequality and regional disparities, if economic convergence (hereafter abbreviated as "convergence") is detected, income inequality and regional inequality decrease; otherwise, income inequality and regional disparities increase.

There are two methods for verifying convergence: β- and σ-convergence. This chapter uses β-convergence, which measures whether a process exists from a particular economic state (initial state) to long-run equilibrium.[6] The Barro regression method presented by Barro et al. (1992, 2004) was used to measure β-convergence. β convergence is determined by measuring β, which is called the convergence coefficient in the following equation:

$$\begin{aligned}\bar{G}(t_0, t_T)_i &= const. + b \times \ln y_{i,t_0} + B\left(\ln y_i^*(\Phi)\right) + u(t_o, t_T)_i \\ &= const. + b \times \ln y_{i,t_0} + \sum_{l}^{k} c_{i,l} z_{i,l} + u(t_o, t_T)_i \end{aligned} \tag{7.1}$$

where y_i is the per capita real GRP in the region i and $\overline{G}(t_0, t_T)_i \equiv \ln\left(y_{i,t_T}/y_{i,t_0}\right)/T$ is the average per capita real GRP growth rate from period t_0 tot_T. b is the coefficient for estimating convergence, where $b = -\left(1 - e^{-\beta_i T}\right)/T$. $B\left(\ln y_i^*(\Phi)\right) = x + \left(1 - e^{-\beta_i T}\right)/T \times \ln y_i^*$ summarize the per capita real GRP in the long-term equilibrium and various control or environmental variables that could affect its value.[7]

There are two additional ideas for beta convergence: absolute and conditional. If they converge to the same long-term equilibrium, it is called absolute convergence. However, if the long-term equilibria of each group are different and convergence appears after controlling for certain conditions, then the convergence is conditional.[8]

In the actual measurements, the two convergence properties were determined as follows. Even without considering the influence of $B(\ln y^*(\Phi))$ in Eq. (7.1), if $\beta > 0$, which indicates convergence, is significantly measured, the convergence is determined to be absolute convergence. In contrast, if $B(\ln y^*(\Phi))$ differs between groups, convergence between groups does not appear as it should ($\beta > 0$ is not significant).[9] However, if convergence appears certain conditions are met, i.e., by incorporating as new explanatory the control or environmental variables that are determinants of $B(\ln y^*(\Phi))$ and are thought to influence convergence, such convergence is considered conditional convergence (Barro et al. 1992, 2004). The $\sum_l^k c_{i,l} \times z_{i,l}$ in Eq. (7.1) represents a set of state, control, or environmental variables that may affect $B(\ln y^*(\Phi))$, and c displays weight parameters corresponding to each variable.

7.3.2 Barro Regression with Human Capital Agglomeration Effect

Next, let us consider measuring the human capital agglomeration effect in the Barro regression.

In Barro regression, if we take into account some variables that determine $B(\ln y^*(\Phi))$, we should use quantification methods such as the ordinary least squares (OLS), instrumental variable (IV), two-stage least squares (2SLS), and generalized method of moments (GMM). The IV method is used when problems arise, such as a simultaneous equation bias or endogeneity (simultaneity). When endogeneity occurs, the estimated values do not have the desirable properties of consistency and lack bias. However, using the instrumental variables method, finding the appropriate control variables will obtain estimated values that hold consistency.

To apply this approach to conditional convergence in Barro regression, we would add additional explanatory variables to the empirical model, such as control variables responsible for different long-run equilibria and control for the endogenous nature of these variables.

When using the IV method in Barro Regression with conditional convergence, we must add some choice variables as factors that give rise to differing long-term equilibria as additional explanatory variables. Moreover, we must control for the endogeneity of these variables. Suppose the estimated value of β is not significant when these are not controlled for but is significant when controlled. In that case, these control variables can be considered factors that generate conditional convergence.

The following steps were required to apply the above ideas and methods to the factor analysis of China's interregional income inequality since 1990. First, we find the control variables related to the human capital agglomeration effect, which has been a factor that prevents β convergence between Chinese regions since 1990. Second, we add the finding control variables and control for endogeneity using instrumental variables (IV). If convergence can be observed through such a process, then these control and manipulated variables may be among the factors that have increased regional disparities since 1990.

Let us consider the control variables related to the human capital agglomeration effect and the instrumental variables that control for them. We examine the statistical indicators related to the human capital agglomeration effect.[10] Tables 7.2a and 7.2b show for the central-western and coastal regions: (1) average growth rate for per capita GRP; (2) the graduate ratio or proportion of university graduates in the region to all nationwide university graduates; (3) the graduate employee ratio or the proportion of university graduates in the region to all employed people in the region; (4) net immigration rate [(labor inflow—labor outflow) (those residing in the region for five years or more + labor outflow)]; and (5) per capita GRP.[11] Table 7.2a lists the group corresponding five central-western regions (Sichuan, Hubei, Henan, Hunan, and Shanxi Provinces) in graduate ratio. Table 7.2b lists six coastal regions (Zhejiang Province, Jiangsu Province, Tianjin Municipality, Beijing Municipality, Guangdong Province, and Shanghai Municipality) in order of average growth rate.

When looking at the central-western region group, the "graduate ratio" in Sichuan, Hubei, and Henan is among the highest in the nation (in the top 10, with a deviation from the nationwide average for the three provinces of 2.06%).[12] Their graduate employee ratio is among the lowest (lower than 12, with a deviation from the nationwide average for the

Table 7.2a Statistical indicators related to "human capital agglomeration effect" (central-western regions)

	(1)		(2)		(3)		(4)		(5)	
	Average growth rate	*Nationwide ranking*	*Graduate ratio*	*Nationwide ranking*	*Graduate-employee ratio*	*Nationwide ranking*	*Net immigration rate*	*Nationwide ranking*	*Per-capita GRP(RMB)*	*Nationwide ranking*
Sichuan Province	8.51	18	6.17	3	2.33	22	−56.81	27	7,895	26
	−0.55		**2.73**		**−2.24**		**−49.84**		**−6,169**	
Hubei Province	8.23	22	5.57	4	3.84	12	−19.04	22	9,898	17
	−0.83		**2.13**		**−0.73**		**−12.07**		**−4,166**	
Henan Province	10.19	8	4.74	8	2.20	24	−44.30	25	9,201	19
	1.13		**1.30**		**−2.37**		**−37.33**		**−4,863**	
Hunan Province	9.22	13	4.54	11	2.63	19	−59.33	28	9,165	21
	0.16		**1.10**		**−1.94**		**−52.36**		**−4,899**	
Shaanxi Province	8.47	20	4.25	12	3.69	15	−7.57	18	8,587	23
	−0.59		**0.82**		**−0.87**		**−0.60**		**−5,477**	
Nationwide average	9.06		3.44		4.57		−6.97		14,064	

Note The bold font shows each indicator's deviation (from the average)
1. Average growth rate: 1991–2004, the data from *China Compendium of Statistics 1949–2008*
2. Proportion of region's graduates among all graduates nationwide (graduate ratio): 1995–2000, the data from *China Statistical Yearbook* (for each year)
3. Graduates as a proportion of all employees in the region (graduate employee ratio): 1996–1999, the data from *China Labor Statistical Yearbook* (for each year) and *China Statistical Yearbook* (for each year)
4. Net immigration rate: 1995–2000, the data from the Nationwide 1% Population Census and Fifth Nationwide Population Census
5. Per capita Gross Regional Product: 2004, the data from *China Compendium of Statistics 1949–2008*
Source Authors' creation

Table 7.2b Statistical indicators related to human capital agglomeration effect (Coastal regions)

	(1)		*(2)*		*(3)*		*(4)*		*(5)*	
	Average growth rate	*Nationwide ranking*	*Graduate ratio*	*Nationwide ranking*	*Graduate-employee ratio*	*Nationwide ranking*	*Net immigration rate*	*Nationwide ranking*	*Per-capita GRP(RMB)*	*Nationwide ranking*
Zhejiang Province	11.86	1	3.10	16	2.93	18	1.19	14	24,352	4
	2.80		**−0.33**		**−1.63**		**8.16**		**10,288**	
Jiangsu Province	11.08	2	7.67	1	3.74	13	10.14	11	20,223	6
	2.02		**4.24**		**−0.83**		**17.11**		**6,159**	
Tianjin Province	10.61	3	2.31	20	8.91	3	27.60	5	30,575	3
	1.56		**−1.12**		**4.34**		**34.57**		**16,511**	
Beijing Municipality	10.01	9	5.53	6	19.81	1	46.74	2	41,099	2
	0.95		**2.10**		**15.25**		**53.71**		**27,035**	
Guangdong Province	9.60	11	4.87	7	4.27	11	49.50	1	20,870	5
	0.54		**1.43**		**−0.29**		**56.47**		**6,806**	
Shanghai Municipality	9.52	12	4.61	9	13.15	2	37.40	4	46,755	1

(continued)

Table 7.2b (continued)

	(1)		*(2)*		*(3)*		*(4)*		*(5)*	
	Average growth rate	*Nationwide ranking*	*Graduate ratio*	*Nationwide ranking*	*Graduate-employee ratio*	*Nationwide ranking*	*Net immigration rate*	*Nationwide ranking*	*Per-capita GRP(RMB)*	*Nationwide ranking*
	0.46		**1.17**		**8.58**		**44.37**		**32,691**	
Nationwide average	9.06		3.44		4.57		−6.97		14,064	

Note The bold font shows each indicator's deviation (from the average)
1. Average growth rate: 1991–2004, the data from *China Compendium of Statistics 1949–2008.*
2. Proportion of region's graduates among all graduates nationwide (graduate ratio): 1995–2000, the data from *China Statistical Yearbook* (for each year)
3. Graduates as a proportion of all employees in the region (graduate employee ratio): 1996–1999, the data from *China Labor Statistical Yearbook* (for each year) and *China Statistical Yearbook* (for each year)
4. Net immigration rate: 1995–2000, the data from Nationwide 1% Population Census and Fifth Nationwide Population Census
5. Per capita Gross Regional Product: 2004, the data from *China Compendium of Statistics 1949–2008*
Source Authors' creation

three provinces [−2.18%]). Let us consider the graduate ratio as a surrogate variable for a region's education and the graduate employee ratio as a surrogate variable for workers' human capital level in a region. The level of workers' human capital in these regions is shallow despite the high level of education. Since regions with a high level of education, such as Japan and the U.S., also have a high level of workers' human capital, it seems paradoxical that there is a negative relationship between the level of education and workers' human capital in the central-western regions of China, as shown in Table 7.2a. However, if we take into account the labor migration between regions or the net immigration rate, the reason for these points could be explained.

For example, Sichuan and Hubei provinces rank third and fourth nationwide in graduate ratio. However, their net immigration rates, which show the situation of the migration of labor, are −56.81% (ranked 27th) and −19.04% (ranked 22nd), respectively. These facts show that, in these provinces, more people move out than move in.[13] It is natural to suppose that the laborers who move out from these regions involve many university graduates who received a high level of education in Sichuan and Hubei provinces (workers with a high level of human capital). If so, we should consider that the paradoxical relationship in Sichuan and Hubei provinces between a high level of education (a high graduate ratio) and a low level of human capital among workers (graduate employee ratio ranking 22nd and 12th) shown in Table 7.2a, is because many workers with high human capital move away. These factors give rise to the low average economic growth rate in Sichuan and Hubei provinces (ranked 18th and 22nd, respectively, among the 29 provinces, municipalities, and autonomous zones) and, as a result, they both rank low in the country in terms of per capita GRP (nationwide rankings of the 26th and 17th, respectively). We found similar results in other central-western regions.

On the other hand, the percentage of college graduates in Shanghai is lower than in Sichuan (3rd in the nation) and Hubei (4th). However, the percentage of college graduates among employees (2nd) is much higher than in those two provinces due to the high net migration rate (4th). Therefore, these factors also contributed to Shanghai's high average growth rate (12th place, with a deviation from the national average of 0.46%) and high GRP per capita (1st).

Beijing has a high graduate ratio (6th), as well as a very high net immigration rate (2nd), and graduate employee ratio (1st). The economic growth rate (9th) is also relatively high. Therefore, we presume that, in

Shanghai and Beijing, the agglomeration of high human capital promotes higher economic growth, and regions such as Sichuan Province and Hubei Province experience the outflow of high human capital workers, deteriorating the economic growth rate in inland regions (mid-western regions).

Thus, it can be considered that many workers with a high level of human capital gather in coastal regions (regions with relatively high economic growth rates), as shown by the cases of Shanghai and Beijing Municipalities. While many workers with high human capital move out of central-western regions (regions with relatively low economic growth), as shown by the cases of Sichuan and Hubei provinces. These data support our hypothesis about the human capital agglomeration effect.

To test our human capital agglomeration effect hypothesis, we take statistical indicators relating to human capital agglomeration and the associated statistical indicators shown in Tables 7.2a and 7.2b as surrogate variables. We consider two types of surrogate variables: type 1, which is an indicator of the level of human capital in the regions and does not consider labor migration, and type 2, which is an indicator of the human capital agglomeration effect that takes into account the effects of migration of labor.[14] In particular, we take the level of education (graduate ratio) in the region and the level of workers' human capital (graduate employee ratio) in the region as type 1 surrogate variables (for example, "ln Averedu, Percen unv empl year, and unv.s year"). The following equation defines type 2 surrogate variables:

$$hca_i = \frac{\sum_{j=1}^{I} M_{i,j} - \sum_{j=1}^{R} T_{i,j}}{\sum_{j=1}^{Q} S_{i,j}} \times \Lambda_i \equiv m_i \times \Lambda_i \tag{7.2}$$

where Λ_i represents the human capital level (e.g., average years of education or "percentage of college graduates") or the human capital level of workers (employees; e.g., "percentage of college graduates among employees") in region i; $\sum_{j=1}^{I} M_{i,j}$ represents the gross number of labor inflows into the region; $\sum_{j=1}^{R} T_{i,j}$ represents the gross number of the labor outflow of the region; and $\sum_{j=1}^{Q} S_{i,j}$ represents the permanent population of at least five years' duration. Thus, $\left(\sum_{j=1}^{I} M_{i,j} - \sum_{j=1}^{I} T_{i,j}\right) / \sum_{q=1}^{Q} S_{i,q} \equiv m_i$ represents expresses the level of net immigration. The stronger a region's human capital agglomeration effect the higher the value of hca_k, which will positively affect on the economic growth rate. Hence, considering the human capital agglomeration effect, we modify the Barro regression equation as follows:

$$\bar{G}(t_0, t_T)_i = const. + b \times \ln y_{i,t_0} + \sum_{\gamma=1}^{p} c_{i,\gamma} \times hca_{i,\gamma} + \sum_{l}^{k} c_{i,l} z_{i,l}(\Theta) + u(t_o, t_T)_i \tag{7.3}$$

Here, the term $\sum_{\gamma=1}^{p} c_{i,\gamma} \times hca_{i,\gamma}$ represents the human capital agglomeration effect. $\sum_{l}^{k} c_{i,l} z_{i,l}(\Theta)$ represents the new control variables that affect the real per capita GRP in long-term equilibrium, such as surrogate variables of the level of human capital (average number of years in education). Other variables include the rate of investment in physical capital, dependence on foreign trade (foreign trade effect), the proportion of foreign direct investment in the GRP (FDI effect), birth rate, and government spending.

In this chapter, we consider endogeneity between the average number of years in education, which is extremely important in generating the human capital agglomeration effect, and the average growth rate of per capita GRP for the following reasons. The average number of years in education (the level of human capital) at any given period is a stock variable.[15] If the accumulation of human capital does not depend on the quality of education in the region, but instead, as suggested in this chapter, is produced by the human capital agglomeration mechanism, high economic growth and high per capita GRP in a region could be an incentive for workers with a high level of human capital to gather in that region. We detect endogeneity between the average years in education and the average growth rate of per capita GRP, as shown in Tables 7.4, 7.5, 7.6, and 7.7.

7.4 Data and Estimation Results

7.4.1 Data

We use the following data: (1) regional macro data in "China Compendium of Statistics 1949–2008," published by the National Bureau of Statistics of China in 2010 (hereafter abbreviated as "New China 60"); (2) "Tabulation on the 1995 1% Population Sampling

Survey of China" and "The Fifth Nationwide Population Census" (2000) published by Population Census Office under the State Council, and other related data. As shown in Fig. 7.1, the 1991–2004 period is when regional disparities widened in China; to be consistent with the macro data used in this chapter, the period estimated in this chapter is set to 1979–2007. Moreover, taking reform from 1978 and actively beginning to flow into FDI from 1986 into account, we divide our estimated periods into (a) 1979–2007 (to verify post-reform convergence), (b) 1987–2007 (to verify convergence considering the FDI effect), (c) 1991–2004 (the period needed to verify the hypothesis in this chapter), and (d) 1991–2007 [extension of period (c)]. Below, we list the variables used for the tests and the data used for these variables.

1. $\overline{G}_i$(Dependentvariable): Average growth in real per capita GRP in the period = per capita GRP adjusted using the nationwide consumer price index. [16] [Data: "New China 60"]
2. $\ln y_{i,t_0} \equiv \ln GRP_t$: Real per capita GRP in the initial term of the calculation period (logarithmic value). [Data: "New China 60"]
3. $z_{i,1} \equiv$ G.cons._Y_t: Government spending as a proportion of expenditure-based GRP (average value for each calculation period. [Data: "New China 60"]
4. $z_{i,2} \equiv$ I_Y_t: Ratio of fixed capital formation to GRP in "expenditure method GRP" (average value for each estimation period). [Data: "New China 60"]
5. $z_{i,3} \equiv$ trade_Y_t: Total overseas trade value as a proportion of GRP (average value for each calculation period) [Data: "New China 60"]
6. $z_{i,4} \equiv$ fdi_Y_t: Foreign direct investment as a proportion of GRP (average value for each calculation period) [Data: "New China 60"]
7. $z_{i,5} \equiv$ ln_fer$_t$: Birth rate during the calculation period (initial term, logarithmic value) [Data: "New China 60"]
8. $Nmig_t$: Net immigration rate during the calculation period. [Data: National Population Census (1995, 2000)]
9. Human capital level (explanatory and control variables): (a) $\ln Averedu$: Logarithmic value of average education (average for each calculation period); (b) Percen.unv_empl_year: Ratio of university graduates to employees (average for each calculation

period); (c) unv. s_year: Proportion of the region's university graduates within all graduates nationwide (average for each calculation period). [Data: Fifth National Population Census (each province), China Statistical Yearbook (for each year)].

10. Human capital agglomeration effects (explanatory and instrumental variables): (a) hca_ ln_AvereduFL: Average education of the foreign labor (logarithmic value) × net immigration rate (which shows the $\mu_j \times m_i$ effect in the theoretical model presented in the appendix); (b) hac_Percen.unv_empl_year: Proportion of university graduates within all employees' times net immigration rate; (c) hca_unv. s_year: Proportion of all students' nationwide times net immigration rate.

Table 7.3 summarizes the basic statistics for the various variables listed..

7.4.2 Estimation Results

Table 7.4 presents estimates for 1979–2007 to show the convergence among regions after the reform. Table 7.5 presents estimates for 1987–2007 to examine the convergence among regions after FDI inflows. Tables 7.6 and 7.7 verify the human capital agglomeration effect.

First, we discuss the estimation results in Table 7.4. Columns (1)–(4) show the estimation results using OLS, whereas columns (5)–(7) present the estimation results using the IV, 2SLS, and GMM methods, respectively. The human capital agglomeration effect is not considered in columns (1)–(3). Column (1) does not consider regional characteristics or differences in human capital levels across regions. At the same time, columns (2) and (3) are the estimation results after considering these factors and adding the primary selection, state variables and regional dummies in this chapter. Column (4) shows the estimation results when including the human capital agglomeration effect without considering the endogeneity of average education. These estimation results show the following. The result in column (1) shows absolute convergence during this period but is fragile. These are consistent with Fig. 7.1, which shows that China's interregional income inequality narrowed once from 1978 but widened again after 1990. Columns (2), (3), and (4) present estimates that consider regional characteristics (regional dummies) and the level of human capital (average education level) across regions, and the estimated coefficient of ln_GRP_t, which indicates convergence, is

Table 7.3 Descriptive statistics of variables

	Obs	*Mean*	*Std. Dev*	*Min*	*Max*
G_$_{9107}$	29	0.102	0.014	0.077	0.129
ln_GRP_$_{91}$	29	6.347	0.469	5.622	7.628
G.cons._Y_$_{9107}$	29	0.154	0.085	0.102	0.574
I_Y_$_{9107}$	29	0.447	0.077	0.266	0.635
trade_Y_$_{9107}$	29	0.034	0.050	0.000	0.175
fdi_Y_$_{9107}$	29	0.002	0.005	0.000	0.024
ln_fer_$_{91}$	29	−1.770	0.310	−2.551	−1.409
Dummy_Region	29	0.345	0.484	0.000	1.000
Nmig_$_{9500}$	29	−0.072	0.353	−0.837	0.495
ln_Averedu_$_{2000}$	29	2.039	0.103	1.816	2.301
unv.s_$_{9506}$	29	0.034	0.019	0.003	0.077
Percen.unv_empl_$_{9699}$	29	0.046	0.039	0.010	0.198

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Table 7.4 Measurement of convergence in 1979–2007 (Dependent variable: Average growth rate of per-capita GRP)

	(1) *OLS*	*(2)* *OLS*	*(3)* *OLS*	*(4)* *OLS*	*(5)* *IV*	*(6)* *2SLS*	*(7)* *GMM*
Const.	0.121***	0.163***	0.107***	0.125***	0.027	0.027	0.014
	0.000	**0.000**	**0.001**	**0.000**	**0.496**	**0.391**	**0.636**
In_GRP_79	−0.007*	−0.018***	−0.027***	−0.030***	−0.023***	−0.023***	−0.022***
	0.077	**0.001**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
G.cons._Y_7907		0.040***	0.037***	0.031**	0.034***	0.034***	0.034***
		0.006	**0.005**	**0.012**	**0.004**	**0.000**	**0.000**
I_Y_7907		−0.019	−0.019	−0.033*	−0.006	−0.006	−0.008
		0.372	**0.303**	**0.087**	**0.757**	**0.698**	**0.556**
trade_Y_7907		0.039	0.031	0.035	0.062	0.062*	0.079**
		0.378	**0.417**	**0.337**	**0.155**	**0.067**	**0.013**
ln_fer_79		−0.007	0.008	−0.010	0.007	−0.007	−0.002
		0.391	**0.305**	**0.141**	**0.329**	**0.216**	**0.541**
Dummy_Region		0.018 ***	0.018***	0.014***	0.013***	0.013***	0.012***
		0.000	**0.000**	**0.001**	**0.001**	**0.000**	**0.000**
ln_Averedu_8907			0.056**	0.056***	0.091***	0.091***	0.102***
			0.013	**0.008**	**0.000**	**0.000**	**0.000**
hca_ ln_AvereduFL_2000				0.004*			
				0.061			
Percen.unv_empl_99					−0.330	−0.330***	−0.408***
					0.009	**0.000**	**0.000**
hac_Percen.unv_empl_9699					0.402	0.402***	0.488***
					0.034	**0.005**	**0.001**

(continued)

Table 7.4 (continued)

	(1) OLS	*(2) OLS*	*(3) OLS*	*(4) OLS*	*(5) IV*	*(6) 2SLS*	*(7) GMM*
VIF (Mean, Max)		1.94, 3.15	2.54, 5.58	2.75, 6.02			
Ramsey RESET test		F(3, 19) = 1.23 Prob > F = 0.32	F(3, 18) = 0.73 Prob > F = 0.55	F(3, 17) = 1.2 Prob > F = 0.33			
Wu-Hausman F test:					4.98 F(1,18) P-value = 0.04		
Durbin-Wu-Hausman chi-sq test					6.3 Chi-sq(1) P-value = 0.01		
Underidentification test(Anderson canon. corr. LM statistic)						Chi-sq(4) P-val = 0.00	Chi-sq(4) P-val = 0.01

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) IV	(6) 2SLS	(7) GMM
Weak identification test(Cragg-Donald Wald F statistic)						101.038	89.344
Sargan statistic						Chi-sq(3) P-val = 0.158	
Hansen J statistic							Chi-sq(3) P-val = 0.38
R^2 *(Adj.*R^2*; Centered* R^2*)*	0.111	0.610	0.698	0.735	0.760	0.837	0.822
Observations	29	29	29	29	29	29	29

Note

1. Instrumented: ln_Averedu_2000; Instruments: hca_ln_AvereduFL, unv.s_2005 and others
2. Bold type, where P (>|t|), ***, ** and * show significance levels of 1%, 5% and 10%, respectively

Table 7.5 Measurement of convergence in 1987–2007 (Dependent variable: Average growth rate of per-capita GRP)

	(1) OLS	*(2) OLS*	*(3) OLS*	*(4) OLS*	*(5) IV*	*(6) 2SLS*	*(7) GMM*
Const.	0.082***	0.154***	0.125***	0.129***	−0.020	−0.020	−0.019
	0.004	**0.000**	**0.000**	**0.002**	**0.654**	**0.562**	**0.682**
ln_GRP_87	0.001	−0.010*	−0.022***	−0.023**	−0.012*	−0.012**	−0.014**
	0.896	**0.080**	**0.008**	**0.013**	**0.089**	**0.023**	**0.012**
G.cons._Y_8707		0.053***	0.053***	0.053***	0.050***	0.050***	0.050***
		0.006	**0.003**	**0.005**	**0.001**	**0.000**	**0.000**
I_Y_8707		−0.024	−0.028	−0.031	−0.004	−0.004	-0.004
		0.268	**0.162**	**0.192**	**0.856**	**0.815**	**0.786**
trade_Y_8707		0.055	0.060	0.061	0.121**	0.121***	0.119***
		0.273	**0.199**	**0.203**	**0.011**	**0.000**	**0.000**
FDI_Y_8707		0.464	0.531	0.505	0.159	0.159	0.106
		0.226	**0.138**	**0.185**	**0.623**	**0.525**	**0.491**
ln_fer_87		0.007	0.007	0.007	0.007	0.007	0.007
		0.483	**0.460**	**0.476**	**0.363**	**0.236**	**0.413**
Dummy_Region		0.014***	0.015***	0.015***	0.008	0.008**	0.008*
		0.006	**0.002**	**0.005**	**0.091**	**0.023**	**0.080**
ln_Averedu_8907			0.052**	0.053**	0.103***	0.103***	0.109***
			0.040	**0.045**	**0.000**	**0.000**	**0.000**
hca_ ln_AvereduFL_2000				0.001			
				0.810			
Percen.unv_empl_99					−0.510***	−0.510***	−0.532***
					0.003	**0.000**	**0.000**
hac_Percen.unv_empl_9699					0.399*	0.399***	0.439***
					0.054	**0.009**	**0.006**
VIF (Mean, Max)		1.97, 3.32	2.66, 6.86	2.8, 6.1			

	(1) *OLS*	(2) *OLS*	(3) *OLS*	(4) *OLS*	(5) *IV*	(6) *2SLS*	(7) *GMM*
Ramsey RESET test		F(3, 18) = 1.5 Prob > F = 0.24	F(3, 17) =1.09 Prob > F = 0.38	F(3, 16) = 01.04 Prob > F = 0.40			
Wu-Hausman F test:					10.603 F(1,17) P-value = 0.005		
Durbin-Wu-Hausman chi-sq test:					11.14 Chi-sq(1) P-value = 0.0008		
Underidentification test(Anderson canon. corr. LM statistic)						Chi-sq(3) P-val = 0.000	Chi-sq(3) P-val = 0.0260
Weak identification test(Cragg-Donald Wald F statistic)						61.003	56.655
Sargan statistic						Chi-sq(2) P-val = 0.7907	
Hansen J statistic							Chi-sq(2) P-val = 0.7426
R^2Adj.R^2	0.001	0.455	0.539	0.735	0.689	0.789	0.791
Observations	29	29	29	29	29	29	29

Note
1. Instrumented: ln_Averedu$_{2000}$; Instruments: hca_ln_AvereduFL, unv.s$_{2005}$ and others.
2. Bold type, where P (>|t|), ***, ** and * show significance levels of 1%, 5%, and 10%, respectively.
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Table 7.6 Measurement of convergence in 1991–2004 (Dependent variable: Average growth rate of per-capita GRP)

	(1) *OLS*	*(2)* *OLS*	*(3)* *OLS*	*(4)* *OLS*	*(5)* *IV*	*(6)* *2SLS*	*(7)* *GMM*
Const.	0.030	0.152***	0.113**	0.095	−0.020	−0.020	−0.013
	0.368	**0.003**	**0.037**	**0.144**	**0.835**	**0.789**	**0.878**
ln_GRP$_{_91}$	0.010*	−0.014	−0.027**	−0.021	−0.028*	−0.028**	−0.024**
	0.076	**0.155**	**0.038**	**0.214**	**0.064**	**0.012**	**0.023**
G.cons._Y$_{_9104}$		0.047*	0.048**	0.051**	0.044*	0.044**	0.046***
		0.054	**0.043**	**0.043**	**0.077**	**0.017**	**0.000**
I_Y$_{_9104}$		−0.026	−0.026	−0.021	0.002	0.002	−0.002
		0.358	**0.333**	**0.488**	**0.963**	**0.953**	**0.936**
trade_Y$_{_9104}$		0.073	0.104	0.091	0.154*	0.154**	0.158**
		0.353	**0.188**	**0.276**	**0.083**	**0.020**	**0.016**
FDI_Y$_{_9104}$		0.310	0.515	0.528	0.413	0.413	0.469
		0.535	**0.306**	**0.305**	**0.449**	**0.326**	**0.173**
ln_fer$_{_87}$		−0.012	−0.010	−0.009	−0.011	−0.011	−0.009
		0.319	**0.419**	0.481	**0.399**	**0.273**	**0.489**
Dummy_Region		0.019***	0.020***	0.021***	0.017**	0.017***	0.016**
		0.010	**0.005**	0.006	**0.032**	**0.003**	**0.046**
ln_Averedu$_{_2000}$			0.063	0.053*	0.132**		0.116***
			0.119	**0.240**	**0.023**		**0.004**
hca_ ln_AvereduFL$_{_2000}$				−0.002			
				0.638			
Percen.unv_empl$_{_99}$					−0.288	−0.288*	−0.217
					0.206	**0.096**	**0.275**

	(1) *OLS*	(2) *OLS*	(3) *OLS*	(4) *OLS*	(5) *IV*	(6) *2SLS*	(7) *GMM*
hac_Percen.unv_empl_9699					0.242 **0.503**	0.242 **0.386**	0.112 **0.705**
unv.s_9500							
VIF (Mean, Max)		2.69, 5.11	3.32, 8.84	4.51, 16.24			
Ramsey RESET test		F(3, 18) = 0.84 Prob > F = 0.488	F(3, 17) = 0.27 Prob > F = 0.846	F(3, 16) = 0.37 Prob > F = 0.775			
Wu-Hausman F test:					7.479 F(1,17) P-value = 0.014		
Durbin-Wu-Hausman chi-sq test:					8.860 Chi-sq(1) P-value = 0.0029		
Underidentification test(Anderson canon. corr. LM statistic)						Chi-sq(3) P-val = 0.000	Chi-sq(3) P-val = 0.0227
Weak identification test(Cragg-Donald Wald F statistic)						33.864	25.543

(continued)

Table 7.6 (continued)

	(1) *OLS*	*(2)* *OLS*	*(3)* *OLS*	*(4)* *OLS*	*(5)* *IV*	*(6)* *2SLS*	*(7)* *GMM*
Sargan statistic						Chi-sq(2) P-val = 0.7268	
Hansen J statistic							Chi-sq(2) P-val = 0.7507
Adj.R^2	0.112	0.386	0.431	0.408	0.382	0.603	0.608
Observations	29	29	29	29	29	29	29

Note
1. Instrumented: ln_Averedu_2000; Instruments: hca_ln_AvereduFL, unv.s_2005 and others
2. Bold type, where P (>|t|), ***, ** and * show significance levels of 1%, 5% and 10%, respectively
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Table 7.7 Measurement of convergence in 1991–2007 (Dependent variable: Average growth rate of per-capita GRP)

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) IV	(6) 2SLS	(7) GMM
const.	0.073**	0.191***	0.134***	0.1324**	−0.0330	−0.0330	−0.0316
	0.050	**0.001**	**0.011**	**0.0480**	**0.7020**	**0.6220**	**0.7000**
ln_GRP_91	0.005	−0.020**	−0.040***	−0.0392**	−0.0283**	−0.0283**	−0.0282***
	0.406	**0.054**	**0.003**	**0.0280**	**0.0390**	**0.0050**	**0.0020**
G.cons._Y_9104		0.079***	0.080***	0.0798**	0.0763***	0.0763***	0.0765***
		0.008	**0.003**	**0.0050**	**0.0040**	**0.0000**	**0.0000**
I_Y_9104		−0.023	−0.022	−0.0214	0.0130	0.0130	0.0126
		0.480	**0.447**	**0.5110**	**0.6810**	**0.5960**	**0.6220**
trade_Y_9104		0.077	0.108	0.1070	0.1756**	0.1756***	0.1739***
		0.325	**0.133**	**0.1640**	**0.0240**	**0.0020**	**0.0010**
FDI_Y_9104		0.745	0.916*	0.9181*	0.5267	0.5267	0.5046
		0.191	**0.079**	**0.0890**	**0.3370**	**0.2110**	**0.1480**
ln_fer_87		−0.016	−0.013	−0.0129	−0.0127	−0.0127	−0.0124**
		0.204	**0.255**	**0.2810**	**0.2440**	**0.1270**	**0.0290**
Dummy_Region		0.015**	0.018***	0.0185**	0.0123	0.0123**	0.0128**
		0.044	**0.010**	**0.0130**	**0.1030**	**0.0290**	**0.0580**
ln_Averedu_9104			0.010**	0.0913**	0.1417***	0.1417***	0.1409***
			0.018	**0.0390**	**0.0040**	**0.0000**	**0.0000**
hca_ ln_AvereduFL_2000				−0.0002			
				0.9730			
Percen.unv_empl_99					−0.3467	−0.3467**	−0.3442*
					0.1650	**0.0660**	**0.0830**
hac_Percen.unv_empl_9699					0.1828	0.1828	0.1802
					0.6490		**0.6490**

(continued)

Table 7.7 (continued)

	(1) OLS	*(2) OLS*	*(3) OLS*	*(4) OLS*	*(5) IV*	*(6) 2SLS*	*(7) GMM*
VIF (Mean, Max)		2.60, 4.87	3.18, 8.36	4.44,15.99			
Ramsey RESET test		F(3, 18) = 1.14 Prob > F = 0.360	F(3, 17) = 0.04 Prob > F = 0.99	F(3, 16) = 0.04 Prob > F = 0.990			
Wu-Hausman F test:						3.216F(1,17) P-value = 0.091	
Durbin-Wu-Hausman chi-sq test:						4.614 Chi-sq(1) P-value = 0.0317	
Underidentification test(Anderson canon. corr. LM statistic)						Chi-sq(3) P-val = 0.000	Chi-sq(3) P-val = 0.0156
Weak identification test (Cragg-Donald Wald F statistic)						54.891	61.127
Sargan statistic						Chi-sq(2) P-val = 0.997	
Hansen J statistic							Chi-sq(2) P-val = 0.995
R^2 (Adj.R^2; Centered R^2)	0.026	0.333	0.475	0.447	0.530	0.698	0.698
Observations	29	29	29	29	29	29	29

Note
1. Instrumented: ln_Averedu$_{8707}$; Instruments: hca_ln_AvereduFL, unv.s$_{2005}$ and others
2. Bold type, where P (>|t|), ***, ** and * show significance levels of 1%, 5% and 10%, respectively

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significantly measured. We also obtain significant estimates for the government's final consumption expenditure ratio to GRP, regional dummies (coastal region = 1, Midwest region = 0), and average years of education as proxy variables for human capital, and human capital agglomeration effect. However, the estimators for other explanatory variables were not statistically significant.

The OLS estimates in Table 7.4 also test for variable dropout likelihood and multicollinearity for the explanatory variables; the Ramsey RESET test and VIF values are the statistics for these tests. All estimations in columns (2) through (4) indicate no possibility of missing variables and no multicollinearity.

Average years of education is another variable that is suspected to be endogenous. Column (5) in Table 7.4 presents the test for the presence or absence of endogeneity in the mean years of education. Columns (5)–(7) in Table 7.4 summarize the endogeneity test's results and the estimates by the IV method when endogeneity is found. The Wu-Hausman F test and the Durbin-Wu-Hausman chi-sq test are tests of the null hypothesis that the mean year of education is an exogenous estimator. If these hypothesis tests are rejected (i.e., if the exogenous nature of average years of education is rejected), then the average years of education are determined as endogenous variables. As indicated in columns (6) and (7), when the human capital agglomeration effect (hca_ ln_AvereduFL_2000) was considered, the estimates for the trade effect (trade dependence) were also significant. This result indicates conditional convergence after the reform. It suggests that the human capital agglomeration effect (hca_ ln_AvereduFL_2000) is present not only in the validation period (1991–2004) but also in the period after the reform until 2007. Columns (5), (6), and (7) also consider Percen.unv_empl_99 and its human capital agglomeration effect, hac_Percen.unv_empl_9699. Estimation results in columns (6) and (7), with average education, hca_ ln_AvereduFL_2000, is as an endogenous variable and others as manipulated variables, show the same results as in column (4), but with a significant effect of hac_Percen.unv_empl_9699. Given that hac_Percen.unv_empl_9699 is a variable that represents the synergistic effect of the human capital level and labor migration (net immigration rate) of workers in each region, the estimated results can be summarized as follows.

Suppose the human capital agglomeration effect exists. In this case, many workers with high levels of human capital will concentrate in coastal regions (the estimation results of hca_ ln_AvereduFL_2000 and ln_Averedu_2000), which will increase the human capital level (hac_Percen.unv_empl_ 9699 estimates) and promote trade, resulting in high economic growth rates.

Meanwhile, the outflow of workers with high human capital in different regions results in lower trade effects and economic growth rates. This result was confirmed by the 1987–2007 and 1991–2007 estimates.

However, unlike Barro (1997), the estimates of the investment rate in columns (2)–(7) were not significant. Nevertheless, the estimates of the government spending to GRP ratio (positive) were all significant. These results can be attributed to the poor investment efficiency of many regions of China during this period. However, it must be considered that Chinese local government consumption expenditures included infrastructure investments that promoted economic growth during this period.

Second, we discuss the results in Table 7.5 which summarizes the results of our previous analysis of China's interregional convergence when FDI effects are considered.

The estimation results in Table 7.5, taking into account the foreign investment effect, are very similar to those in Table 7.4, including the fact that the foreign investment effect (fdi_Y_9104) is not significant in any of the estimations results. As in Table 7.4, the estimation results in Table 7.5 are all significant (positive) for hac_Percen.unv_empl_9699 (the agglomeration effect on the level of workers' human capital).

Third, we discuss the results in Table 7.6 and 7.7. Table 7.6 presents the estimation results for the period in which the hypotheses of this chapter were tested. The results are similar to those in Tables 7.4 and 7.5 except for the human capital agglomeration effect (hac_Percen.unv_empl_9699), which is not significant. However, if the hypothesized estimation period is extended to 2007, due to the human capital agglomeration effect of migrants (hca_ ln_AvereduFL_2000), the convergence coefficient ($\widetilde{\beta}_i$) is larger than in any other period, as shown in Table 7.7.

7.5 A Comparison with China and Japan During High Economic Growth Era

In Japan and China, high economic growth (the 1960s in Japan and the 1990s in China) experienced widening income disperity among regions. This section investigates the factors that widened income disparities during high economic growth in Japan from the perspective of population movement. We examine the relationship between population movement to large cities and income disperity during this period and compare this relationship with the expanding income disperity in China in the 1990s. This comparison provides a perspective on appropriate policies to resolve income disperity among the regions in China.

Considering the population movement to large city areas in Japan, Tokyo had a major economic scale compared to other large cities. Migration to the Tokyo metropolitan area was prominent; at the peak of population movement in 1962, about twice as many people flowed into the Tokyo metropolitan area as into the Osaka metropolitan area and about six times as many as into the Nagoya metropolitan area. For this reason, we focus on the Tokyo metropolitan area when considering the reasons for population movement in urban areas.

7.5.1 Population Migration and Income Inequality in Japan

We can find some previous studies on the factors of income inequality during Japan's high economic growth. Watanabe (1989) focused on the industrial structure, and Nawata (2008) focused on the scale of public works projects. These studies have pointed out that labor migration to the Tokyo metropolitan area was a significant factor in the income disparity between regions during Japan's rapid economic growth. Looking at the period from 1955 to 1974, the population inflow to the Tokyo metropolitan area rose consistently from 1955, peaked in 1961, and then continued to decline, becoming negative (population outflow) from 1967. When we compare the per capita income of the Tokyo metropolitan area to the national average, the discrepancy is the same as that for population outflow: it increased from 1955 to 1961 and continued to decline after 1961. In other words, population movement in Japan is closely related to income inequality.

Various studies have been conducted on the factors that led to population movement in metropolitan areas during periods of high economic growth. Watanabe (1989) showed that changes in the industrial structure are a major factor in population movement. Watanabe (1989) noted that during the period of high economic growth, the development of the manufacturing industry had a significant impact on changes in population movement. Wang (1994) shows that the population movement between prefectures during high economic growth (1955–1972) was largely influenced by the income level of the place of transfer. Nawata (2008) points out that population inflow to the three metropolitan areas approximates the economic growth rate using data on the economic growth rate and population movement from 1955 to 2006. As the reason for this, Nawata (2008) points out that rapid labor migration to highly productive areas, especially from the 1950s to the 1970s, induced high economic growth. It also indicates that the expansion of public works projects in rural areas under the Comprehensive National Development Plan was the reason for the decline in population inflows to urban areas in the 1970s, which narrowed the income gap between urban and rural areas. During the period of high economic growth, when manufacturing was a significant industry, the location of manufacturing companies in rural areas, due to infrastructure development through public works projects, helped reduce the income gap between rural and urban areas. Hatta and Tamura (2020) also attributed the decline in population movement to large cities in the early 1970s to a decrease in the income gap between urban and rural areas. Similar to Nawata (2008), Hatta and Tamura (2020) show that the decline in income disparity is also attributed to public works policies that are biased toward rural areas based on the concept of "balanced development of the nation's land." The shift in manufacturing bases due to local infrastructure development and the increase in labor demand due to public works projects in rural areas have contributed to the decrease in income inequality between urban and rural areas. This result is consistent with the findings of Nawata (2008).

Based on the above literatures, we can conclude that "job search" was a factor in labor migration during high economic growth. In other words, there was active labor migration to the Tokyo metropolitan area and other urban areas during low unemployment in urban areas and high unemployment in rural areas. Meanwhile, labor migration from urban to rural areas was active during periods when labor demand in rural areas increased due to public works and factory relocations. Therefore, if infrastructure (especially roads, since manufacturing was the main industry during this period) was built in rural areas, factories could be built, and people would stay in those areas. As a result, the wage gap between rural and urban areas narrowed, and population movement subsided. Population movements during Japan's rapid economic growth can be explained by the Todaro model, which shows that labor migration occurs based on expected wages—that is, how much income can be earned in the future and the present.

7.5.2 Population Migration and Income Inequality in China

In this study, we have focused on the human capital agglomeration effect of China's internal migration policy, the *hukou* system, and clarified the causes of income inequality in China by using Barro Regression with regional macro data and the 2000 Chinese Population Census data.

First, absolute β convergence was not significantly measured to summarize the results of the empirical analysis. However, conditional convergence is significantly measured when the human capital agglomeration effect is considered. Furthermore, the coefficient estimates of foreign investment and trade effects on regional economic development are also significant. In other words, when human capital accumulation occurs, workers with high levels of human capital are concentrated in the coastal region, which promotes production activities and the trade of foreign-invested firms and leads to higher economic growth rates. In other regions, workers with high human capital leave the region. The effect of foreign investment is insufficient, and the economic growth rate is low. As a result, the income gap between the regions widened during this period.

We then compared the characteristics of population mobility and income inequality in Japan and China. First, as a commonality, we find that China's interregional income disparities are largely related to population mobility as in Japan's high-growth period. The main reason is that higher-income employment opportunities are more prevalent in urban areas. Meanwhile, during Japan's period of rapid economic growth, population movement reversed as the manufacturing base moved to the countryside, narrowing the income gap between regions and reversing population mobility. A household registration system in China is a factor in widening regional disparities. It creates incentives for people to move to coastal areas, where higher wages are available when jobs are available.

What kinds of policies would effectively reduce interregional income disparities in China? During Japan's period of rapid economic growth, the reduction in regional income disparities and population mobility was the supply of infrastructure to move industrial bases to the countryside. If infrastructure is developed in low-income inland regions and the production and development bases are also located in these regions, and if the infrastructure for information and communication technology is developed in the future to increase incomes in the regions, population movement and income inequality between regions will be reduced.

However, it has been pointed out that the migration of production bases to rural areas has caused a decline in productivity in urban areas, reducing the growth rate (Hatta & Tamura, 2020). The policies should be implemented depending on the country's economic situation.

7.6 Conclusions and Future Issues

In this chapter, using Barro regression, we test the hypothesis that the human capital agglomeration effect can explain income disperity between coastal and internal regions in China. We summarize our results as follows. First, absolute β convergence was not measured significantly during the estimation period from 1991 to 2004. Second, conditional convergence is significant when the human capital agglomeration effect is considered, and the trade effect on regional economic development is also significant. This empirical result implies the following. When human capital agglomeration effect exists, workers with high levels of human capital accumulating in the coastal region promote production activities and the trade of foreign-invested firms in the coastal region, leading to a higher economic growth rate. However, the outflow of workers with high levels of human capital in other regions reduces the effect of foreign investment, resulting in a lower economic growth rate. As a result, the income disperity between the regions widened during this period.

In Sect. 7.5 we compare the drivers of population mobility and interregional income inequality in Japan during its rapid economic growth with population mobility and interregional income inequality in China in the 1990s. The main common factor of population movement in both countries is the expected income of the workers. However, there are differences in income inequality trends after population movement between the two countries. In Japan, infrastructure development in regional cities led to a shift in manufacturing production bases to regional cities, resulting in an influx of population to urban areas and a decline in interregional income inequality. In the 1990s, population movement increased interregional income disperity due to the human capital agglomeration effect.

In the future, we need to test our hypothesis over a more extended period to show the reason for income disperity between regions in China. Thus, further research must be conducted using panel analyses and other methods.

Appendix

The Solow–Swan Model with Human Capital Agglomeration Effect

In the Mathematical Appendix, we discuss the theoretical basis for our empirical analysis. This chapter assumes a theoretical model that introduces labor migration into the Solow–Swan model developed by Barro and Sala-i-Martin (2004, chap. 9). Labor is the only factor of production transferred between regions (between countries). The dynamic equations for capital and labor in region i in this chapter are expressed as follows.

$$\begin{aligned} \frac{dK_{i,t}}{dt} &= \dot{K}_{i,t} = s_i Y_{i,t} - \delta_i K_{i,t} + \mu_j M_{ij} \\ \frac{dL_{i,t}}{dt} &= \dot{L}_{i,t} = n_i L_{i,t} + m_i L_{i,t} \quad (i \neq j) \end{aligned} \tag{7.4}$$

where $Y_{i,t}$, $K_{i,t}$, $L_{i,t}$, and M_{ij} represent the number of outputs, capital, and workers in region i and the number of net migrants from region j to region i. s_i, δ_i and n_i are the savings rate, capital depreciation rate, and population growth rate of region i, respectively. To simplify the model, we assume that the savings, capital depletion, and population growth rates are identical across all regions ($s_i = s_j \equiv s, \delta_i = \delta_j \equiv \delta, n_i = n_j \equiv n$ $for\, \forall i, j$). m_i ($\equiv M_{ij}/L_{i,t}$) represents the net migration rate from region j to region i and μ_j represents the level of education (human capital level) of migrants from region j to region i. We represent the Chinese household registration system by making the following assumptions regarding the relationship between M_{ij} and μ_j. First, if the expected income of region i (Ey_i) is extremely higher than that of region j (y_j), that is $Ey_i \gg y_j$, the number of people moving into region i from region j is $M_{ij} > 0$. Meanwhile, if the income level of region i (y_i) is extremely low compared to the expected income of region j ($y_i \ll Ey_j$), the number of people moving out of region i to region j will be $M_{ij} < 0$. Second, with the Chinese household registration system, the higher the level of education (human capital level) of workers (college graduates or those with high school education or above), the more likely they are to be employed in urban areas, especially in developed areas (coastal areas). Thus, the more likely they are to become residents (obtain household registration) in those areas.

Let λ_{ij} ($0 \leq \lambda_{ij} \leq 1$) be the probability that immigrants from region j can obtain household registration in region i. Now we consider the net number of immigrants when we consider the household registration system. We consider the probability of acquiring a household register λ_{ij} depends on the size of human capital of immigrants μ_j, that is $\lambda'_{ij}(\mu_j) > 0$. The larger the human capital μ_j and the closer its value is to the educational level $\overline{\mu}_i$ of long-term employment in region i ($\mu_j \approx \overline{\mu}_i$), the closer the value of λ_{ij} gets to 1 ($\lambda_{ij} \leq 1$) and most of the immigrants (M_{ij}) have high human capital levels ($\lambda_{ij} M_{ij} = M_{ij}^{high}$). However, the lower μ_j is $\mu_j \approx \mu_j^{low} \approx 0$, the closer λ_{ij} is to zero ($\lambda_{ij} \geq 0$), the lower the human capital level of most of the immigrants and the less they can obtain household registration ($(1-\lambda_{ij})M_{ij} = M_{ij}^{low}$). Therefore, the net number of migrants in region i is $\lambda_{ij} M_{ij} + (1-\lambda_{ij})M_{ij} = M_{ij}$. Equation (7.5) expresses the relationship.

$$M_{ij} = \begin{cases} M_{ij}^{high} & if\ \lambda_{ij} \leq 1 \Leftrightarrow \mu_{ij} \approx \mu_j^{high} \approx \bar{\mu}_i \\ M_{ij}^{low} & if\ \lambda_{ij} \geq 0 \Leftrightarrow \mu_{ij} \approx \mu_j^{high} \approx 0 \end{cases} \tag{7.5}$$

We now assume that the production technology in region i is a Cobb–Douglas production function ($Y_{i,t} = K_{i,t}{}^{\alpha}\left(A_{i,t}L_i\right)^{1-\alpha} h_i^{\mu_j m_i}; 0 < \alpha < 1$). In the production function, $A_{i,t} = e^{xt}$ represents the level of technology (x is exogenous technological progress) and $h_i^{\mu_j m_i}$ is the productivity effect of immigrants in region i ($\partial Y_{i,t}/\partial h_i^{\mu_j m_i} > 0$). As noted earlier, in the presence of a household registration system, the higher μ_j, the higher the human capital level of migrants; so, the net migration rate becomes $m_i \approx M_{ij}^{high}/L_{i,t}$. In this case, the productivity effect ($h_i^{\mu_j m_i}$) of the immigrants may be even higher because of the synergistic effect of μ_j and m_i. Thus, we can interpret $\mu_j m_i$ as the human capital agglomeration effect under the household registration system. If $\mu_j > 0$ and $m_i > 0$, this represents an influx of workers with high human capital levels from other regions. Therefore, the productivity effect, which is due to the human capital agglomeration effect, is positive (i.e., positive human capital agglomeration effect) in region i. However, if $\mu_j > 0 and m_i < 0$, it expresses the state that workers with high human capital levels are flowing out to other regions, and the productivity effect by human capital agglomeration effect in region i becomes negative (i.e., negative human capital agglomeration effect). Using Eq. (7.4), the per capita output of region i and the dynamic equation of capital when the human capital agglomeration effect occurs is considered are as follows:

$$\begin{aligned} y_{it} &= k_{i,t}^{\alpha} h_i^{\mu_j m_i} \\ \dot{k}_{i,t} &= s k_{i,t}^{\alpha} h_i^{\mu_j m_i} - \left(x + \eta + \delta + \varphi\left(k_{i,t}\right)\right) k_{i,t} \\ \text{where } \varphi\left(k_{i,t}\right) &= m_i\left(k_{i,t}\right)\left(1 - \frac{\tilde{\mu}_j}{k_{i,t}}\right) \end{aligned} \tag{7.6}$$

where $\tilde{\mu}_j \equiv \mu_j / A_{i,t}$ and y_{it} $(\equiv Y_{i,t}/A_{i,t}L_i)$ and k_{it} $(\equiv K_{i,t}/A_{i,t}L_i)$ represent the GRP per capita and capital per capita, respectively. $\varphi\left(k_{i,t}\right)$ is the emigration function. Barro and Sala-i-Martin (2004) assumed that $\varphi\left(k_{i,t}\right)$ is an increasing function of $k_{i,t}$ $(\varphi'\left(k_{i,t}\right) > 0)$. This is because an increase in per capita physical capital leads to an increase in the wage rate in region i, which in turn leads to an increase in the number of migrants and the migration rate.

Figure 7.3 shows the relationship between steady-state growth rates and capital stock levels for three possibilities with different μ_j and m_i: $\mu_j > 0, m_i > 0$ (denoted as Region 1 below), $\mu_j \approx 0, m_i > 0$ (Region 2 below), and $\mu_j > 0, m_i < 0$ (Region 3 below).

We can derive the relationship shown in Figure A through the following process. From Equation (A3), the steady-state per capita GRP (y_i^*) and capital per capita (k_i^*) are obtained as follows:

$$\begin{aligned} k_i^* &= \left(\frac{s h_i^{\mu_j m_i^*}}{x + \eta + \delta + \varphi\left(k_i^*\right)}\right)^{\frac{1}{1-\alpha}}; \\ y_i^* &= \left(\frac{s h_i^{\frac{\mu_j m_i^*}{\alpha}}}{x + \eta + \delta + \varphi\left(k_i^*\right)}\right)^{\frac{\alpha}{1-\alpha}} \end{aligned} \tag{7.7}$$

According to Eq. (7.7), the relationship between μ_j, m_i^* and y_i^* is as follows:

$$\frac{\partial y_i^*}{\partial \mu_j} = \left(\frac{m_i^*}{\alpha} \ln\, h_i + \frac{m_i^*/k_i^*}{x + \eta + \delta + \varphi\left(k_i^*\right)}\right) \psi > 0$$

$$\frac{\partial y_i^*}{\partial m_i} = \left(\frac{\ln h_i \mu_j/\alpha(x + \eta + \delta) + \left(\ln h_i \mu_j m_i^*/\alpha - 1\right)\left(1 - \frac{\tilde{\mu}_j}{k_i^*}\right)}{x + \eta + \delta + \varphi\left(k_i^*\right)}\right)$$

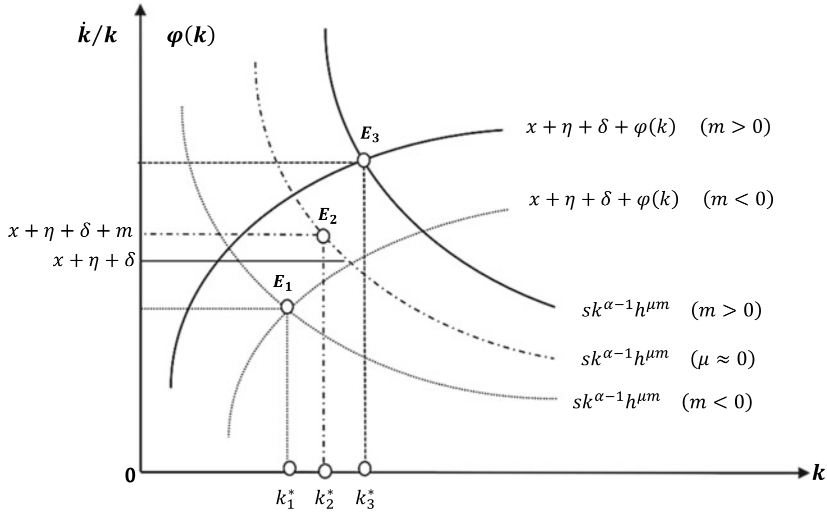

Fig. 7.3 The Solow–Swan Model with human aggregation effect (*Source* Authors' creation)

$$\psi \underset{<}{\overset{>}{-}} 0 \Leftrightarrow \mu_j \underset{<}{\overset{>}{-}} \frac{\alpha}{m_i^* \ln h_i} \tag{7.8}$$

where $\psi \equiv \alpha y_i^*/(1-\alpha)$. As can be seen in Eq. (7.5), if $m_i^* > 0$ and μ_j is high, a positive human capital agglomeration effect in region$i$, by immigrants from region$j$, will occur, resulting in an increase in per capita GRP (GRP(y_i^*)) in region i ($\partial y_i^*/\partial \mu_j > 0$). In contrast, even if m_i^* is high, the human capital level of immigrants must satisfy certain conditions ($\partial y_i^* \big/ \partial m_i - 0 \Leftrightarrow \mu_j \ \alpha \big/ m_i^* \ \ln h_i$); no increase in per capita GRP (y_i^*) in region i is due to the positive human capital agglomeration effect brought about by immigrants occurs.

Figure 7.2 illustrates the relationship ($y_1^*(k_1^*) < y_2^*(k_2^*) < y_3^*(k_3^*)$) of capital per capita for the three cases in steady state (regions 1 ~ 3). Assuming a Cobb–Douglas production function $y_i^* = \left(k_{i,t}^{\alpha}\right)^* h_i^{\mu_j m_i^*}$, the relationship of per capita GRP for the three cases ($y_1^*(k_1^*) < y_2^*(k_2^*) < y_3^*(k_3^*)$) in steady state is also confirmed similarly.

Considering Figure A and Equation (A4) together, we conclude that: (1) per capita capital (k_3^*) and GRP (y_3^*) in Case 1 ($\mu_j > 0, m_i > 0$) are the highest due to the positive human capital agglomeration effect, while per capita capital (k_3^*) and GRP (y_3^*) in Case 3 ($\mu_j > 0, m_i < 0$) are negative and the lowest due to the effect; (2) Case 2 ($\mu_j \approx 0, m_i > 0$) has higher capital per capita (k_2^*) and per capita GRP (y_2^*) than Case 3 and lower than Case 1 because the increase in the number of migrants is not accompanied by a productivity effect due to immigration ($h_i^{\mu_j m_i^*} \approx 1$).

When the human capital agglomeration effect is considered, the convergence coefficient for capital per capita ($k_{i,t}$) is obtained as follows. First, we rewrite the capital dynamic equation in equation (A3) as $\Gamma\left(\ln k_{i,t}\right) = s h_i^{\mu_j m_i} e^{-(1-\alpha)\ln k_{i,t}} - (x + \eta + \delta) - m_i\left(e^{\ln k_{i,t}}\right)\left(1 - e^{\ln \tilde{\mu}_j - \ln k_{i,t}}\right)$, and using the Taylor expansion of the equation around the steady state ($\ln k_i^*$), we obtain the following equation:

$$\begin{aligned}
&\frac{\dot{k}_{i,t}}{k_{i,t}} \cong \Gamma'\left(\ln k_i^*\right)\ln\left(\frac{k_{i,t}}{k_i^*}\right) = -(\beta_i + \omega)\ln\left(\frac{k_{i,t}}{k_i^*}\right) \equiv -\underset{i}{\tilde{\beta}}\ln\left(\frac{k_{i,t}}{k_i^*}\right) \\
&\beta_i \equiv (1-\alpha)(x + \eta + \delta); \\
&\omega = \left(1 - \underset{j}{\tilde{\mu}}/k_i^*\right)\partial m_i/\partial \ln k_i^* + (1-\alpha)m_i^* + \alpha\,\underset{j}{\tilde{\mu}}\, m_i^*/k_i^*
\end{aligned} \tag{7.9}$$

where β_i is the convergence coefficient in the absence of labor migration, and $\tilde{\beta}$ is the convergence coefficient when labor migration and migration function are introduced, that is, when the human capital agglomeration effect is assumed. The relationship between β_i and $\tilde{\beta}$ is as follows:

$$\begin{aligned}
&\text{if} \quad m_i^* \geq 0 \quad \text{then} \quad \tilde{\beta}_i \geq \beta_i; \quad \text{if} \quad m_i^* < 0 \quad \text{then } \tilde{\beta}_i < \beta_i; \\
&\text{if} \quad \tilde{\mu}_j \approx 0 \quad \text{and} \quad m_i^* >; 0 \quad \text{then } \tilde{\beta}_i \geq \beta_i
\end{aligned} \tag{7.10}$$

Assuming a Cobb–Douglas production function $\left(y_{it} = k_{i,t}^{\alpha} h_i^{\mu_j m_i}\right)$, the convergence coefficient related to per capita GRP and its differential equation solution is as follows:

$$\begin{aligned}
&\frac{\dot{y}_{i,t}}{y_{i,t}} \cong -(\beta_i + \omega)\ln\left(\frac{y_{i,t}}{y_i^*}\right) \equiv -\tilde{\beta}_i \ln\left(\frac{y_{i,t}}{y_i^*}\right) \\
&\ln y_{i,t} = x + \left(1 - e^{-\tilde{\beta}_i t}\right)\log y_i^* + \left(1 - e^{-\tilde{\beta}_i t}\right)\log y_{i,0}
\end{aligned} \tag{7.11}$$

From Eq. (7.11), the Barro Regression [Eq. (17.3) in the main text] that considers the human capital agglomeration effect from period t_0 to period

t_T is obtained as follows:

$$\overline{G}(t_0, t_T)_i = \frac{1}{T}\ln\left(\frac{y_{i,t_T}}{y_{i,t_0}}\right) = x - \left(\frac{1 - e^{-\tilde{\beta}_i T}}{T}\right)\left(\ln y_{i,t_0} - \ln y_i^*\right) + u(t_0, t_T)_i$$

Notes

1. The standard deviation of the logarithm of GRP per capita is one statistical indicator of interregional economic convergence, and if it decreases over time, economic convergence is considered to exist (income inequality decreases). Barro and Sala-i-Martin (2004) call it "sigma convergence."
2. This fact is also confirmed by Jian (1996), World Bank (1997), Chen (2000a, 2002b), Barro and Sala-i-Martin (2004) call it "sigma convergence." Lin and Liu (2003) and others.
3. For economic convergence, see Barro et.al. (1992, 1994).
4. For "club convergence" in economic convergence, see Quah (1996).
5. This may be the reason for the recent "Minkou Roughness" phenomenon (a phenomenon in which there is a shortage of migrant workers (Minkou) in economically developed areas of China, despite the abundance of labor resources in the country).
6. In other words, it quantitatively measures whether there is a process to (convergence on) the long-term equilibrium (steady state) from an initial state, by solving a differential equation obtained from a Solow model or an optimal growth model.
7. See Barro (1997) for choice variables, environmental variables, and state variables in Barro regression.
8. See Barro and Sala-i-Martin (2004), chapter 1.2.10.
9. See Nakazato (1999).
10. Because the data set used in this chapter is insufficient for Qinghai and Tibet, all the following analyses exclude these two regions.
11. Yan (2005, Chapter 3) defines mobility (net immigration) as "net immigration rate = those moving out less those moving in the permanent population" (at the time of the population census).
12. While the graduate ratios of the four regions other than Shaanxi Province (namely, Sichuan, Hubei, Henan, and Hunan Provinces) were among the highest in 2000 (within the top 10, deviation from the nationwide average of 1.63% for the four regions), their graduate employee ratios were among the lowest (within the bottom 12, deviation from the nationwide average for the four regions of −6.79%).
13. The figures −56.81% and −19.04% for net immigration rate mean that those within the permanent population who had moved in minus those

who had moved out has a negative value and that more people moved out than moved in.

14. The net migration rate is -56.81% and -19.04% are negative because the population that went out from the region is grater than the population that come in.
15. Given data limitations in this chapter, we use the average years of education in each region for the year 2000.
16. Due to incomplete consumer price index data for some regions, we use the national consumer price index (1952 = 100).

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CHAPTER 8

Environmental Policies and Water Resource Management

Nanae Yamada

8.1 Introduction

Due to the rapid economic growth since the transition to a market economy, China has been facing diverse and serious environmental problems, including water, air, and soil pollution and the destruction of the ecosystem. In particular, water is not only a key driver of economic and social development but also an essential element of the natural environment. In China, with the world's largest population, water is a scarce resource as the rapid industrialization and urbanization have put heavy pressure on both the quantity and quality of water, resulting in serious water shortages, as symbolized by the Yellow River cutoff in the 1990s, as well as severe contamination. To achieve sustainable economic growth amid resource constraints, China must improve water quality control to

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_8

increase the amount of available water while improving the water productivity per unit, which is far below that of developed countries, through water conservation and the appropriate allocation of resources among sectors.

Since the first United Nations Conference on the Human Environment in 1972, China has been actively incorporating the environmental policy measures of developed countries. In particular, China learned much from the Japanese experience in shaping its environmental policies through Official Development Assistance (ODA) schemes and academic exchanges.[1] China has selected useful policy tools based on the Japanese experience and has adopted them with considerable modifications to suit China's actual situation, including its socialist political system.

This chapter presents the achievements of China's water environmental policy and resource management as well as its long-term challenges and prospects with comparisons to Japan, which experienced severe pollution incidents, such as Minamata disease, during its period of rapid economic growth. Both countries belong to the Asian monsoon climate zone and share many common challenges related to water, such as water scarcity due to a dense population, a long history of agricultural irrigation, and a rapid economic development that is rare in world history. Of those common environmental policy issues for Japan and China, the author focuses on two topics: the cost sharing of water pollution control and the sectorial coordination of water rights among stakeholders.

The content of the rest of this chapter is as follows. It first briefly reviews the evolution of water environmental policies in both countries to show that they have been shifting from ex post facto regulations adopted after an incident has occurred to Integrated Water Resource Management (IWRM) toward more sustainable and integrated watershed management. It then examines three examples of water environment policies during Japan's and China's periods of rapid economic growth: the emission surcharge system based on the Polluter-Pays Principle (PPP), inter-sectoral water rights transfer, and Participatory Irrigation Management (PIM) at the rural community level. Finally, policy implications from the case studies and the future prospects for the post-economic growth and population decline phases in China and Japan are discussed.

8.2 Research Background

8.2.1 Water Environmental Problem in China

China faces water environmental problems in two aspects: quantity and quality control. First, water is an extremely scarce resource in China. The amount of water resources per capita is about 2000 m^3, which is only a quarter of the world average (FAO, *Aquastat*). Although China basically belongs to the continental monsoon climate zone, there are regions with diverse natural conditions coexisting within the country, ranging from the cold and dry northwestern interior to the warm and humid eastern coastal regions. There are more than 150 rivers with a basin area of more than 1,000 km^2, but the distribution of water volume is concentrated in the southern part of the country. Moreover, there is a large seasonal fluctuation. The demand for water also varies depending on the level of economic and social development in each region.

Figure 8.1 shows the composition of annual freshwater withdrawals by sector since 1982 in China and Japan. Water stress, which indicates the percentage of water resources used for economic activities, or the degree of water scarcity, is also shown. In China in 1982, the agricultural sector accounted for 87.6% of total water withdrawals. In 2017, it had shrunk to 64.4% due to changes in the industrial structure and urbanization. Instead, the industrial and domestic sectors have grown significantly, accounting for 22.3% and 13.3% of the total in 2017, respectively. Water stress increased from 33.6% to 43.2% over the same period, but has remained mostly high since 2012, indicating that utilization efficiency is improving due to recycling and other factors. Rapid industrialization from the 1980s to the 1990s, which caused the cutoff of the Yellow River, posed challenges to the proper allocation of resources among industrial sectors and between upstream and downstream of watershed.

In Japan, due to data limitations, the figure only shows the data in the post-high economic growth period. The agricultural sector remained stable at just under 70%, while the industrial sector declined from 18.5% to 14.3% due to improved use efficiency and lower demand. The domestic sector increased from 16.1% to 18.9% due to urbanization but has been on a slight downward trend since the 2000s, when the population entered a phase of aging and decline. Water stress also exceeded 40% in the 1990s but has since declined to 36.5% in 2017.

As for water quality, Fig. 8.2 shows the mainstream water quality by grade in seven major river basins in 2020. There are six categories of water quality in China, ranging from Grade I to inferior V (shown as V* in the figure).[2] I to III are water that is suitable for domestic drinking, IV is for industrial use, V is for agricultural use, and V* is heavily polluted water that cannot be used for any purpose. While most of the rivers meet the criteria for water quality above III, the water quality of Songhuajiang, Liaohe, and Haihe is relatively poor, with the percentage of grade IV in the Liaohe accounting for 78.6% and grade V in the Haihe accounting for 50%.

Figure 8.3 shows the change in the ratio of water under Grade V in the mainstream of seven major rivers in China since 1991. As an overall trend, the water quality of the Pearl River and the Yangtze River, located in the southern part of the country where precipitation is abundant, is better than that of rivers in the northern part, and the ratio of water quality below Grade V remains at a low level. From the graph, it can be observed that the pollution of the rivers in the north was quite severe during the 1990s and 2000s. The percentage of pollution below Grade V reached nearly 80% in the Liaohe and Haihe and around 60% in the Yellow River and Huaihe. From the 2010s onward, the percentage declined, but the Liaohe remains the only river that has not improved. Note that only the water quality of the mainstream of each river is shown here; the pollution is more serious in the entire watershed, including tributaries.

There are many reports on the health hazards and ecological damage caused by the deterioration of water quality due to industrial and domestic wastewater in China. For example, the discussion of the water crisis in the heavily polluted Huaihe in Economy (2010) attracted worldwide attention.

Finally, let us compare China's water productivity with that of Japan and other developed countries. Table 8.1 shows the change in GDP per cubic meter of water since 1982. While China's productivity has increased significantly from 0.8 USD in 1982 to 17.2 USD in 2017, Japan's has doubled from 36.6 USD to 75.7 USD, and the average for high-income countries has increased from 22.2 USD to 57.6 USD in the same period, indicating that there is still a large difference from developed countries.

8.2.2 Environmental Policy in Rapid Economic Growth Era

8.2.2.1 Japan

The history of Japan's postwar environmental policy can be divided into four major phases (Kojima et al., eds. 1995; Japan Society on Water

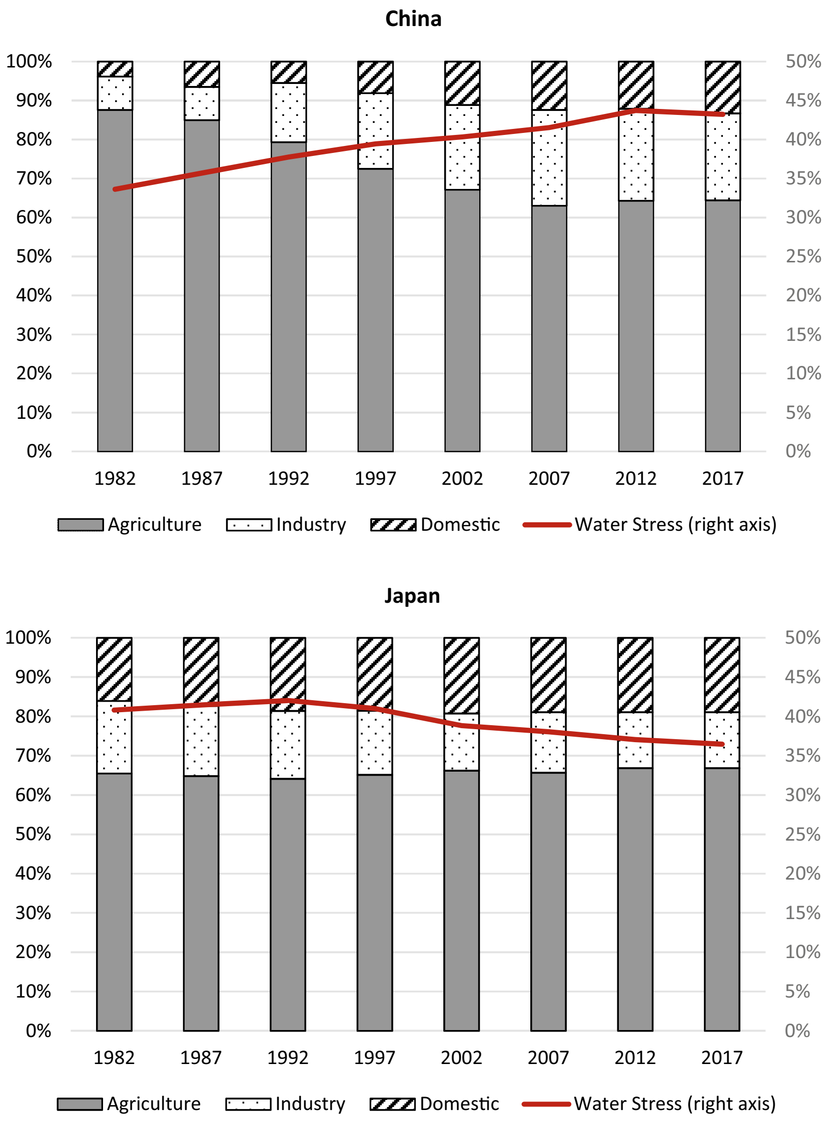

Fig. 8.1 Freshwater withdrawals by sector in China and Japan (Unit: %) (*Note* Data show the share of freshwater withdrawal in each sector. "Water Stress" is the ratio between total freshwater withdrawn by all major sectors and total renewable freshwater resources after taking into account environmental water requirements. *Source* The World Bank, FAO *Aquastat*

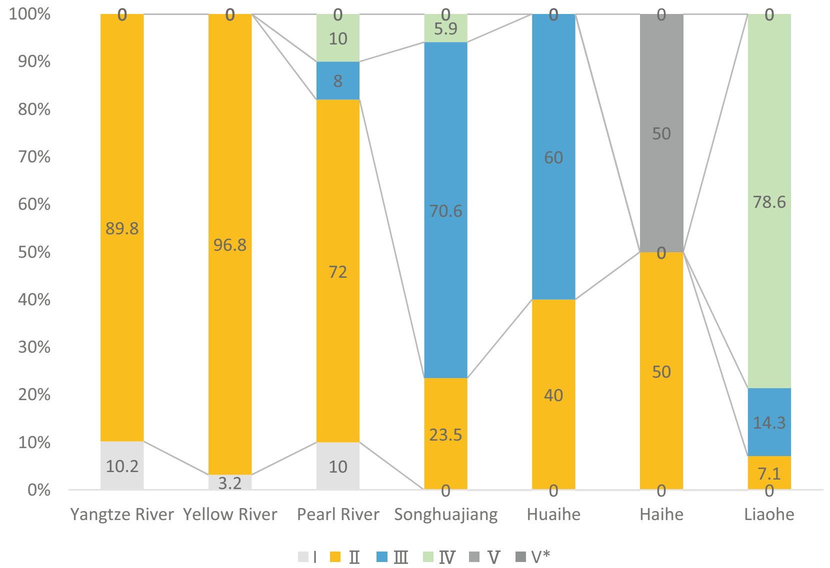

Fig. 8.2 Water quality in China's seven major rivers in 2020 (Unit: %) (*Note* The data reflect water quality of mainstreams. *Source* Ministry of Ecology and Environment, *Report on the State of the Ecology and Environment in China 2019*)

Environment eds. 2009). The first phase (1945–1963) was a period of postwar reconstruction when pollution problems became more serious and diseases, such as Minamata disease and Ouch-ouch disease, occurred in many areas due to factory wastewater containing heavy metals. The Water Quality Protection Act and the Factory Wastewater Regulation Act, or collectively referred to as "Old Two Law Concerning Water Quality Control," were enacted in 1958 in response to health hazards and damage to fisheries and were epoch making in that they regulated wastewater discharges into public waters for the first time; however, the law's effectiveness in preventing water pollution was limited, partly because it was an ex post facto type of law that allowed water quality standards to be set only after pollution had occurred.

In the second phase (1964–1974), environmental policy was formed and developed. The Basic Act for Environmental Pollution Control (BAEPC) was enacted in 1967 as a result of the residents' movements against pollution, the subsequent pollution trials, and the efforts of

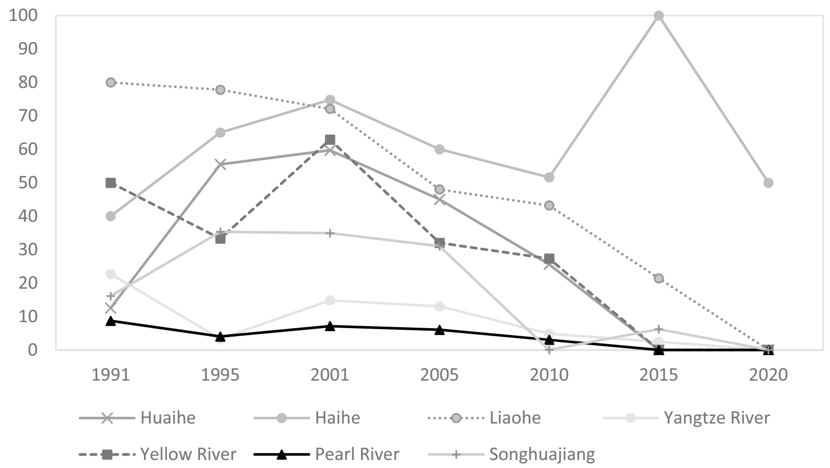

Fig. 8.3 The Ratio of Water under Grade V in Seven Major Rivers in China (1991–2019) (Unit: %) (*Note* The data show the total ratio of Grade V and V* in the mainstream. *Source* Data of 1991 and 1995 come from Wang (2005) in which only the data of Yangtze River, Yellow River, Songhuajiang, and Liaohe reflect the water quality of the mainstream. The rest were drawn from Ministry of Ecology and Environment, *Report on the State of the Ecology and Environment in China*, various years)

Table 8.1 Water productivity in China, Japan, and high-income countries (GDP per cubic meter, USD)

	1982	*1987*	*1992*	*1997*	*2002*	*2007*	*2012*	*2017*
China	0.8	1.4	2.0	3.3	4.8	8.1	12.0	17.2
Japan	36.6	44.4	53.7	59.2	63.7	70.7	71.1	75.7
High income countries	22.2	27.3	32.0	35.8	40.5	48.5	52.2	57.6

Note GDP per cubic meter of total freshwater withdrawal calculated with a constant 2010 USD price
Source The World Bank

progressive local governments. At the so-called Pollution Diet held at the end of 1970, 14 pollution-related laws were enacted, including the revision of the BAEPC. The following year, the Environment Agency was established to centralize environmental administration. The Water Pollution Prevention Act enacted in 1970 by the Pollution Diet aimed to achieve the environmental standards set under the BAEPC. This set environmental standards for public waters as administrative targets and penalties were applied for violations. Monitoring of water quality in public waters was also initiated, and to protect the quality of closed waters, such as lakes and inland seas, regulations on total load were introduced in addition to concentration regulations for wastewater. Of particular note is the Act on Compensation for Pollution-Related Health Damage (ACPHD) enacted in 1973. This established a policy system centered on pollution control and relief for pollution victims based on the PPP, which was highly regarded in international society.

However, even with these brilliant achievements, Japan's environmental policy was forced into recession by the global depression following the first oil crisis in 1973. In the third phase (1975–1992), as Japanese society increasingly prioritizes economic development over environmental conservation, environmental policies have come under increasing pressure from industries. Consequently, in the late 1970s, environmental standards for atmospheric nitrogen oxides were significantly relaxed, and in 1987, the law was amended to revise the ACPHD, resulting in a major setback in relief measures for victims.

The fourth phase, which was after the Basic Environment Law was enacted in 1993, included increased interest in global environmental issues. Domestically, the pollution movement has subsided, and the aim shifted to building a recycling-oriented society and nature conservation for an era of low growth and a declining population.

In the international discussion, environmental policy is defined as a public policy aimed at environmental conservation, and it refers to a comprehensive system consisting of pollution control, nature conservation, and amenity improvement (Teranishi, 1995). In general, developed countries are actively using not only regulatory and technical instruments in their environmental policies but also economic instruments, such as emission surcharges and environmental taxes, and institutional instruments, such as cross-compliance, where compliance with environmental regulations is a requirement for obtaining subsidies. In contrast, due to socioeconomic reasons, such as bureaucratic political systems, environmental policies in Japan have been criticized for giving priority to industries and being biased toward technological and regulatory measure.[3]

Nevertheless, it is gradually working toward a comprehensive environmental policy. Specifically, the enactment of the Basic Law on the Water

Cycle in 2014, which aimed at the maintenance or restoration of the sound water cycle as well as the healthy development of the economic society and the stability and improvement of people's lives, is a step forward toward IWRM (Ono, 2015).

8.2.2.2 China

Even before the transition to a market economy, serious pollution incidents occurred in the 1970s, but information disclosure was inadequate, and measures taken were extremely limited. The participation in the United Nations Conference on the Human Environment in 1972 provided the impetus for China's environmental policy. In the following year, 1973, China held its first national environmental protection conference.

China's environmental policy was fully developed in the 1980s and 1990s, when environmental problems became more serious. For water-related issues, State Environmental Protection Administration (SEPA) and the Ministry of Water Resources (MWR) were responsible for water quality conservation and quantitative water resource management, respectively. SEPA, established in 1998, was ungraded to the Ministry of Environmental Protection in 2008 and further reorganized into the Ministry of Ecology and Environment (MEE) in 2018.

First, let us examine the policies related to water quality protection. Since the late 1970s, in response to the pollution caused by state-owned enterprises and township and village enterprises, the Environmental Protection Law (tried in 1979 and implemented in 1989) and the Law on Prevention and Control of Water (enacted in 1984 and revised in 1996) were enacted. The Three-Simultaneous Systems and the Pollution-Discharge Fee System (PFS), enacted under the above two laws, characterized the PPP in Chinese style. The Three-Simultaneous System requires that the design, construction, and operation of pollution control equipment must be carried out simultaneously with the construction of the main body of a factory or other facility. In addition to total load control for key pollutants, the PFS allows provincial governments to set additional standards and to collect pollution fees from violator; however, in practice, the effect was limited due to poor implementation.

Next, regarding quantitative control, the cornerstone of water resources policy is the Water Law, which was enacted in 1988 and revised in 2002. The Water Law regulates the recharge, development, and use of water resources (basin planning, flood control), coordination of water rights among sectors (water withdrawal permits, paid transactions), and the establishment of water for ecological and environmental use. In the 1990s, frequent cutoffs in the Yellow River and floods in the Yangtze River created the need to integrate water use and conservation administration, which had previously been fragmented by province and by department. Basin committees were established for some major rivers, and basin-based water management began.

Under the amended Environmental Protection Law of 2002, MWR enacted the Water Function Zoning Management Measure in 2003, which zoned major watersheds by use. In response, SEPA has established the Water Environmental Function Zoning Plan from the perspective of preserving the ecosystem. It is expected that these two concepts will function like two wheels on a car in watershed management from the different perspectives of water resource utilization and environmental conservation (Kataoka, 2008).

Recent changes in Chinese water policy took place partly due to the influence of IWRM, which has been gaining recognition in the international community as a concept for equitable and sustainable development. IWRM is a concept that includes not only targeting the quantitative and qualitative control of water but also the integrated management of rivers, lakes, and groundwater bodies at the watershed level. Under the concept of IWRM, China's water resources management is also changing from a conventional, fragmented scheme to a more integrated one based on basin-based water use planning and zoning by use while taking environmental capacity into account.

Furthermore, under China's hierarchical political system, patron–client relationships between governments at each level through performance appraisals and personnel systems have a profound influence on environmental governance. To strengthen the enforcement capacity, the achievement of environmental targets was added to the key criteria for the promotion of local officials set by the central government (one-vote veto) in 2006. The policy enforcement, which has been the biggest difficulty, is expected to be strengthened by the revised Environmental Protection Law in 2015. The main revisions include strengthening the responsibility of local governments for environmental goals, increasing their authority to punish pollution-emitting enterprises, and establishing a system for the disclosure of environment-related data and reporting by residents (Kitagawa, 2018a, 2018b).[4] The "river chief system" was introduced in 2016, for which each level of officials is responsible for the conservation of whole watersheds of each level.

IWRM aims to shift from top-down management by governments and technocrats to decentralized watershed governance with broad stakeholder participation, including governments, businesses, local communities, media, and NGOs, viewing the entire watershed as a common. In recent years, although policy enforcement has been strengthened dramatically by making environmental policy goals directly linked to bureaucratic personnel evaluations and more rigorously at achieving them, public participation in environmental policy seems to be limited.

8.3 Case Study

8.3.1 *Qualitative Control*

The Polluter-Pays Principle (PPP) is a widely recognized economic principle for allocating the costs of pollution control adopted by OECD in 1972. Although PPP essentially means that those who produce pollution should bear all costs of damage to human health or the environment incurred, the interpretation of costs to be borne slightly varies from country to country. In the theory of environmental economics, when the costs incurred by environmental pollution are not imposed on polluters, their costs are externalized to society by so-called "market failure." Thus, such social costs, which otherwise would be borne by an economic agent other than the polluter, should be charged to the polluter to "internalize" the cost. According to the definition of OECD, the polluter should bear the expenses of pollution prevention and control measures decided by public authorities "to ensure that the environment is in an acceptable state." Initially, the PPP covered costs of pollution prevention and control, costs of monitoring, and other administrative measures, and later, costs of damage to pay compensation to victims were added through the expansion of the concept (OECD, 1992).

While the OECD conceived of the PPP as a market mechanism to resolve externalities caused by pollution, Japan created its own PPP philosophy to realize social justice and fairness through its experience with pollution problems. Japan's PPP was developed in the late 1960s, prior to OECD, covering a wider range of costs, including stock pollution costs or restoration costs for accumulated pollution in addition to the OECD definition. The Act on Entrepreneurs' Bearing of the Cost of

Public Pollution Control Works, enacted in 1970 under the Basic Act for Environmental Pollution Control (1967), stipulates that business operators bear all or part of the costs of pollution prevention and restoration of stock pollution to its original state. It was succeeded by a subsequent law, the Basic Environmental Law (1993). The payments for stock contamination were considered a unique system in Japan but were also referenced in the U.S. Superfund Law enacted in 1980 regarding cleanup costs for contaminated soil.[5] For compensation for victims, ACPHD was enacted in 1973.

Kin (2016) attempts to compare the Chinese PPP with those of OECD and Japan (Table 8.2). In China, the Three-Simultaneous Systems and PFS basically cover the costs for pollution prevention and control under the PPP, although there are difficulties related to enforcement. The cost for the restoration of stock pollution is partly covered by the Time-Limited Pollution Control Measures attempted by the Ministry of Environment in 2009, which enforced mandatory removal of contaminants, shutdowns, and plant closures of enterprises causing severe pollution within a specific time frame. At present, health damage compensation and other relief costs are not covered by the polluter in China.

China's PPP shares similarities with those of the OECD and Japan in that they require polluters to bear the costs; however, the difference between China and the others is that the biggest polluters during the period of environmental legislation were state-owned enterprises. Therefore, in effect, the state finances bore the cost of environmental measures, and the administration cost was financed by incorporating environmental measures into the business plans of state-owned enterprises (Kin, 2016, 68), which is totally different from the PPP in other countries that aim to increase the incentives of private enterprises or individuals for environmental protection and to promote technological innovation in the market economy.

8.3.2 Quantitative Control

8.3.2.1 Water Right Transfer Among Sectors

In Japan and China, both of which have a long history of agricultural irrigation, the pre-modern water use order was primarily shaped by the agricultural sector. As economic development and urbanization led to a rapid increase in water demand in the non-agricultural sector, it became necessary to save less productive agricultural water and to redistribute the

Table 8.2 Comparison of PPP cost coverage in Japan, OECD, and China

Type of cost	*Pollution prevention and control*	*Compensation for pollution victims*	*Restoration of stock pollution*
Japan	The Basic Act for Environmental Pollution Control (1967), the Basic Environmental Law (1993)	The Act on Compensation for Pollution-Related Health Damage (1973)	The Act on Entrepreneurs' Bearing of the Cost of Public Pollution Control Works (1970)
OECD	Yes	Partly	U.S. Superfund Law (1980)
China	The Three-Simultaneous Systems, the Pollution-discharge Fee System under the Environmental Protection Law (1989), and the Law on Prevention and Control of Water (1984, revised in 1996)	None	Partly covered by Time-limited Pollution Control Measures (2009)

Source Prepared by the author with reference to Kin (2016, 67)

surplus to more economically valuable sectors. This section first discusses water rights transactions among industries at a river basin level (Yamada, 2005).[6]

The past Japanese policy presumably referred to in China is the Agricultural Water Rationalization Project (AWRP), for which water use was diverted from agricultural water to urban water in the suburbs of metropolitan Tokyo and other large cities after the 1970s. The aim of the project was to divert a portion of agricultural water use rights to urban use by rehabilitating irrigation facilities that have become difficult to operate and maintain due to the decline in the rural population. In exchange for bearing a portion of the renovation costs, the urban side received a reallocation of water rights.

The reasons that this project was implemented in the 1970s, when the high economic growth period had already passed, are as follows. In Japan, the demand for urban and industrial water, which increased significantly during the 1950s and the 1960s, was procured not by redistribution of existing water rights but mainly by the development of new water resources, such as dam construction. The demand for water began to decline after the recession following the first oil shock in 1973, but conversely, the demand for domestic water increased in the suburban areas that developed as bedroom towns in the Tokyo metropolitan area. At this time, opposition from residents and rising costs made it difficult to construct new dams, so the diversion of water from agricultural use became a policy issue (Moritaki, 2003, pp. 273–281).

The following are two Chinese cases similar to Japan's AWRP (Kataoka, 2008, pp. 52–55). The first water rights transaction in China took place in Zhejiang Province in 2000, where Yiwu county bought permanent water use rights of a 50 million m^3 dam reservoir from Dongyang county. The agreement was made subject to a one-time payment of 200 million Chinese yuan (RMB) and an administrative fee of 0.2 RMB per cubic meter of water supply. Yiwu, famous for its huge wholesale market of general merchandise, was facing a shortage of water for domestic use due to rapid urbanization. This transaction was beneficial to both parties. Yiwu was able to procure water at a lower cost compared to developing a new water source, while Dongyang was able to finance another water development project with the profits from this deal. Overall, the diversion of water from agricultural use to urban use has improved water productivity; however, the deal later led to government mediation due to inadequate compensation for farmers in Dongyang, who lost part of their water rights, and another city downstream was disadvantaged by Dongyang's new water development.

Another example is the water transfer case from agriculture to industry in Inner Mongolia and Ningxia Autonomous Region in the Yellow River basin, which occurred in 2000. More than 90% of the water used in both autonomous regions was for agricultural use at that time, but the efficiency was quite low due to large losses in water delivery. Therefore, power generation and industrial companies paid for water-saving projects, such as concreting irrigation facilities in irrigation districts, and acquired water rights for the surplus water generated. Unlike the first case in Zhejiang Province, in this case, the Yellow River Water Committee and the local provincial government's water department worked together and communicated with other provincial governments involved in Yellow River water utilization. In addition, representatives of the Water User's Association (WUA), a farmers' organization involved in water saving, are providing information, which is discussed in more detail in the next section. This case involved a paid transfer of water resources between stakeholders under government supervision. Remaining issues include determining how to compensate for future shortages of water for agricultural use during droughts and how to consider the environmental impact of the change of use.

8.3.2.2 Participatory Irrigation Management (PIM)

After WW II, many large water facilities were built by international aid agencies, such as the World Bank and governments in developing countries, but by the 1970s and 1980s, operation and maintenance (O&M) began to face difficulties. Therefore, a method called PIM attracted attention as a means of the proper O&M of water facilities and collecting fees from beneficiaries. The World Bank defines PIM as "the involvement of irrigation users in all aspects of irrigation management, and at all levels" (World Bank, 1996).[7] Some PIMs are based on existing traditional water users' organizations, as in Japan, while others are newly created artificially as a counterpart organization of the project. Increasing the efficiency of agricultural water use, which is the largest water-using sector and is located upstream in the watershed in many countries, has two important implications: proper resource allocation among sectors and a stable food supply.

In China, agricultural water utilization facilities were constructed rapidly during the era of the planned economy, but after the collapse of the People's Commune System, the facilities were neglected, and in many areas, water loss occurred due to aging facilities and poor management. The first PIM in China began in the early 1990s, when the World Bank was required to introduce PIM models as a condition for loans for the construction of water conservancy facilities in Hunan and Hubei provinces (Yamada, 2015).

The international aid organizations, based on the arguments of Ostrom (1992), insisted that the PIM in China should be run autonomously and democratically by the beneficiaries in each basin and that beneficiaries' participation in the decision making and transparency of the organizations should be strengthened (Xie et al., 2009); however, the low cost-bearing capacity of farmers and the political system in China made it difficult to create this autonomous system of governance.

China has been promoting the slogan of "Building a Water-Saving Society" since 2000, and the central government's emphasis on water conservancy, as evidenced by the 2011 Central Number One Document on "Accelerating Water Conservancy Reform and Development," led to a significant increase in investment in irrigation, from 33.4 billion RMB in 2010 to 139.2 billion RMB in 2015. The WUAs were established mainly in the government's model irrigation districts to raise farmers' awareness of water conservation through appropriate water fee collection and to ensure the proper management of facilities at the village level. Most of China's WUAs are not voluntary organizations by farmers but rather top-down organizations. Their performance is often harshly evaluated, and not much information on them has been available since the 2010s. Li (2009), for example, states that two-thirds of WUAs need improvement or are poor. According to Kikuchi (2018), while investments in water facilities and water-saving technologies have made remarkable progress in recent years, the management system has not always been well-organized, and Chen Lei, the head of the MWR, said at a conference in 2012 that water loss in "the last one kilometer" is significant due to the insufficient maintenance of the terminal canals.

Internationally, Japanese water users' associations called Land Improvement Districts (LIDs) are regarded as a good example of PIM and were said to be introduced to China through ODA. Japanese LID is organized by the beneficiaries of governmental Improvement Projects under the Land Improvement Law and responsibly manages irrigation water.[8] LIDs are autonomous, participatory organizations of farmers that distribute water, operate and maintain water facilities, collect water fees, arbitrate disputes, and respond to emergencies, such as droughts. They have a democratic decision-making mechanism and serve as recipients of government water projects.

Figure 8.4 presents the number of LIDs, the number of association members, and the area under management during 1955 and 2020. The number of LID organizations peaked in 1961 with 13.16 thousand organizations and has since been merged due to depopulation, decreasing to 4.32 thousand in 2020. Similarly, the number of members fell dramatically from 5 million to 3.46 million. The area under management only slightly decreased, and the area per LID more than doubled from 270 to 574 hectares. Currently, 73% of the LIDs mainly engage in the O&M of facilities, and they manage 60% of the key irrigation facilities in Japan. The national and local governments are bearing some of the costs, such as dispatching technical staff, as LID's cost-bearing capacity has declined due to labor shortages and an aging workforce.

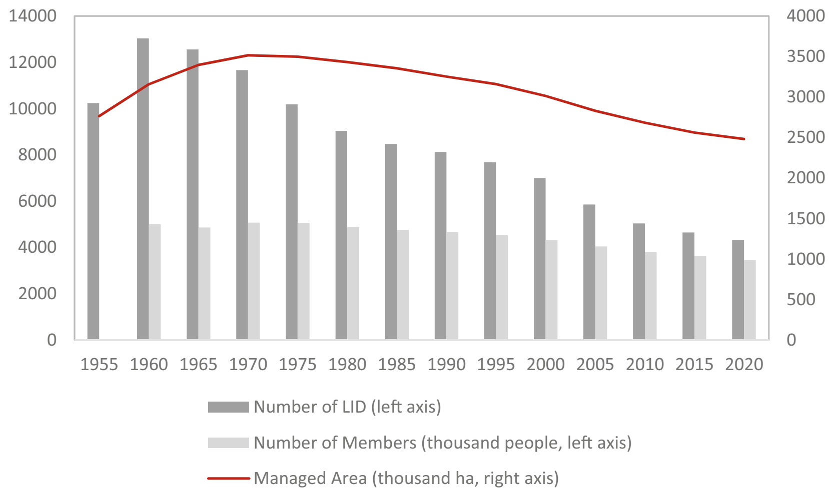

Fig. 8.4 Development of LID in Japan (1955–2020) (*Source* Ministry of Agriculture, Forestry, and Fishery (MAFF), Japan: https://www.maff.go.jp/j/nousin/kikaku/dantaisidou_riyouchousei.html)

8.3.3 Conclusions: Policy Implication

As discussed, environmental policy in China and Japan has shifted from symptomatic regulations and technical responses to more comprehensive watershed management. In China, the management of water quantity in China has been greatly improved through the collaboration between the MRW and the MEE and the establishment of the Watershed Committee. Water Function Zoning Management Measure under the amended Water Law in 2002, combined with the Water Environmental Function Zoning Plan by MEE, is expected to enable further balanced basin management. To improve water productivity, which is still considerably lower than in developed countries, the recycling rate for industrial and urban water needs to be increased. The low water use efficiency in rural areas, where water loss is significant, should be increased by an appropriate level of public investment in water use facilities and support for O&M systems. Although water quality has also improved considerably in comparison to previous years, China still has fairly serious water pollution problems.

The Japanese experience that was referred to by China was primarily a policy response to pollution control during a period of rapid economic growth. Japan has already entered a period of post-high economic growth and an aging society with a declining birthrate. China also has entered a post-growth era called "the New Normal" since the 2010s during the President Xi administration. Japan is anticipating the challenges that China will face in the future. For example, there is the problem of aging water utilization facilities in rural areas and in determining how the cost of facility renewal should be borne as well as who should take over for the O&M activities that have been undertaken by local communities in the period of depopulation and aging.

As Kitagawa (2018a, 2018b) pointed out, the revised Environmental Protection Law of China, which came into force in 2015, put great emphasis on the enhancement of the disclosure of information by the government and enterprises, public participation, implementation of environmental impact assessment, and strengthening the responsibility of leaders for the environment conservation through political schemes, including the retrospective pursuit of liability. Reflecting on the Japanese experience, in addition to environmental policy and policy implementation by the public administration, the role of residents' movements, mass media, local government initiatives, and pollution trials, although they later regressed, was significant in the process of forming proper environmental policy. China's environmental administration has been basically government-led, but it is expected that the issues, such as information disclosure, the reform of the judicial system, and the steady implementation of policies, will be improved in the future to build a sustainable water environment policy.

Notes

1. There are some articles on Japanese environmental policy written in English to share its experience with developing countries, such as Kojima et al. eds. (1995), OECD (1977; various years), and JIID (2003). The following are some examples of studies on China's water environment problems from the perspective of international comparisons with Japan: Turner and Otsuka eds. (2005), OECD (2006), Otsuka eds. (2008; 2010; 2012), Mori et al. eds. (2008), Bi et al. eds. (2011), Imura (2013), Kitagawa and Kubota eds. (2015), Kitagawa eds. (2018), Otsuka (2019), etc.
2. According to the definition in Report on the State of the Ecology and Environment in China 2019, "Grade I or II standard of water refers to the water in Class I protected areas of drinking water sources, habitats of rare aquatic species, fish and shrimp spawning grounds, and feeding grounds of

fry and young fish. Grade III standard of water could be used for Class II drinking water source protected areas, fish and shrimp wintering grounds, migration channels, aquaculture areas, and swimming sites. Grade IV standard of water could be used for general industrial water use and recreation without any direct contact with the human body. Grade V standard of water could be used for agriculture and landscape related irrigation, and waters failing to meet Grade V standard hardly have any function except adjustment of local climate."

3. China has learned about economic instruments in the environmental sector mainly from the experiences of Western countries (see OECD, 1997).
4. Revised law contains advanced features, such as a daily penalty system, which imposes a daily fine for illegal emissions until improvements are made, and the introduction of Environmental Public Interest Litigation, which does not exist in Japan (Kitagawa, 2018a, 2018b).
5. The Superfund Law, one of the U.S. environmental protection laws, was enacted in response to the problem of contaminated soil cleanup caused by the Love Canal incident. The law establishes a trust fund (Superfund) for contaminated soil cleanup costs, clarifies liability for compensation for contamination, and provides for prior investigation regarding the presence of contamination.
6. Water rights in Japan consist of two types of water rights: Customary Water Right and Approved Water Right. The former harkens back to the seventeenth century and is a historically created water right, primarily for agricultural use. The latter is a water right granted to water users by river administrators under the River Law enacted in 1964 (Kataoka, 2005).
7. All aspects include planning, design, construction, operation and maintenance, financing, decision rules, and the monitoring and evaluation of the irrigation system. All levels include the primary, secondary, and tertiary levels (World Bank, 1996).
8. For the historical change of LID and irrigation management in more detail, see Yamada (2005) and Takeda (2021).

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CHAPTER 9

Dual Economic Structure, Surplus Labour and Rural-Urban Migration

Xinxin Ma and Ryoshin Minami

9.1 Introduction

Regarding economic development and the change in the structure of the economy of a country, the Lewisian dual economy model assumes a coexistence of the "capitalist sector" and "subsistence sector" (Lewis, 1954) in development economics. The former is characterized by the

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A part of this chapter is a revised version of: Minami, R., & Ma, X. (2010). The Lewisian turning point of Chinese economy: Comparison with Japanese experience. *China Economic Journal*, 3(2), 165–181. Copyright © reused by permission of Taylor & Francis Ltd.

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_9

profit-maximizing behavior of capitalists, while in the latter, the marginal productivity of labor (MPL) is smaller than wages, which are determined by the subsistence level (SL) dominant in society. The subsistence sector entails a lot of surplus labor.[1] The labor force of the subsistence sector is supplied to the capitalist sector at constant SL (unlimited supplies of labor), which results in a large number of rural-urban migrants with low and almost constant wage levels. An increase in MPL that ultimately reaches SL drives profit-maximization. Moreover, the labor force of the subsistence sector is now available only with increasing wages. This point in time is the "turning point" (TP). Therefore, when an economy passes the Lewisian TP, the wage of low-skilled workers (who provided surplus labor in the past) increases. However, this may reduce the wage differentials between unskilled and skilled workers (Minami, 1968, 1973), which contributes to reducing income inequality (Minami, 1998, 2008). In addition, in the post-Lewisian TP period, the government may establish social security systems (e.g., public pension, medical insurance, minimum wage, basic living protection) to support the poor individuals (Minami, 1998, 2008). These measures may reduce the income inequality, which Kuznets refers to as the "Kuznets turning point" (Kuznets, 1955). Therefore, empirical studies on surplus labor, rural-urban migration, and income inequality are heated topics in development and labor economics.

This study further attempts to investigate how surplus labor changes with economic growth in China and Japan, and how the wage differentials between migrant and local urban workers change with the decrease in surplus labor in China, using official government data and survey data.

This chapter is structured as follows: Sect. 9.2 discusses the Lewisian TP and evaluates the changes in surplus labor and wage differentials between unskilled and skilled workers in China and Japan. Section 9.3 investigates the determinants of wage differentials between migrant and local urban workers in China. Section 9.4 summarizes the conclusions.

9.2 Surplus Labor and the Lewisian Turning Point in China and Japan

9.2.1 Agricultural Surplus Labor in China and Japan

According to the methods advocated in Minami (1968, 1973), based on the agriculture production function,[2] we evaluated the MPL, which is obtained as a product of the coefficient of labor (α) in the agriculture production function with average labor productivity (APL), and compared them with the two indices for the SL of agricultural population. These are per capita net incomes of rural households and per capita consumption expenditure of rural households in Estimation (1) and (2), respectively. Table 9.1 shows the results. The MPL/SL ratio demonstrates an increasing trend in all the estimations, which shows a change in the agricultural labor market. For instance, in Estimation (1), the ratio increased among the three sub-periods as follows: 35.6% (1990–1995), 39.1% (1996–2000), and 56.6% (2001–2005); in Estimation (2), they are 42.2%, 51.6%, and 75.5%, respectively, in the same three sub-periods. This indicates the existence of a significant amount of surplus labor in China during the period from 1990 to 2005. The estimates for Japan are 32.4% during 1920–1937, which indicates that there existed a large amount of surplus labor in Japan during the relevant period. In contrast, the estimates for Japan during the period from 1955–1968 were 104.9%, which suggests that the surplus labor disappeared in the 1960s.

In Table 9.2, surplus labor is estimated as the difference between the total labor force and "equilibrium labor" which makes MPL = SL. In Estimation (1), these account for 75.5% (1990–1995), 71.5% (1996–2000), and 64.8% (2001–2005); in Estimation (2), these account for 57.9, 56.4, and 34.6%, respectively, in the three sub-periods. This confirms the existence of a large number of surplus laborers in China and a decreasing trend of surplus labor, which signifies that the Chinese economy is approaching the TP. The estimates for Japan are 57.2% during 1906–1940, which indicates that there existed a large number of surplus laborers in Japan during this period.

Table 9.2 also displays the rate of surplus labor based on three districts in China from 2001–2005. These are the smallest in the Eastern districts and largest in the Central districts. This result shows that the rate of surplus labor tends to be larger in less-developed areas.

These results further suggest that the Japanese economy passed the TP around 1960; the Chinese economy is approaching the TP, particularly for well-developed districts (eastern districts). Nonetheless, there was surplus labor in China, and in less-developed countries in 2005.[3] It is safe to say that currently, surplus labor has decreased significantly. It is still unclear whether the Chinese economy has passed the Lewisian TP because the regional disparity is large and the urbanization is incomplete due to the household registration (*hukou*) system. Further, the

Table 9.1 Comparison of marginal productivity of labor and wages in agriculture: Japan and China

	Average Productivity of Labor APL	*Production elasticity of labor α*	*Marginal Productivity of Labor MPL = αAPL*	*Estimation (1)*		*Estimation (2)*	
				Subsistence Level SL	*MPL/SL (%)*	*Subsistence Level SL*	*MPL/SL (%)*
Japan							
1920–1937	184	0.245	45	139	32.4		
1955–1968	342	0.562	192	183	104.9		
China							
1990–1995	2,380	0.215	512	1,438	35.6	1,213	42.2
1996–2000	2,979	0.259	772	1,974	39.1	1,497	51.6
2001–2005	3,486	0.379	1,321	2,333	56.6	1,749	75.5
East	4,596	0.259	1,190	4,114	28.9	2,390	49.8
Central	3,225	0.097	313	2,519	12.4	1,849	16.9
West	2,399	0.328	974	1,920	50.7	1,534	63.5

Note
1. Japan: 1934–1936 prices. China: 1995 prices
2. Japan: Minami (1973). α is the coefficient of labor in the agriculture production function. SL is wages for annual contract agricultural workers
3. China: APL is calculated as a ratio of GDP to employment of primary industry. GDP is from the Tables 2–1 and 2–5 in *China Statistical Yearbook 2008*
Employment is our estimates based on Chinese population census.α is the coefficient of labor in agriculture production function. SL (Estimation 1: per capita net income of rural households, Estimation 2: per capita consumption expenditure of rural households). Deflator is obtained as a ratio of nominal GDP to real GDP of primary industry. GDP is from the Tables 2–1 and 2–5 in *China Statistical Yearbook 2008*
Source Authors' creation based on Minami and Ma (2010).

income inequality between rural and urban areas, and the wage differentials between migrant workers and urban local workers still exist in China.

Table 9.2 Estimation of surplus labor in agriculture: Japan and China (Unit: 10 thousands)

	Total labor force	*Estimation (1)*			*Estimation (2)*		
		Equilibrium labor force	*Surplus labor*	*Ratio of surplus labor (%)*	*Equilibrium labor force*	*Surplus labor*	*Ratio of surplus labor (%)*
Japan							
1906–1940	2,133	917	1,216	57.2			
China							
1990–1995	45,907	11,129	34,778	75.7	19,316	26,591	57.9
1996–2000	45,671	13,077	32,761	71.5	24,585	21,253	46.4
2001–2005	45,803	16,112	29,691	64.8	29,913	15,890	34.6
East	15,925	6,960	8,965	56.3	13,829	2,096	13.2
Central	17,154	2,733	14,421	84.1	5,120	12,034	70.2
West	12,724	6,419	6,305	49.6	10,964	1,760	13.8

Note
1. Equilibrium labor force is the size of employment with MPL=SL. Surplus labor is a difference between total labor force and equilibrium labor force
2. Estimation 1: per capita net income of rural households, Estimation 2: per capita consumption expenditure of rural households
Source Authors' creation based on Minami and Ma (2010). Japan: Minami and Ono (1977). China: Calculated by authors based on agriculture production function.

9.2.2 Change in Wage Differentials in China and Japan

According to the Lewis theory, agricultural wages are determined by the SL before the TP, and the MPL after the TP. When an economy passes the TP, the wage levels of unskilled workers may increase owing to their MPL; therefore, the wage differentials between unskilled and skilled workers might be reduced.

The change in the real wages of Japanese agricultural laborers (annual contract workers) shows a relatively different pattern compared to China. They did not show a significant increasing trend during the prewar period. The growth rate was only 1.2% between 1898 and 1938. In the postwar period, the growth rate was 4.4% before the TP (1954–1961) and 7.1% after the TP (1961–1969) (Minami, 1973). As shown in Fig. 9.1A, the ratio of agricultural wages to machinery industry (male laborers only), which is an index for wage differentials between unskilled and skilled workers, was almost constant in the 1950s, but decreased considerably in the 1960s.[4] This indicates that the unskilled workers that were supplied mainly from agriculture became too scarce to significantly increase their wages. This provides evidence for demarcating the TP around 1960.[5]

However, such changes in the labor market are not observed in China. Figure 9.1B depicts the ratios of SL (here, per capita net income of rural households) to the three groups of urban industries–manufacturing, financial, and infrastructure industries (electric, gas, and water supply)—in China. Manufacturing is the most typical urban industry, which employs a large number of migrant workers, while the other two industries[6] employ white collar and skilled workers with high wages, and only a few migrant workers. Such differences among these industry groups in employing migrant workers cause a difference in the pattern of change in wage differentials; the ratio to manufacturing decreased slowly, while the ratios to the other industries indicated a rapid decrease since the 1990s as well as after 2004. They show that the wage differentials between skilled and unskilled workers did not decrease.

Figure 9.2 shows the trend of average annual disposable income per capita of rural and urban residents during the period from 1979 to 2019. The average annual disposable income per capita increased during the economic transition period. However, the range of income rise is higher for urban residents than for rural residents; therefore, the income inequality between rural and urban residents still existed and even widened during the period. We calculated the ratio of urban resident income to rural resident income as the indicator of income inequality between these two groups, and found that the income inequality ranges from 1.82 to 3.33 times. Even in the recent year (2019), the income inequality between the urban and rural resident is 2.63 times, which is higher than that in 1979 (2.56 times).

Figure 9.3 displays the change in the Gini coefficients during the period from 2003 to 2019 in China, during which period the coefficient remained high, ranging from 0.46 to 0.49. The Gini coefficient increased from 0.479 in 2003 to 0.491 in 2008, then decreased to 0.462 in 2015. However, since 2015, the Gini coefficient has increased, reaching 0.469 in 2019.

Contrary to the Japanese experience, in China, the wage differentials between unskilled and skilled workers increased. Further, the income inequality between rural and urban residents increased, despite the amount of surplus labor decreasing during the 2000s.

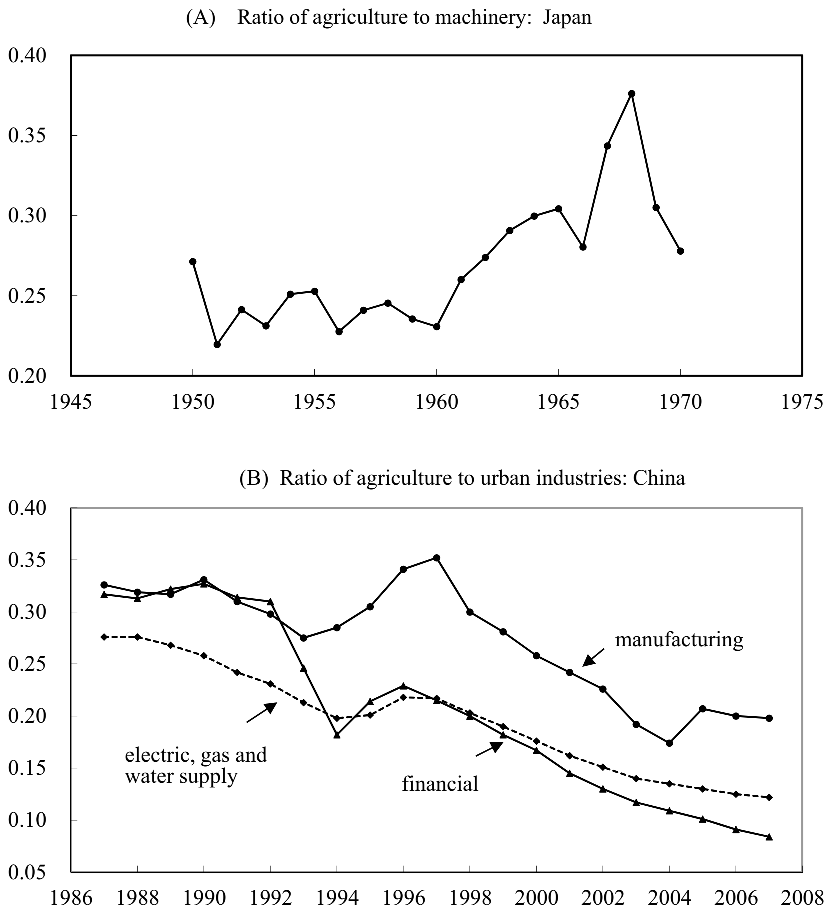

Fig. 9.1 Wage gaps of agriculture to other industries: Japan and China (*Note* Japan: Ratio of wages of annual contract agricultural workers [male only] to other industries; China: Ratio of per capita net income of rural households to other industries. *Source* Authors' creation based on Minami and Ma [2010]. Japan: Minami [1973]. China: *China Statistical Yearbook 2008*, Table 4–27)

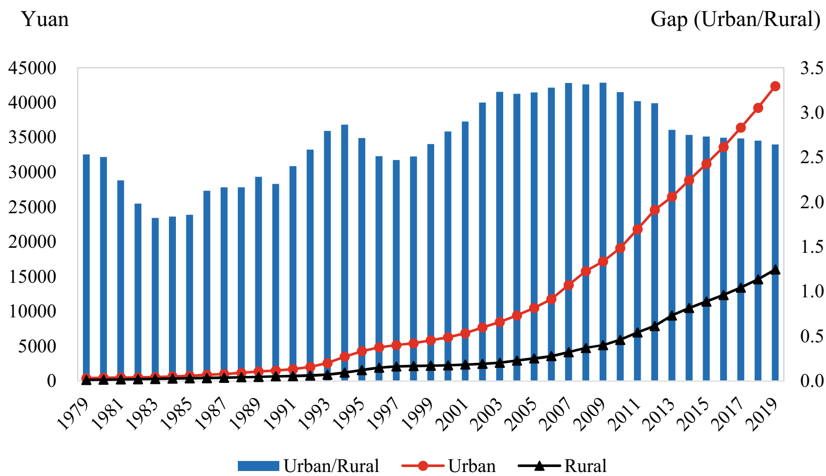

Fig 9.2 Income inequality between rural and urban residents in China (1979–2019) (*Note* The vertical axis shows the average annual disposable income per capita and the gap (urban/rural) between the urban and rural residents. *Source* Authors' creation based on the data from *China Statistical Yearbook 2020*)

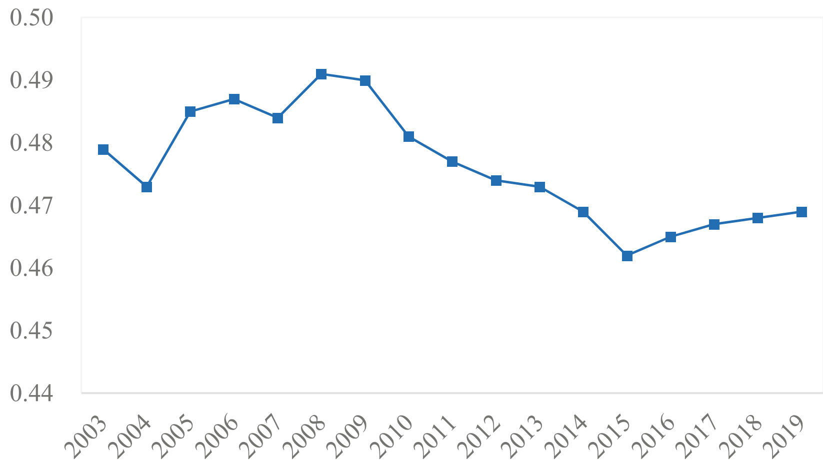

Fig. 9.3 Change of Gini coefficients in China (2003–2019) (*Source* Authors' creation based on the data published by National Bureau of Statistics of China)

It is worth noting that the assumption of a change in wage differentials and income inequality around the Lewisian TP is based on a perfectly competitive labor market. However, the Chinese labor market is segmented by institutional factors such as the *hukou* system, which led to the discrimination against rural-urban migrant workers in China (Ma, 2018a, 2018b). The situations of the labor market and policies/systems differ between China and Japan, in the period during which surplus labor decreased. Therefore, in China, although the surplus labor has decreased significantly, it is still unclear whether China has passed the Lewisian TP even in the current period as urbanization is not complete (most rural-urban migrants cannot obtain the urban *hukou*). The following section examines how discrimination against migrants influences wage differentials between migrants and local urban workers in China.

9.3 Wage Differentials Between Migrant and Local Urban Workers in China

9.3.1 Background

In China, during the planned economy period (1949–1977), the government referred to the model of the former Soviet Union to implement the heavy industry development priority policy, to further respond to the political cold war between the East and West, and to catch up the economic level of developed countries. To obtain agricultural production and concentrate national funds on industrial production in urban areas, it was necessary to prohibit the rural-urban labor migration. Therefore, in 1958, the Chinese government implemented a *hukou* system that distinguishes urban and rural residents.[7] Labor mobility from rural to urban areas was banned unless the government procured a labor force.

During the market-oriented reform period (after 1978), the number of migrant workers[8] increased owing to the deregulation of the *hukou* system. According to the *Floating Population Development Report 2018* published by the National Health Commission of China on December 22, 2018, the number of floating population, including migrant workers, was 241.5 million.[9]

According to the Lewis dual economy structure model (Lewis, 1954), the migration from rural agriculture sector to the manufacturing or service industrial sector in urban areas may reduce surplus labor in rural areas and improve the efficiency of economic resources allocation. Expectedly, moving from a low-wage sector to a high-wage sector can increase marginal labor productivity to promote economic growth. Additionally, according to the theory of comparative advantage in international trade, the employment of low-wage migrant workers in urban areas may contribute to reduce the labor costs in the manufacturing industrial sectors. The Chinese economy has become part of the global value chain worldwide. Which is referred to as the "factory of the world". It was pointed out that the urban migration contributed to the Chinese economic growth (Cai & Wang, 1999; Lees, 1997; World Bank, 1996). However, the problem of discrimination against migrant workers in terms of wages, employment, and social security is becoming serious as the number of migrant workers increases (Cai, 2016; Knight et al., 1999; Ma, 2018a, 2018b).

Regarding wage differentials between migrant and local urban workers, from an economic perspective, we can consider two kinds of components. The first one is the discrimination against migrant workers. As mentioned above, since the 1990s, economic reforms have been promoted. Furthermore, the *hukou* system has been deregulated, but is still maintained. This separates workers into two groups: (i) workers with rural *hukou* (migrant workers) and (ii) workers with urban *hukou* (local urban workers). Notably, the wage levels of rural migrant workers will be set lower than that for local urban workers despite their labor productivity (i.e., education) being similar in the same firm; therefore, there may be wage differentials between these two groups. The second one is the differences in endowment (i.e., education). There are differences in public education systems between urban and rural areas (Wang, 2012; Wen, 2017). The majority of the government's public education investment focuses on urban areas. By 1990, compulsory education up to junior high school was implemented, but only in urban areas. Accordingly, there are still significant disparities between rural and urban areas in terms of school facilities, and the number and quality of teachers. In addition, regarding private education investment, the annual per capita household income of urban areas in 2018 was about three times that of rural areas during the period from 1979 to 2019 (see Fig. 9.2). Therefore, it is safe to say that there is a difference between urban and rural areas regarding private education investment, owing to household income inequality between the two areas. This creates a difference in human capital (especially years of schooling) between rural and urban areas, which also contributes to the wage differentials between migrants and local urban workers. Therefore, when considering wage gap, it is necessary to investigate the following two components: (i) discrimination against migrant workers, and (ii) differences in human capital between migrant and local urban workers.

9.3.2 Literature Review on Wage Differentials Between Migrant and Local Urban Workers

Regarding the empirical study on wage differentials between migrant and local urban workers, we summarize the main results using the decomposition method as follows.

Most previous studies employed the decomposition analysis based on the Blinder and Oaxaca model (Blinder, 1973; Oaxaca, 1973). Although previous studies indicate that the explained component, including differences in human capital and unexplained components, including discrimination against migrants, affect wage differentials, the estimated values of the unexplained components are inconsistent in these studies. For example, some studies indicate that the unexplained components (the indicator of discrimination against migrant workers) are more significant than the explained components (the indicator of differences in human capital between two groups); thus, discrimination is the main causal factor of wage differentials. Specifically, the estimated values of the unexplained components were 24.88–94.11% during 1999–2000 (Maurer-Fazio & Dinh, 2004), 60% in 2002 (Deng, 2007), 55.2% during 2003–2004 (Xie & Yao, 2006), and 54.25% during 2004–2011 (Chang & Zhao, 2016). Some studies show that the estimated values of the unexplained components were 38.10% during 1993–2000 (Chang & Zhao, 2016), 27% in 2002 (Guo & Zhang, 2011), 26.3% in 2002, 42.3% in 2007 (Zhu, 2016), 4% in 2005 (Xing & Luo, 2009), 10% in 2005 (Lee, 2012; Xing, 2008), 27.11% in 2006 (Meng & Wu, 2014), and 36% in 2007 (Zhang et al., 2014). Messinis (2013) pointed out that the explained components, especially the difference in educational qualifications between migrant and local urban workers, are the main causal factors of the wage gap, and that the wage differentials completely disappear when the endogeneity problem of education is addressed. Moreover, their influence increases during the market-oriented reform period.

Based on the wage distribution decomposition method, Deng (2007), Xing and Luo (2009), Yu and Chen (2012), and Zhu (2016) analyzed wage differentials by wage percentiles. Deng (2007) showed that the influence of the unexplained components in 2002 was greater for the low- and middle-wage groups, and smaller for high-wage groups. Xing and Luo (2009) pointed out that the explained components are greater (94%) than the unexplained components, and that the unexplained components are higher for the low-wage group than for the high- and middle-wage groups. Yu and Chen (2012) showed that the influence of the unexplained components is greater for middle-wage groups than for low-and high-wage groups in 1997, 2004, and 2009, but greater for the low-wage group than for the middle-and high-wage groups in 1994; the effect is mostly similar between the low-, middle-, and high-wage groups in 2000. Zhu (2016) showed that the unexplained components are higher for the high-wage groups than for the low-and middle-wage groups in 2002 and 2007. These estimated results are inconsistent, following the difference in the analyzed period, survey data, and variables used in the models.

Further, some studies investigate labor market segmentation on wage differentials. For example, using the Chinese Household Income Project Survey (CHIPs 2002, CHIPs 2013) and the Blown model, Ma (2018a), it was found that the difference in human capital between migrant and urban workers and the discrimination against migrant workers in the same industry sector are the main causes of wage differentials.

However, there are still issues that need to be discussed further. First, the government implemented various policies to improve employment equality between migrant and local urban workers as the economy system transforms. Therefore, the determinants of wage differentials may change over the years. However, in previous studies, few studies comparing changes at two time points have been conducted, except for Ma (2018a). Second, unlike capitalist countries such as Japan, the Chinese labor market during the market-oriented reform period is influenced by the systems implemented in the planned economy period. Further, the political system (e.g., the Communist Party of China) significantly influences the wage or employment of workers (Ma, 2019; Ma & Iwasaki, 2021). However, previous studies do not examine the influence of the political system on wage differentials. This study fills the gaps and provides new evidence on this issue.

9.3.3 Methodology

9.3.3.1 Model

The wage functions of migrant workers and local urban workers are expressed by Eqs. (9.1) and (9.2).[10]

$$\ln W_{ui} = \beta_u X_{ui} + \varepsilon_{ui} \tag{9.1}$$

$$\ln W_{mi} = \beta_m X_{mi} + \varepsilon_{mi} \tag{9.2}$$

The subscripts i indicates individual, u and m indicate local urban workers and migrant workers, respectively. $\ln W_{ui}$ and $\ln W_{mi}$ denote the logarithmic hourly wage, X_u and X_m are factors that affect wages, and β_u and β_m are coefficients calculated using the wage function. ε_u and ε_m are the error terms.

Blinder (1973) and Oaxaca (1973) decomposed the determinants of wage differentials into two: (i) differences in endowment and (ii) discrimination despite similar endowment. The former is defined as the explained components (differences in the mean values of factors), and the latter is defined as the unexplained components (the differences in coefficients of factors). The contributions of these two components to wage differentials can be evaluated using Eqs. (9.3) and (9.4).

$$\overline{\ln W_u} - \overline{\ln W_r} = (\overline{X}_u - \overline{X}_m)\beta_u + \overline{X}_m(\beta_u - \beta_m) \tag{9.3}$$

$$\overline{\ln W_u} - \overline{\ln W_r} = (\overline{X}_m - \overline{X}_u)\beta_m + \overline{X}_u(\beta_m - \beta_u) \tag{9.4}$$

where $\overline{\ln W_u} - \overline{\ln W_r}$ is the average wage gap between local urban and migrant workers, X_u and X_m are the average values of each factor, and β_u and β_m are the coefficients of the wage function. $(\overline{X}_u - \overline{X}_m)\beta_u$ or $(\overline{X}_m - \overline{X}_u)\beta_m$ is the explained component, including differences in human capital, and $\overline{X}_m(\beta_u - \beta_m)$ or $\overline{X}_u(\beta_m - \beta_u)$ are unexplained components, including discrimination.

9.3.3.2 Data

This empirical study uses data from the 2002 and 2013 Chinese Household Income Project Surveys (CHIPs 2002, CHIPs 2013) conducted in 2003 and 2014, by the Institute of Economic Research of the Chinese Academy of Social Sciences, Beijing Normal University, and the

National Bureau of Statistics of China, which covered individuals and households in representative regions in China. These surveys covered rural migrant workers and local urban workers. Furthermore, we can obtain comprehensive information on wage, demographic, and workplace factors. Therefore, CHIPs 2002 and CHIPs 2013 were the appropriate data for this study.

Regarding the dependent variables, the logarithm of hourly wages is used in the wage function. The hourly wage is the monthly earnings divided by the corresponding monthly working hours.

Following previous studies, we constructed three kinds of independent variables: (i) human capital, (ii) political status, and (iii) other factors as follows.

First, according to the theory of human capital advocated by Becker (1964) and Mincer (1974), human capital factors affect wages. The years of schooling, years of experience, and its squared term, which were used in previous studies, are constructed as human capital indicators.

Second, the main feature of the political system in China is the existence of a political organization, the Communist Party of China (CPC), which has influenced all aspects of society significantly. Yan (2019), Ma (2019), and Ma and Iwasaki (2021) revealed that there is a party membership wage premium in China. The party member dummy (CPC member = 1, non-member = 0) is constructed as an indicator of political status.

Third, for other factors, sex (male = 1, female = 0), Han ethnicity (Han = 1, minority = 0), health (healthy = 1, otherwise = 0), marital status (married = 1, otherwise = 0), industrial sector, corporate ownership, and regional dummy variables were also used as control variables.

Samples of migrant workers and local urban workers in the CHIPs were used. Regarding the impact of the mandatory retirement system in the public sector, the age of samples was limited to 16–59 years. Further, samples with missing variables were excluded. The number of samples used in the analysis was 9,577 for local urban workers and 3,289 for migrant workers in 2002, and 9,620 for local urban workers, and 1,228 for migrant workers in 2018.

9.3.4 Results

9.3.4.1 Results Based on Descriptive Statistics

Table 9.3 summarizes the wage differentials between migrant and local urban workers by the group in 2002 and 2013. The ratio of the wages of

Table 9.3 Wage differentials between migrant workers and local urban workers by group

	2002			*2013*		
	Urban (U)	*Migrant(M)*	*Gap (M/U) (%)*	*Urban (U)*	*Migrant (M)*	*Gap (M/U) (%)*
Education						
Primary	5.796	2.324	40.1	8.946	9.205	102.9
Junior high	5.419	3.099	57.2	10.230	10.104	98.8
Senior high	6.289	3.908	62.1	12.132	12.110	99.8
College and above	8.397	4.942	58.9	17.372	13.551	78.0
Party						
CPC member	7.305	4.239	58.0	16.887	14.962	88.6
Non-member	5.284	3.048	57.7	12.648	10.634	84.1
Ownership						
SOE	6.517	3.029	46.5	15.398	12.102	78.6
POE	4.901	3.697	75.4	13.049	11.064	84.8
Self-employed	3.489	3.019	86.5	11.645	10.739	92.2
Others	5.299	2.842	53.6	10.408	8.992	86.4
Industrial sector						
Construction	4.968	4.762	95.9	15.559	12.786	82.2
Manufacturing	4.968	3.896	78.4	12.951	10.804	83.4
Retail/wholesale	4.175	2.784	66.7	10.532	9.842	93.4
Service	5.088	2.650	52.1	12.526	11.566	92.3

Note
1. The hourly wage was used. The wage level was adjusted based on the 2002 consumption price index in China
2. Gap=Migrant workers/local urban workers; SOE: state-owned enterprises; POE: privately-owned enterprises
Source Authors' creation based on the data from CHIPs of 2002 and 2013

migrant workers to those of local urban workers is used as an indicator of wage differentials between the two groups. The smaller these figures are, the larger the wage differentials.

The main results are as follows. First, the wage differential narrowed in 2013 compared to 2002. For example, in the highly educated (college and above) group, the wage differential narrowed from 58.9% in 2002 to 78.0% in 2013.

Second, in 2002, the wage differentials was larger in the less educated group than in the highly educated group. However, in 2013, the wage differential between educational backgrounds decreased.

Third, the wage differentials among CPC members was smaller than that among non-members in 2002 and 2013. For example, in 2013, the wage gap accounted for 88.6% among CPC members, which was smaller than that among non-members (84.1%).

Fourth, the wage differential in the state-owned sector was greater than that in the non-state-owned sector (private sector, self-employed, etc. in 2002 and 2013.). For example, in 2013, the wage differential accounted for 78.6% in the state-owned sector, which was larger than the 84.8% in the private sector, and 92.2% in the self-employed sector and other sectors.

Fifth, the wage differentials differed by industrial sector and changed during the period from 2002 to 2013. For example, in 2002, the wage gap in the service industry (52.1%) was the largest, while in 2013, the wage differential in the construction industry (82.2%) was the largest.

Table 9.4 summarizes the differences in distribution proportions of factors between the two groups in 2002 and 2013. First, regarding differences in education, the two groups differ in human capital. The proportion of workers with medium-level education (senior high school) and high-level education (college and above) is higher for local urban workers than for migrant workers. For example, in 2013, the percentage of workers with an education level of college and above was 38.8% for local urban workers and 12.0% for migrant workers; the gap between the two groups was 26.8%. Additionally, the difference in education levels decreased during the period from 2002 to 2012. For example, the differences in proportions decreased from 16.2% in 2002 to 8.0% in 2013 for senior high school graduates, and from 46.5% in 2002 to 26.8% in 2018 for the college graduate group. The results may be attributed to policies such as the spread of compulsory education and the expansion of public education investment in rural areas, which could have caused an increase in the education level of migrant workers over the years, and the reduction of differences between migrant workers and local urban workers in human capital (especially education level).

Second, the percentage of workers who are CPC members is higher for local urban workers than for migrant workers. For example, in 2002, the proportion of CPC workers was 29.3% for local urban workers and 3.3% for migrant workers; the difference was as large as 26.0%. In 2013, the

Table 9.4 Difference in distribution proportions of factors between the migrant and local urban workers

	2002			*2013*		
	U (%)	*M (%)*	*Gap (%)*	*U (%)*	*M (%)*	*Gap (%)*
Education						
Primary	1.8	26.0	−24.2	4.7	14.2	−9.5
Junior high	15.4	53.9	−38.5	26.1	51.5	−25.4
Senior high	34.0	17.8	16.2	30.4	22.3	8.1
College and above	48.8	2.3	46.5	38.8	12.0	26.8
Party						
Party	29.3	3.3	29.0	20.8	4.3	16.5
Non-party	70.7	96.7	−26.0	79.2	95.7	−16.5
Ownership						
SOE	66.7	7.0	59.7	40.7	8.8	31.9
POE	13.8	11.6	2.2	32.3	39.1	−6.8
Self-employed	9.1	73.0	−63.9	18.9	44.4	−25.5
Others	10.4	8.4	2.0	8.1	7.7	0.4
Industrial sector						
Construction	3.3	4.6	−1.3	4.9	9.0	−4.1
Manufacturing	25.7	9.7	16.0	14.4	17.0	−2.6
Retail/wholesale	12.2	47.5	−35.3	17.5	35.8	−18.3
Service	11.8	21.7	−9.9	18.5	17.5	1.0
Others	47.0	16.5	30.5	44.7	20.7	24.0

Note
1. U: local urban workers; M: migrant workers; Gap=U-M
2. SOE: state-owned enterprises; POE: privately-owned enterprises
Source Authors' creation based on the data from CHIPs of 2002 and 2013

proportion of CPC workers was 28.8% for local urban workers, and 4.3% for migrant workers; the gap between the two was 16.5%. Although the difference in the proportion of workers with party membership decreased from 2002 to 2018, it is clear that the difference still existed from 2003 to 2013.

Third, the Chinese urban labor market is segmented by the employment sector, including the ownership sector (e.g., state-owned and non-state-owned enterprises) and industrial sectors (e.g., monopoly and competitive industries) (Ma, 2018a, 2018b, 2018c).

Regarding the proportions by the types of ownership sectors, the percentage of workers in the state-owned sector is higher for local urban workers than for migrant workers. From 2002 to 2013, the gap between the two groups in the distribution of state-owned sectors decreased. However, the gap is still large in the current period. For example, in 2002, the proportion of workers in the state-owned sector was 66.7% for local urban workers, but only 7% for migrant workers; the gap between the two groups was 59.7%. In 2013, the proportion of state-owned sector workers was 47.7% for local urban workers and 8.8% for migrant workers, with a gap of 38.9%.

In terms of the proportion of industrial sectors, the percentage of workers in the construction and retail/wholesale industrial sectors is higher for migrant workers than for local urban workers. This suggests that migrant workers are concentrated in competitive industries such as construction and the retail/wholesale, while local urban workers are concentrated in other industries, including monopoly industrial sectors and government organizations.

These results suggest that there is a wage differential between migrant and local urban workers, and that there are differences in the distribution of education attainment, CPC membership, the ownership or the industrial sector of workplace. We further examines how these factors affect wage differentials between these two groups, and whether migrant workers are still discriminated against.

9.3.4.2 *Decomposition Results of the Wage Differentials Between Migrant and Local Urban Workers*

Table 9.5 summarizes the decomposition results of the wage differentials between migrant and local urban workers based on the Blinder-Oaxaca model. The main findings are summarized as follows.

First, the contribution rate to wage differential is larger for explained components (106.6% in 2002, 129.3% in 2013) than for unexplained components (−6.6% in 2002, −29.3% in 2013). It was shown that endowment differences in human and political capital have a significant impact on wage differentials than the effects of discrimination against migrant workers in 2002 and 2013.

Second, the top five factors that contribute significantly to widening the wage differential are as follows: In 2002, the corporate ownership system (44.6%), education (38,7%), industry (15,3%), number of years of experience (3.5%), and CPC membership (3.3%) in the explained components; industry sector (39.3%), constant term (25.9%), years of experience (23.8%), sex (7.6%), and marital status (1.2%) in unexplained

Table 9.5 Decomposition results of wage differentials between migrant workers and local urban workers

	Values		*Percentage*	
	Explained	*Unexplained*	*Explained (%)*	*Unexplained (%)*
2002				
Total	0.708	−0.044	106.6	−6.6
Education	0.257	−0.006	38.7	−0.8
Experience	0.023	0.158	3.5	23.8
Health	0.005	−0.062	0.7	−9.3
Party	0.022	0.000	3.3	0.1
Female	−0.001	0.050	−0.1	7.6
Han	−0.003	−0.096	−0.4	−14.5
Married	−0.001	0.008	−0.2	1.2
Ownership	0.296	−0.463	44.6	−69.8
Industry	0.101	0.263	15.3	39.3
Region	0.009	−0.069	1.2	−10.0
Constants	0.000	0.172	0.0	25.9
2013				
Total	0.217	−0.049	129.3	−29.3
Education	0.166	0.012	99.3	7.4
Experience	0.004	−0.057	2.7	−33.7
Health	−0.004	0.012	−2.6	7.0
Party	0.008	0.000	4.5	−0.2
Female	−0.007	0.051	−4.4	30.5
Han	0.000	−0.211	0.0	−126.2
Married	0.002	0.081	1.0	48.2
Ownership	0.027	0.012	16.0	7.3
Industry	0.022	0.011	13.2	6.7
Region	−0.001	−0.05	−0.5	−30.0
Constants	0.000	0.090	0.0	53.7

Source Authors' creation based on the data from CHIPs of 2002 and 2013

components. In 2013, these became education (99.3%), corporate ownership (16.6%), industry (13.2%), party membership (4.5%), and years of work experience (2.7%) in explained components; constant term (53.7%), marital status (48.2%), sex (35.5%), education (7.4%), and corporate ownership (7.3%) in unexplained components. The results indicate that the contributions of endowment differences in human capital, political status, and labor market segmentation by sectors in the explained components, and the differences in the evaluations of human capital such as the years of experience and education are more significant.

Differences in the contribution rate of human capital factors in unexplained components are related to discrimination against migrant workers. For example, the years of work experience are related to the seniority wage system implemented in the state-owned sector during the planned economy. Moreover, wage levels gradually increased with age. During the market-oriented reform period, although the influence of the seniority wage system on wage levels decreased, it also influenced the wage levels in the state-owned sector. Local urban workers were still significantly affected by the seniority wage system, because the proportion of workers in the state-owned sector is higher for local urban workers than for migrant workers (see Table 9.4).

Third, when comparing the results of 2002 and 2013, we observe the following: (i) regarding the influence of explained components, differences in human and political capital, and the differences in sector distribution contribute significantly to widening the wage gap in 2002 and 2013; the influence of these factors was greater in 2013 than in 2002. For example, the contribution rate of education increased from 38.7% in 2002 to 99.3% in 2013. Further, the contribution rate of CPC membership rose from 3.3% in 2002 to 4.5% in 2013.

(ii) Regarding the unexplained components, the constant term, marital status, sex, education, and corporate ownership increased from 2002 to 2013. This suggests that discrimination due to gender and family factors has become serious in the migrant worker group, which might widen the wage gap. Regarding the results of education, the theory of human capital in neoclassical economics states that when human capital is the same (meaning that labor productivity is the same), the wage level should be equal. However, the results of this study indicate that when other factors are held constant, the return to education is higher for local urban workers than for migrant workers, which may widen the wage differential between these two groups.

Why is there a difference in the return to education? Three reasons can explain the results.

First, discrimination resulting in lower wage levels for migrant workers despite having the same level of education attainment as local urban workers.

Second, migrant workers have less social capital (e.g., parents with high social economy status) than local urban workers. Therefore, the ability to obtain good job information is lower for migrant workers than for local urban workers. Consequently, migrant workers are more likely to experience employment mismatch or overeducated problems (taking a job that requires skills that are lower than a migrant worker's actual skill), which may decrease the wage levels of migrant workers.

Third, there may be differences in personality, other than the ability that is reflected in the education level. For example, there may be differences in non-cognitive abilities between migrant workers and local urban workers. Additionally, the educational environment of households in childhood differs between rural and urban areas (Wang, 2012; Wen, 2017). These factors may also result in differences in the return to education between the two groups.

9.4 Conclusions

Using official government data and data from the Chinese Household Income Project survey, this chapter evaluated the surplus labor in China and Japan, and investigated the change in wage differentials between unskilled and skilled workers in China and Japan based on the Lewisian dual economy structure model. Regarding labor market segmentation by the *hukou* system in China, which differs from Japan, we also conducted a decomposition analysis on the determination of wage differentials between migrant workers and local urban workers in China.

The results suggest that surplus labor decreased from 1990 to 2005 in China following the development process in Japan, which indicates that the Chinese economy was approaching the Lewisian TP by 2005. However, in contrast to Japan, the wage differential between skilled and unskilled workers rose in China. The results of the decomposition analysis on wage differentials between migrant and local urban workers indicate that the endowment difference acts as the main causal factor widening the wage differentials between migrant and local urban workers in China during the 2000s. The contribution rate of return to education to wage differentials increased from 2002 to 2013, suggesting that discrimination against migrant workers in China contributes to widening the wage differential between migrant and local urban workers in China. The sector factor (i.e., ownership, industry sector) in unexplained components also widens wage differentials. The results suggest that currently, labor market segmentation by a set of institutions such as the *hukou* system contributes to widening the wage differentials in China, even when the Chinese economy approached the Lewisian TP.

Based on the results of the empirical analysis, the following policy suggestions can be considered. First, the analysis results based on the Lewisian dual economy structure model revealed that, similar to the process of economic development in Japan, the economic structure of China has changed, and that the manufacturing industry (modern sector) has developed under lower labor costs caused by significant surplus labor in the agricultural industry sector and significant rural-urban migration since the 1980s. However, the change in the wage differential between unskilled and skilled workers differs between China and Japan. In Japan, the wage differential between unskilled and skilled workers decreased around the Lewisian TP (immediately before and after the TP). This has resulted in the discrimination against migrant workers. To address this problem, future studies should examine the reform of the *hukou* system and the enforcement of equal employment laws for migrant workers.

Second, the differences in education endowment contribute to widening the current wage differentials. This is related to inequality in public education investment between urban and rural areas. Although the Chinese government implemented public policies to improve the education system in rural areas, there is still inequality of educational situations in China. To reduce income inequality, the Chinese government should consider reducing the inequality in public education investment. Additionally, to address the problem of employment-qualification mismatches among migrant workers, the implementation of a vocational education and training system for migrant workers and establishing public organizations for job hunting, such as the *Hellowork* project in Japan, should be considered.

Appendix

See Table 9.6.

Table 9.6 Results of wage function

	Migrant Coef	t-*value*	*Urban Coef*	t-*value*	*Gap U-M*
2002					
Exp	0.026***	4.07	0.024***	6.38	−0.002
Exp_squared	−0.000***	−4.94	−0.000***	−3.84	0.001
Education (junior high)					
Primary	−0.114***	−3.95	−0.185***	−4.62	−0.071
Senior high	0.178***	5.84	0.236***	13.95	0.058
College and above	0.430***	5.71	0.520***	25.79	0.090
Health	0.047	1.22	−0.021	−1.56	−0.068
Party	0.074	1.19	0.085***	5.73	0.011
Female	−0.232***	−10.26	−0.116***	−9.11	0.116
Han	0.044	1.13	−0.061**	−1.97	−0.105
Married	0.073*	1.65	0.082***	3.23	0.009
Ownership (SOE)					
POE	0.186***	3.53	−0.170***	−8.85	−0.356
Self-employed	0.101**	2.25	−0.473***	−19.27	−0.574
Others	−0.072	−1.30	−0.113***	−5.41	−0.041
Industrial (manufacturing)					
Construction	−0.205***	−3.49	−0.093***	−2.60	0.112
Retail/wholesale	−0.456***	−8.96	−0.195***	−5.05	0.261
Service	−0.434***	−8.19	−0.145***	−3.78	0.289
Others	−0.297***	−5.41	0.105***	3.01	0.402
Region (East)					
Central	−0.267***	−10.30	−0.427***	−29.36	−0.16
West	−0.287***	−10.51	−0.328***	−21.17	−0.041

(continued)

Table 9.6 (continued)

	Migrant *Coef*	t-*value*	*Urban* *Coef*	t-*value*	*Gap* *U-M*
Constants	0.977***	8.86	1.149***	17.36	0.172
Observations	3289		9569		
Adj. *R*	0.174		0.313		
2013					
Exp	0.044***	4.12	0.032***	8.60	−0.012
Exp_squared	−0.001***	−4.61	−0.000***	−7.75	0.001
Education (junior high)					
Primary	0.073	1.15	−0.062*	−1.63	−0.135
Senior high	0.150***	2.96	0.187***	9.26	0.037
College and above	0.348***	4.64	0.542***	23.11	0.194
Health	0.080	1.36	0.093***	4.84	0.013
Party	0.054	0.56	0.046**	2.31	−0.008
Female	−0.350***	−8.64	−0.226***	−15.02	0.124
Han	0.264***	2.95	0.042	1.23	−0.222
Married	−0.023	−0.34	0.073***	2.92	0.096
Ownership (SOE)					
POE	−0.096	−1.25	−0.058***	−2.89	0.038
Self-employed	−0.054	−0.68	−0.094***	−3.72	−0.040
Others	−0.435***	−4.34	−0.240***	−8.06	0.195

	Migrant *Coef*	t-*value*	*Urban* *Coef*	t-*value*	*Gap* *U-M*
Industrial (manufacturing)					
Construction	−0.244***	−2.92	−0.216	−5.64	0.028
Retail/wholesale	−0.328***	−4.36	−0.328	−8.63	0.000
Service	−0.208***	−2.60	−0.294	−7.91	−0.086
Others	−0.272***	−3.40	−0.169	−4.72	0.103
Region (East)					
Central	−0.178***	−4.06	−0.253	−15.03	−0.075
West	−0.094*	−1.64	−0.212	−11.09	−0.118
Constants	2.113***	10.61	2.203	30.21	0.090
Observations	1228		9620		
Adj. *R*	0.142		0.198		

Source Authors' creation based on the data from CHIPs of 2002 and 2013
Note $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Notes

1. The labor force at the TP is defined as the "equilibrium labor force", while the labor force beyond that is defined as the "surplus labor". Lewis defined the labor force with zero MPL as surplus labor (Lewis, 1954).
2. For details on the results of the agricultural production function, please refer to Minami and Ma (2010, 2014).
3. Minami and Ma (2014) also evaluated the change in surplus labor in China from 1990 to 2008; the results show that there was surplus labor in 2008, despite the number of surplus laborers decreasing significantly during the period from 2000 to 2008.
4. The most representative wage differential is the scale of the enterprises. The ratio of small-and medium-sized to large-sized corporations decreased in the 1950s and increased in 1959 (Minami, 1973).
5. The demarcation of TP wages for unskilled workers in urban industries is also important. One of the authors, in a study in Japan, used not only wages of annual contract workers in agriculture but also wages of female workers in the textile industry (Minami, 1973).
6. They are the industries with the highest wages among the 19 industry groups in the *China Statistical Yearbook 2008* (Table 4–27).
7. For details on the implementation of the *hukou* system and its deregulation, please refer to Cai and Bai (2006), Cai (2016), and Ma (2018a).
8. This study defines a migrant worker as one who owns a rural *hukou* and works in urban areas.
9. According to the definition of the National Bureau of Statistics, floating population refers to the individuals who have lived in a region for more than half a year with a *hukou* that is different from the one in their local region; the majority of them are migrant workers.
10. The constant term is omitted to simplify the description.

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PART II

Mechanisms of Behaviors of Corporates, Households and Individuals

CHAPTER 10

Household Consumption and Manufactural Industrial Upgrading

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10.1 Introduction

What are the drivers of these industries? Why do some industries upgrade faster than others? While some industries expand rapidly and grow after

This chapter is a revised version of: Zhang, D., Ma, X., Zhang, J., & Deng, Q. (2019) Can consumption drive industrial upgrading? Evidence from household and manufacturing matching data. *Emerging Markets Finance and Trade*, 56(2), 409—426. Copyright © Reused by permission of Taylor & Francis Ltd.

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_10

entry, others do not develop well after several years. Therefore, understanding the sources of heterogeneity in industrial dynamics upgrading and growth is crucial to explain the dynamics of aggregate growth in China. Industrial upgrading has been characterized by several systematic patterns that have been documented in several empirical studies. Several theories can rationalize these facts that rely on different underlying mechanisms, such as stochastic productivity growth, endogenous innovation behavior, demand accumulation, or demand learning (Berman et al. 2019).

Theoretically, Romer (1990) demonstrates that new technology is driven by market profit, and the increase in new technology results from profit maximization. The market supply and demand determine the quantity of new technology. Additionally, the determinants of productivity have similar logistics. Several studies have attempted to explain endogenous decisions on productivity (Klette & Kortum 2004; Rossi-Hansberg & Wright, 2007). To better understand the drive for industrial upgrading, we should focus on two theoretical perspectives: "supply push" and "demand pull." "Supply push" hypothesizes that supply-side factors, such as new scientific knowledge, the probability of new techniques, and R&D input contribute to innovation and productivity growth (Dosi, 1988; Rosenberg, 1974). Meanwhile, the "supply push" hypothesis demonstrates that the industries and firms in the market are passive takers. Therefore, the "supply push" hypothesis means "the more input in R&D, the more output in innovation and productivity." In contrast, the demand-pull hypothesis hypothesizes that patents and innovation activities are similar to other economic activities; they are all constrained and guided by market demand under the maximization profit hypothesis. In other words, demand is more important than knowledge progress (Schmookler, 1966), and variations in sales and profitability stimulate patent-making activities (Judd, 1985). Berman et al. (2019) document

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that demand accumulation or learning is an important driver of the firm and industry dynamics.

Previous studies tell R&D input is the determinant factor to explain the difference in innovation ability among different countries (Furman et al., 2002; Anneloes & Hesen, 2004; Cheung & Lin, 2004), such as Furman et al. (2002) find R&D input can explain the innovation gap (90%) among OECD countries. However, the R&D expenditures over GDP ratio in developed countries account for approximately 2.5% to 3%; nevertheless, this ratio in developing countries is approximately 1–2%. In China, the R&D expenditures to GDP ratio has gone to 1.34% until 2005, the average level of developing countries. However, during the past decade, China has experienced high GDP growth and has created a growth miracle in the world economic history. Therefore, Lin (2004) demonstrates that current developing economies cannot explain how developing countries catch up with developed ones and raises the question of why an increase in R&D input cannot contribute to economic growth. Thus, the "supply push" hypothesis cannot give a reliable explanation why most countries do not allocate more recourses in the R&D department.

However, empirically, disentangling the role of these specific channels has not been seen, as it requires separate identification of the contributions of idiosyncratic demand and variations in demand. For this reason, previous studies have used an indirect approach, such as investigating the relationship between industrial sales growth and industrial upgrading. In contrast, this study directly tests for the existence of demand and variation in demand by identifying industries' drive toward demand. We document the drive of industrial upgrades and growth using detailed data on consumption from the National Bureau of Statistics household bookkeeping surveys in China's urban regions containing information on household consumption by destination and 6-digit product between 2002 and 2007. Furthermore, we draw our industrial information from the dataset for this study from the Annual Surveys of Industrial Firms (ASIF) conducted by China's National Bureau of Statistics (NBS) from 1998 to 2007. The ASIF database includes all industrial firms that are state-owned or non-state-owned and over-scaled firms (with sales above 5 million RMB). The industry is defined as mining, manufacturing, and public utilities.

Throughout this study, we refer to a product destination as the consumption demand and use household consumption information to account for demand. Moreover, the explanatory variables were considered from two perspectives: demand quantities and demand variations. We show that the existing results on aggregate consumption are carried over during the industry update. Specifically, we show that demand is an important driver of industrial dynamics. We further investigate the marginal effect of demand on industrial upgrades between agricultural and manufacturing industries and find that the marginal effect of demand on total factor productivity (TFP) in agricultural industries is larger. The marginal effect of demand on innovation in manufacturing industries is greater. This study further investigates the mechanisms by which demand drives industrial upgrades. We find that profit is an efficient proxy for industrial upgrades; however, export behavior does not significantly drive industrial upgrades. Moreover, we reveal the different impacts on industrial upgrades between the private and state sectors. Our results show that the private sector drives industrial upgrades significantly through the demand side. The result further illustrates that private sectors with new products drive industrial upgrades significantly on demand.

This study contributes to the literature in several ways. First, we use household survey data to account for several demand dimensions through the quantities and variations in consumption in urban China. Second, this study also improves our understanding of the demand and supply relationship. To this end, it adds to the literature by empirically analyzing how performance on the demand side influences industrial upgrading. This allows us to determine whether rapid upgrades, such as productivity growth and innovation, in the industrial sector have been enhanced by demand. Third, the study reveals the different influences of agriculture and manufacturing industries. Fourth, we incorporate industry profit and export behavior into our analysis and show the mechanisms by which demand drives industry upgrading. Finally, this study provides new evidence on the contribution of the state and private sectors in the industrial upgrading processes. The effect of demand through state and private-sector channels and innovation input activities is then analyzed to assess their relative importance across the state and private sectors.

The remainder of this chapter is organized as follows. Section 10.2 focuses on our data and outlines the demand-side and industrial-level variables. Section 10.3 presents the empirical framework and introduces our methodology. In Sect. 10.4, we provide empirical evidence and explore the possible mechanisms of the role of demand-industrial upgrade links.

Section 5 estimates our results using an alternative method and attempts to solve the potential endogeneity issue. Finally, Sect. 10.5 concludes the paper.

10.2 Data and Matching Process

10.2.1 Data

To investigate the relationship between industrial upgrades and the dynamics of household activities, we use a combination of both the industrial and household levels dataset. We adopt annual household bookkeeping survey data from the NBS and the Chinese large and medium-sized manufacturing enterprises dataset. Our unique contribution is to match them according to their common characteristics to link these two levels.

Our household dataset is from the NBS household bookkeeping surveys data, imposed in China's urban regions since 1956. This dataset covers the time ranging from 2002 to 2007. Geographically, this dataset included participants from 18 provinces, autonomous regions, and municipalities. Each household was tracked for several consecutive years, but any household observed three times was replaced by a new one. In total, our dataset comprised 155,905 families over six years, with 294,422 observations. Different average household income levels can be observed, reflecting the diverse development in China over time and region. For each urban region in the sample, usually a city, households were randomly selected from those residing there for more than half a year, regardless of *hukou* (a system of household registration, rural or urban). Thus, on average, every household included in our sample shows 1.89 times. Each household was required to complete a personal document asking the individual information of each household member, such as age, sex, and education level, and a household questionnaire about household income and expenditure information. The households in the sample were asked to keep daily records of their total spending and eight components, such as food clothing[1]. Expenditure information was collected over a year and reported to the Bureau in January of the following year for each household. Regarding inflation, all expenditure amounts are measured in 2002 constant yuan, using province-specific price indices. In particular, each household's total consumption expenditure was adjusted according to the CPI index of the province where the household was living. Each household's consumption expenditure in the eight categories was adjusted according to the price index of that category in the corresponding province. A noticeable feature of this summary is the huge variations among households in expenditure levels. Variations in transportation and communication expenditures are most noteworthy, with standard deviations over three times the mean. In contrast, variations in food expenditures are the smallest relative to the mean, since the demand for food does not vary significantly with different socio-economic conditions. All households in our sample have positive food expenditures because food is a subsistence.

Industry-level data are constructed using firm-level data for each city and industry. The firm-level data were derived from the Chinese large and medium-sized manufacturing enterprise dataset. The dataset comprises all state-owned and non-state-owned firms with sales exceeding 5 million RMB. Furthermore, irrespective of size, all industrial firms were sampled in the census years. NBS firm-level data are available as early as 1992, when all firms with independent accounting were covered, with 350,000 firms. In 1998, the NBS changed the coverage of the annual survey so that all state-owned firms and only above-scale non-state firms were included. It has also changed firm identifiers as part of a wider overhaul of the statistical apparatus. Hence, firms can be easily linked from 1998 onwards, and most studies start their sample in that year. The survey was conducted in the following years, but to the best of our knowledge, the latest year with reliable data available was 2007. Therefore, we focus on 1998–2007. The full sample covers all industrial firms, consisting of mining, manufacturing, and public utilities; nevertheless, many studies have limited themselves to the manufacturing sector.

10.2.2 Matching Process

Since the Urban Household Survey Database is based on Chinese urban households, it is challenging to match it with the Chinese Industrial Enterprises Database based on firms. We matched them at the city level by sorting these two datasets and forming a supply and demand model to solve this problem. Another concern is that the urban household survey database only contains information about the products. By adopting CIC 2002, a standard code system for Chinese industries, we improve the accuracy of our matching process. We used the method described in Han et al. (2016) and matched the datasets manually. First, we matched the urban household survey database with the ISIC. We then match the outcome with the CIC 2002. We obtained one-to-many codes based on UHS and CIC by adopting these two steps. Finally, we use the city and industry codes to match according to year and obtain a city-industry-year-level dataset for supply and demand.

In this study, we need information about productivity at the city industry level and innovation. Nevertheless, the Chinese Industrial Enterprises Database has not included variables such as intermediate inputs and research and development expenditures since 2008. Therefore, we considered only data from 2002 to 2007. We must adjust the urban household survey database to the same time range to maintain consistency. Additionally, regarding patent information, we merged the Chinese Industrial Enterprises Patents Database with industrial enterprises, and the State Intellectual Property Office maintains this database. Therefore, the matched dataset allows us to present empirical evidence on the role of demand in industrial upgrades by allowing quantities and variations to vary across cities with different industries.

10.3 Model and Variables

10.3.1 Model

This study estimates how demand (the quantities and variations of demand) at the city level affects industrial upgrading. Following prior studies (e.g., Han 2016), we employed the OLS model to examine our hypotheses. The basic empirical model is as follows.

$$\begin{aligned}\ln \text{Industrial Upgrading}_{i,c,t} = \alpha_0 + \alpha_1 \ln \text{Consumption}_{i,c,t} + \alpha_2 \text{Scale}_{i,c,t} \\ + \delta_{c,t} + \gamma_{i,c} + \theta_i t + \varepsilon_{i,c,t}\end{aligned} \tag{10.1}$$

We further explore profit, export, and private-sector mechanisms on the relationship between consumption and industrial upgrading.

$$\begin{aligned}\ln \text{industrial upgrading}_{i,c,t} = \alpha_0 + \alpha_1 \ln \text{consumption}_{i,c,t} \\ + \alpha_2 \ln \text{consumption}_{i,c,t} \\ * \text{profit}(\text{export}/\text{private})_{i,c,t} \\ + \alpha_2 scale_{i,c,t} + \delta_{c,t} + \gamma_{i,c} + \theta_i t + \varepsilon_{i,c,t}\end{aligned} \tag{10.2}$$

Equation (10.2) allows us to navigate the mechanism by which consumption affects TFP and patents. The dependent variable of industrial upgrading is measured by two proxies-TFP and patents, following Aghion et al. (2014), who use incumbents' productivity growth and patenting to measure technological development and industrial upgrading. TFP growth can explain industrial growth and the allocation efficiency of resources, and patents are the output and signal of industrial updating. TFP and patents describe productivity and innovation perspectives to account for industrial upgrading. TFP is estimated using the *OP* method (Olley & Pakes, 1996), and we use the logarithm of TFP and patent numbers to measure industrial upgrading. Aghion et al. (2014) document that the effect of reform on innovative activity in countries is pronounced in industries where innovators are generally more prone to rely on patenting and innovation responds positively to competition-enhancing product market reform in industries. Therefore, patent number is used as a proxy for industrial upgrading.

The consumption value is calculated as the unit value using the Chinese UHS conducted by the Urban Survey Organization of the NBS. We further utilize the variation in this measure to describe consumption shocks. Our data provide detailed information on household consumption patterns. Consumption value and variations are used to account for domestic consumers' consumption ability and the activity level of the consumption market. A higher consumption value indicates an important market share, and higher consumption variations indicate that the market is active and changing quickly. The sample of households was drawn through stratified random sampling, and this method can help ensure the representativeness of households in urban China.

The control variables included industry size, industry, city, and year fixed effects, where α_i represents the regression coefficients. $\theta_i t$ represents the year fixed effects, $\gamma_{i,c}$ is the city-fixed effects, $\delta_{c,t}$ is the city-specific trend, and.$\varepsilon_{i,c,t}$ is the error terms.

10.3.2 Descriptive Statistics

Appendix Table 10.6 contains some descriptive statistics on the main variables of our full sample. Regarding the proxies of industrial upgrading, the mean of the logarithm of TFP and patents is 0.934 and 0.947 in columns (1) and (2), respectively, TFP is higher in agriculture industries (0.948), and the patent indicator is higher in manufacturing industries

(1.063). Moreover, we find that the logarithm of TFP and patents grew from 2002 to 2007, illustrating that industrial upgrading was promoted efficiently during this period. For the consumption indicators, the average consumption value and consumption variations were 5.087 and 5.661, wrespectively. The consumption value is higher in agricultural industries (5.120), but the consumption variation is higher in manufacturing industries (6.306). Consumption indicators have been growing since 2002, consistent with industrial upgrading proxies. Additionally, the average labor is about 6.510, exports are 0.18, and the size and export in manufacturing industries are larger than those in agriculture industries. Related to other indicators of industrial performance information, it shows that the profit rate is 0.020, R&D investment is 0.146, and the capital-labor ratio is 3.999. Over this period, these firm performance variables are characterized by positive average growth.

10.4 Resultss

10.4.1 Baseline Results

The results obtained when estimating Eq. (10.1) are presented in Table 10.1. We report two specifications for each regression: First, city-fixed effects are used to control for any city-specific factors, as these factors might impact consumer quantities and variations, and city-industry-level labor to control for any time-variant scale at the city-industry level, as shown in columns (1)–(4). In columns (5)–(8), we add city-year fixed effects to control for any time-variant factors at the city level to control the effects that might affect consumption quantities and variation. We further introduce the product-city fixed effects to control for any unobserved heterogeneity for each product-city pair in columns (5)–(8) and find all the significance is 1% and the coefficients are larger than other specifications in columns (1)–(4), and this is our preferred specification.

First, we find consistent evidence that consumption is a positive and significant driver of industrial upgrading, including TFP and patents. According to columns (5) and (6), the estimated marginal effects on TFP are 0.041 and 0.052, indicating that a 1% increase in consumption quantities and variations increases TFP by 4.1% and 5.2%. Second, we find that patents depend significantly on consumption quantities and variations. Columns (7) and (8) show that the estimated marginal effects on

Table 10.1 Consumption and industry upgrade baseline regression results

	TFP		*Innovation*		*TFP*		*Innovation*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Consumption value	0.020***		0.035***		0.041***		0.040***	
	(0.007)		(0.011)		(0.006)		(0.009)	
Consumption change		0.029***		0.034**		0.052***		0.035***
		(0.009)		(0.013)		(0.007)		(0.010)
Labor	0.041***	0.040***	0.118***	0.118***	0.045***	0.045***	0.117***	0.118***
	(0.005)	(0.004)	(0.018)	(0.019)	(0.003)	(0.003)	(0.006)	(0.007)
Constant	0.369***	0.334***	−2.183***	−2.158***	0.367***	0.330***	−2.196***	−2.144***
	(0.063)	(0.067)	(0.176)	(0.173)	(0.054)	(0.058)	(0.080)	(0.078)
City FE	YES	YES	YES	YES				
Year FE	YES	YES	YES	YES				
Product trend	YES	YES	YES	YES	YES	YES	YES	YES
City-Year FE					YES	YES	YES	YES
Product-City FE					YES	YES	YES	YES
Observations	6,774	6,774	10,281	10,281	6,774	6,774	10,281	10,281
R-squared	0.133	0.133	0.200	0.200	0.082	0.083	0.202	0.202

Source Authors' creation

patents are 0.040 and 0.035, indicating that a 1% increase in consumption quantities and variations create patents by 4.0% and 3.5%.

Third, we further investigate heterogeneity across products to explore how demand, demand quantities, and variations affect TFP growth and patent growth rate. Following Han et al. (2016), we categorize the products into agricultural goods (food and beverages) and manufacturing goods (clothing and household appliances).

The mechanics of the demand drive suggest that the coefficients of consumption quantities and variations in TFP growth in agricultural industries are larger than those in manufacturing industries. The marginal effect of consumption quantities and variations on patents is greater in manufacturing than in agricultural industries.

The results presented in Table 10.2 suggest that the baseline marginal consumption quantities and variation rates on TFP are 4.5% and 6.5% in the agricultural sector, more than those in the manufacturing sector, 3.6% and 4.0%. For the marginal consumption effect on patents, the ratios in the manufacturing sector (5.2% and 3.0%) are larger than in the agricultural sector (2.7% and 3.0%). This finding shows that industrial upgrading in the agricultural sector impacts productivity and that the manufacturing sector influences patents.

10.4.2 Extended Results on the Demand Mechanism for Industrial Upgrading

Following Eq. (10.2), we explore the mechanisms through which demand quantities and variations in industrial upgrading are explored in this section. As discussed in Sect. 2.1, the main potential channels include the industry profit rate and share of exported goods in industries.

10.4.2.1 Profit Drive Mechanism Test

We start by estimating the degree of profit in the demand drive mechanisms using city-industry-level profit rate data. Consumption contributes to profits.

Previous theories and evidence show that new technology is significantly affected by market profit, and an increase in new technology results from profit maximization. Profit maximization can guide the industry to reduce costs and increase productivity. Variations in sales and profitability stimulate patent-making activities, as these variations are signals that show the activity level in the market (Judd, 1985; Romer, 1990). Therefore,

Table 10.2 Consumption and industry upgrade under different industries

	TFP				*Innovation*			
	Agriculture Industries		*Manufacturing Industries*		*Agriculture Industries*		*Manufacturing Industries*	
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Consumption value	0.045***		0.036***		0.027***		0.052***	
	(0.009)		(0.008)		(0.006)		(0.016)	
Consumption change		0.065***		0.040***		0.030***		0.039**
		(0.011)		(0.010)		(0.007)		(0.018)
Labor	0.051***	0.050***	0.042***	0.042***	0.025***	0.025***	0.192***	0.193***
	(0.005)	(0.005)	(0.004)	(0.004)	(0.003)	(0.003)	(0.011)	(0.011)
Constant	0.283***	0.202**	0.496***	0.365***	−1.385***	−1.388***	−1.609***	−1.636***
	(0.075)	(0.079)	(0.066)	(0.096)	(0.049)	(0.052)	(0.196)	(0.239)
Product trend	YES	YES	YES	YES	YES	YES	YES	YES
City-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Product-City FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	3,559	3,559	3,215	3,215	5,663	5,663	4,618	4,618
R-squared	0.073	0.076	0.100	0.099	0.033	0.033	0.233	0.232

Source Authors' creation

profit is a positive and significant factor contributing to the link between consumption and industrial upgrading in a rational market.

The relationship between consumption and TFP is estimated and shown in columns (1) and (2) of Table 10.3. The results show that the coefficients of the consumption variables (consumption quantities and variations) are 0.30 and 0.041 at 1% level, and the interactions with profit are 0.158 and 0.154, positive significance, indicating that profitability can further help consumption increase the TFP growth rate by 15%. The interaction effects of consumption quantities and variations on patents are 0.053 and 0.198 at the 10% significance level in columns (3) and (4).

These findings show that profitability is the mechanism by which consumption is consumed. Industries are profit-oriented, consumption behaviors that gain and send profits to signal firms and industries to increase their TFP and innovation activities.

Table 10.3 Mechanisms of consumption through industrial profit

	TFP		*Innovation*	
	(1)	*(2)*	*(3)*	*(4)*
Consumption value	0.030***		0.017**	
	(0.006)		(0.006)	
Consumption value × profit	0.158***		0.053*	
	(0.061)		(0.022)	
Consumption change		0.041***		0.031
		(0.007)		(0.018)
Consumption change × profit		0.154**		0.198*
		(0.074)		(0.116)
Profit	1.393***	1.300***	0.146**	−0.989
	(0.285)	(0.396)	(0.050)	(0.589)
Labor	0.036***	0.036***	0.092***	0.118***
	(0.003)	(0.003)	(0.014)	(0.037)
Constant	0.462***	0.418***	−1.377***	−2.123***
	(0.051)	(0.055)	(0.106)	(0.303)
City-Year FE	Yes	Yes	Yes	Yes
Product-City FE	Yes	Yes	Yes	Yes
Product Trend	Yes	Yes	Yes	Yes
Observations	6,748	6,748	10,183	10,183
R-squared	0.168	0.168	0.181	0.203

Source Authors' creation

10.4.2.2 Export Drive Mechanism Test

We further explore whether exports might drive the positive relationship between consumption and industrial upgrading, extending our baseline results by including a series of export estimations. Theoretically, knowledge spillovers through exports have been seen as a crucial driving force for economic growth (e.g., Aghion & Howitt, 1992; Jones, 2005). Developed countries generally carry out most innovation activities, and export behavior can directly help local firms and industries improve their quality or introduce new products (Eaton & Kortum, 1999). Thus, consumers can benefit from export spillover effects through consumption behavior. Therefore, domestic industries can raise their productivity, shape the market structure (Luh et al., 2016; Vives, 2008), and increase their industrial upgrading.

Table 10.4 presents two sets of estimation results for the marginal effects of TFP and patents. Unlike the predictions discussed above, the interactions of export and consumption variables are insignificant for TFP and patent indicators. The coefficients of consumption quantities and variations in TFP are 0.044 and 0.055 at the 1% level, and these patents are 0.037 and 0.034 at the 5% level, respectively. These findings illustrate that the export behavior in industries does not contribute to domestic consumption to help industrial upgrading. This implies that the export behavior of the knowledge spillover effect does not have a significant impact on local consumption in China. Local consumption is not driven by export behavior, and exports are not a proxy for the link between consumption and industrial upgrading.

10.4.2.3 Private Sector—Mechanism Tests

Regarding industrial upgrades in China, ownership cannot be ignored. The share of state-owned enterprises (SOEs) is a relevant cause of market imperfections in local industries. Local industries heavily regulated and dominated by the state sector may have limited flexibility in adjusting and changing cost conditions (Han et al., 2016; Szamosszegi & Kyle, 2011). In contrast, evidence shows that a rising Chinese private sector can help create markets and accelerate competition (Jin & Qian, 1998; Naughton, 1994; Park et al., 2006). This is expected to improve consumption. A more active consumption market can give incentives and raise the ability of domestic markets and industries to increase their productivity and innovation efficiency. Furthermore, we explore the potential channels through

Table 10.4 Mechanisms of consumption through export behavior

	TFP		*Innovation*	
	(1)	*(2)*	*(3)*	*(4)*
Consumption value	0.044***		0.037**	
	(0.006)		(0.012)	
Consumption value × export	−0.018		0.021	
	(0.013)		(0.013)	
Consumption change		0.055***		0.034**
		(0.008)		(0.016)
Consumption change × export		−0.019		0.057
		(0.017)		(0.090)
Export	0.078	0.104	−0.095	−0.611
	(0.073)	(0.105)	(0.070)	(0.464)
Labor	0.046***	0.046***	0.117***	0.096***
	(0.003)	(0.003)	(0.017)	(0.029)
Constant	0.344***	0.303***	−2.184***	−1.490***
	(0.057)	(0.063)	(0.133)	(0.214)
City-Year FE	Yes	Yes	Yes	Yes
Product-City FE	Yes	Yes	Yes	Yes
Product trend	Yes	Yes	Yes	Yes
Observations	6,753	6,753	10,192	10,192
R-squared	0.083	0.084	0.203	0.190

Source Authors' creation

which the private sector affects the consumption of new products (Table 10.5).

First, a rise in domestic industries increases the responsiveness of producer prices. As a result, consumption increases, and firms in the industries would improve their productivity and innovate to complete their competitors and gain market power. Therefore, the local industrial TFP growth rate and patent numbers at the city level can increase as the share of the private sector at the industrial level increases.

Second, the share of the private sector increases competitiveness through a proxy as new sales growth in the industries, and the consumption quantities and variations with high new sales can improve the TFP and patentability to drive industrial upgrading.

Table 10.5 Mechanisms of consumption through new product of the private sector

	TFP				*Innovation*			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Consumption value	0.013**	0.011*			0.011**	0.010**		
	(0.006)	(0.007)			(0.004)	(0.005)		
Consumption value × Private	0.027***	0.029***			0.010***	0.008**		
	(0.003)	(0.004)			(0.003)	(0.003)		
Consumption value × Private × new		0.023*				0.144***		
		(0.014)				(0.028)		
Consumption change			0.025***	0.015**			0.032***	0.032***
			(0.007)	(0.008)			(0.006)	(0.006)
Consumption change × Private			0.024***	0.021***			0.009***	0.007*
			(0.003)	(0.003)			(0.003)	(0.003)
Consumption change × Private × new				0.021*				0.124***

	TFP				*Innovation*			
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
				(0.011)				(0.024)
Labor	0.042***	0.042***	0.042***	0.041***	0.093***	0.093***	0.088***	0.088***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.005)	(0.006)	(0.005)	(0.006)
Constant	−2.286***	−2.268***	−2.297***	−2.277***	−1.648***	−1.677***	−1.715***	−1.746***
	(0.179)	(0.184)	(0.179)	(0.329)	(0.110)	(0.119)	(0.112)	(0.121)
Product Trend	YES	YES	YES	YES	YES	YES	YES	YES
City-Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Product-City FE	YES	YES	YES	YES	YES	YES	YES	YES
Observations	6,774	5,598	6,774	5,598	10,281	8,402	10,281	8,402
R-squared	0.128	0.136	0.128	0.151	0.184	0.196	0.187	0.199

Source Creation by authors

Third, product market reform created exogenous variations in market conditions across industries, countries, and time. The positive average effects of this reform on product market competition have been widely documented (Bottasso & Sembenelli, 2001; Badinger, 2007; Griffith et al. 2010). Product market competition can become a complementary force in a Schumpeterian growth model with step-by-step innovation (Aghion et al., 2015). Thus, consumption combined with product market competition can drive industrial upgrading.

UHS data were used to construct the private sector's share for each city from 2002 to 2007 to explore these two channels. We then compare the private sector share with consumption quantities and variations to explore the role of private share in consumption in driving industrial upgrading. The results are presented in Table 10.5. The estimated coefficients of interaction terms—private sector with consumption quantities and variables are significantly positive, indicating that the two proposed channels are valid. This means that the private sector's rising share helps increase the consumption of TFP growth and increase patents. A 1% increase in the private share in consumption quantities and variations leads to 27 percentage points and 25 percentage points increase in TFP growth. In contrast, the same increase in the private share increases 10 percentage points and 9 percentage points in consumption quantities and variations into patents. This finding proves the importance of the private sector in understanding the relationship between consumption and industrial upgrades. Furthermore, the new product sales ratio drives the private-sector consumption mechanism. We find that the interactions with the private sector and consumption quantities and variations are positive and significant. The coefficients on TFP are 0.023 and 0.021, respectively. In addition, the coefficients of patents are 0.144 and 0.124 with 1% significance. This finding highlights the importance of new sales in understanding the private sector's consumption mechanism.

10.5 Conclusions

The relationship between domestic consumption and industrial upgrading is a crucial component of a transition economy. However, the existing literature is yet to study how household consumption affects industrial upgrading and, more importantly, how consumption interacts with the private sector. This study contributes to the literature by documenting that consumption quantities and variations enhance TFP growth and the ability to make patents, consequently increasing the extent to which industrial upgrading benefits from household consumption.

This study shows that profit-oriented market mechanisms work efficiently through consumption for industrial upgrading by allowing for different mechanisms across Chinese cities. When the profit rate at the industry-city level is considered, the contribution through consumption induced by the profit increases significantly. However, export behavior does not contribute to the link between consumption and industrial upgrading. These findings indicate that profit-oriented market mechanisms are effective, and the Chinese government should focus policies on domestic consumption rather than too much on export policies. Domestic consumption is an effective driving force for industrial upgrades.

Incorporating the private sector in China, this study shows that increasing the private sector's share enhanced China's industrial upgrading through consumption for all households. Moreover, increasing new sales growth in the private sector can better improve industrial upgrading through household consumption. We demonstrate that the consumption and reform of non-SOEs enhanced competition and efficiency within the domestic economy.

Appendix

See Table 10.6.

Table 10.6 Description statistics of variables

	Mean (1)	*SD.* (2)	*Agriculture* (3)	*Manufacture* (4)	*2002* (5)	*2003* (6)	*2004* (7)	*2005* (8)	*2006* (9)	*2007* (10)
TFP	0.934	0.395	0.948	0.922	0.739	0.853	0.939	0.979	1.018	1.084
Patent	0.947	0.685	0.829	1.063	0.858	0.905	0.936	0.969	0.997	1.039
Consumption value	5.087	1.697	5.120	5.047	4.806	5.008	5.075	5.084	5.140	5.341
Consumption change	5.661	1.325	5.135	6.306	5.647	5.526	5.636	5.668	5.735	5.757
Labor	6.510	1.778	6.016	7.016	6.527	6.483	6.494	6.525	6.525	6.512
Profit rate	0.020	0.066	0.023	0.017	0.011	0.011	0.015	0.022	0.027	0.032
Export ratio	0.118	0.224	0.042	0.198	0.144	0.130	0.089	0.131	0.129	0.091
R&D rate	0.146	0.421	0.064	0.232	0.138	0.148	0.177	0.129	0.132	0.162
Capital labor ratio	3.999	0.994	4.310	3.680	3.726	3.886	3.944	4.025	4.088	4.268
Mean of amount	31.79	63.70	59.79	3.123	13.53	33.85	33.56	33.43	32.65	38.65
Mean of price	2845	13399	14.72	6340	2160	1863	2499	2942	3468	4028
Obs.	7,467		3,564	3,903	1,056	1,470	1,282	1,344	1,311	1,004

Source Authors' creation

Note

1. The "food" category consists of processed and whole foods, condiments and beverages, alcohol, and tobacco. The "clothing" category includes clothes, headwear, footwear, and raw materials. The "household facilities, articles, and services" category includes home appliances, furniture, ornaments, and miscellaneous items, such as dishes and tea sets. The "health care and medical services" category is made up of medicines, medical equipment, and hospital bills. The "transportation and communication" category includes vehicles, fuels, and public transportation expenses. The "education, culture, and recreation services" category includes books and magazines, stationery, musical instruments, sporting goods, and electronic equipment, such as computers. The "residence" category consists of rents for tenants or imputed rents for homeowners, decoration and maintenance costs, and utility fees. The "miscellaneous goods and services" category includes purchasing other items such as jewelry, cosmetics, hotel accommodations, and haircuts.

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CHAPTER 11

Enterprise Ownership Reform and Wage Gaps Between Public and Private Sectors

Xinxin Ma and Shi Li

11.1 Introduction

With the progress of economic system transition and economic development, income inequality has become more pronounced in China (Li et al., 2008; Sicular et al., 2020). The determinants of income inequality include the rational (e.g., differences in human capital) and irrational factors (e.g., wage gaps between monopolized and competitive sectors, income inequality caused by corruption income, discrimination against disadvantaged groups such as migrant workers and female workers). Among the issues on income inequality in China, numerous studies focus on the wage

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_11

gap between the public and private sectors, because with the advancement in economic reform, the wage gap between the public and private sectors declined in the earlier period, while since 2004, the wage gap has widened. This issue is related to state-owned enterprise (SOE) reform, which is a key part of Chinese economy reform; thus, investigating the determinants of the wage gap between the public and private sectors is an important issue.

What determines the wage level of a worker? Given that labor is a necessary factor in production, the wage determination mechanism attracts attention for its role in setting the price of labor properly. Neoclassical economics asserts that wages in perfectly competitive markets are decided by labor demand and supply and by the principles of utility maximization for individuals and profit maximization for firms.[1] In addition, the government establishes wage policies—for example, the Minimum Wage Act[2]—to rectify inequalities, and trade unions also influence wage levels through collective bargaining. It can be said that wage policies and systems coincide with market mechanisms to determine wage levels.

Wage-determining mechanisms in China transformed between its planned economy period (1949–1977) and the market-oriented reform period (post-1978). Market mechanisms did not function during the earlier period when the government priced both labor and capital. In the planned economy period, the Chinese government enacted a united management wage policy to set wage levels and control wage growth ranges. Even as the Chinese economy shifted to marketization, wage determination reforms were late compared to price reforms of production and consumption goods (Lin et al., 1996). In addition, China's economic reform was incomplete.[3] For example, most small SOEs were privatized, but the corporate governance of large SOEs scarcely changed (Iwasaki et al., 2020).

Next, considering the changes in the wage gap between the public and private sectors during the economic transition period, we calculated the ratio of the average annual wage of SOEs to that of collectively owned enterprises (COEs), and the ratio of the average annual wage of SOEs to that of privately owned enterprises (POEs) from 1952 to 2019, as shown in Fig. 11.1. The wage level in POEs was higher than that in SOEs from the 1980s to the early 1990s. However, the wage gap declined from 1993 to 2003, and the wage levels in SOEs exceeded those in POEs after 2004, and after 2015, the wage gap grew. In terms of the wage gap between SOEs and COEs, it is observed that the wage level was higher for SOEs than COEs from 1957 to 2019, and the wage gap between SOEs and COEs declined from 2008 to 2014, but after 2015, the wage gap widened. The results indicate that since 2015, the growth speed in SOEs has been faster than that in COEs and POEs, leading to a widening wage gap between the public and private sectors in China.

What determines the wage gap between the public and private sectors? This study focused on this issue using the latest survey data. Regarding empirical studies on this issue, Dong and Bowles (2002), Xing (2006),

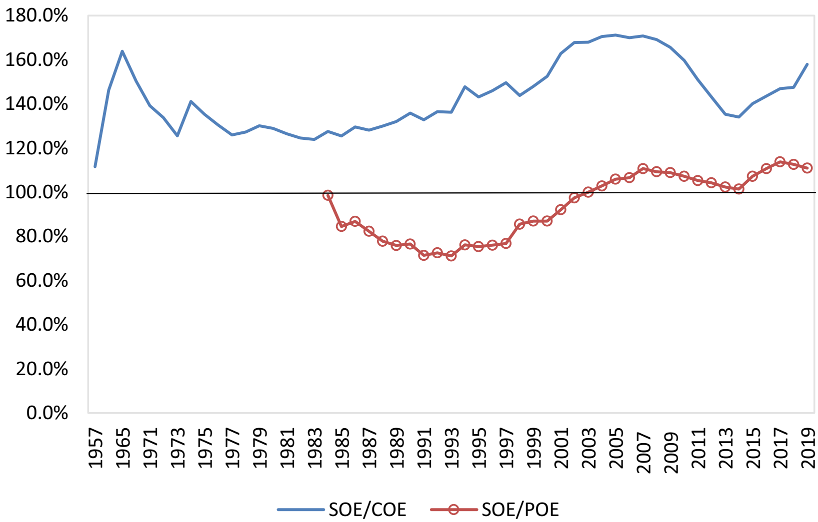

Fig. 11.1 Wage gap between SOE, COE, and POE in China (*Note* SOE: state-owned enterprises; COE: collectively owned enterprises; POE: privately owned enterprises that is expressed as "other tyeps of ownership enterprises" in the yearbook. It should be noticed that "other tyeps of ownership enterprises" in *China Statistical Yearbook* includes the POEs in which the number of labors is more than 8, which means the small-size firms in which the number of labors is less than 8 and individual self-employed workers are not accounted for in the government official data. *Source* Authors' creation based on the data from *China Statistical Yearbook 2020)*

Demurger et al. (2007), Yin and Gan (2009), Xing and Li (2012), Lu et al. (2012), and Ma (2018a, 2018b, 2018c) found that the wage structure differs between SOEs and non-SOEs (e.g., difference in return to education). Chen et al. (2005), Zhang and Xue (2008), Ye et al. (2011), Demurger et al. (2012), Zhang (2012), and Ma (2018a) decomposed the determinants of the wage gap into two components: (i) differences in wage structures between SOEs and non-SOEs (e.g., difference in return to education), and (ii) differentials in the endowment of workers (e.g., differences in education attainment level). They found that both components affect the formation of the wage gap, and the main factor is the human capital (e.g., education, years of experience) of workers, which is related to labor productivity.

However, most studies use annual and monthly wages as dependent variables and ignore working hours. If working hours are longer in the private sector, using annual and monthly wages rather than hourly wages might underestimate the wage gap. Furthermore, there is no empirical study on the change in wage gaps over the long term—the period from 2002 to 2018. This study fills these gaps in the literature.

Using the data from Chinese Household Income Project Survery of 2002 and 2018, this study attempts to answer three questions: (i) How large are the wage gaps between public and private sectors in urban China? (ii) Are there wage structure differences between the two sectors? and (iii) What determines the wage gap between the public and private sectors? Using two-period survey data, we analyze the changes in the wage structure and determinants of the wage gap from 2002 to 2018.

The remainder of this chapter is structured as follows. Section 11.2 provides the background of changes in China's wage policies and systems during the market-oriented reform period from the 1980s to 2000s. Section 11.3 introduces the framework of the empirical analysis, including the datasets and models. Section 11.4 presents the results of descriptive statistics. It also introduces and explains the results of the econometric analysis. Section 11.5 gives a summary of the conclusions and policy implications, and compares it with the policy on the wage gap between the public and private sectors in Japan.

11.2 Institutional Background: State-owned Enterprises Reforms and Changes of Wage Policy in China

To give the institutional background of the empirical study, the mechanism of wage determination changed as the market-oriented reform advanced, particularly SOE reform, as follows.

To promote the priority development of heavy manufacturing during the planned economy period, China's government implemented low-wage and more employment policies, and established a unified management wage system in the public sector (Bowles & White, 1998; Li & Zhao, 2003; Ma, 2018a; Marukawa, 2002; Meng & Kidd, 1997). In 1956, the self-employment sector, POEs, and foreign-owned enterprises (FOEs) disappeared under the "socialism restructuring" campaign enforced by the government. The entirety of the government organizations, SOEs, and COEs became state-owned, forming only one sector named "the public sector."

China's government reformed wage systems in 1951 and 1956 and established a job grade wage system in the public sector. The government managed the wage levels and wage growth ranges. Wage determinations were essentially based on factors such as job grade and tenure (Gustafsson & Li, 2000; Li & Zhao, 2003; Ma, 2018a). Individual workers' productivity or performance did not affect their wage levels. Thus, the distribution of wages was equal during the earlier period of market-oriented reform (Gustafsson & Li, 2000; Ma, 2018a). However, these wage policies and systems did not incentivize work efforts, and both labor productivity and enterprise effectiveness were low. To address these problems, China's government reformed its wage policies after the 1980s.

Changes in wage policies and systems during the market-oriented reform period (after 1978) can be summarized into three phases: the 1980s, 1990s, and 2000s (see Table 11.1).

11.2.1 Wage Policy Reform in the 1980s

During the 1980s, a set of new regulations on the wage system of SOEs was promulgated, and while the basic wage levels in the SOEs were controlled by the government, bonuses were paid in addition to that.

In 1978, the State Council promulgated "*Notice on the Implementation of Bonuses and Wage Bills*," which permitted bonuses and performance

Table 11.1 Transformations of wage policies in China

Phase	*Years*	*Wage Policy*	*SOE Reform*
1980s	1978	Notice on the Implementation of Bonuses and Wage Bills	Implementation of management contact system, expansion of corporate management autonomy
	1985	Notice on the Problem of Wage Reform of State-owned Enterprises	
	1986	Some Provisions on Promoting Corporate Reforms and Strengthening Corporate Vitality	
	1987	Attempt to Link Total Corporate Wage Bills with Performance	
	1989	Notification on Opinions to Further Link Wage Bills to Performance	
1990s	1990	Opinions on Establishing a 10-year Plan for National Economy and Social Development of the Central Committee of Communist Parity of China and the 8th 5-year Plan	Promote the reform of SOEs, reduce surplus employment and increase firms' efficiency, implementation of "*Catch the large SOEs and let go of the small SOEs*" policy
		Outline for Setting up a 10-year plan for the National Economy and Social Development of the Central Committee of Communist Party of China and the 8th Five-Year Plan of the Central Committee of the Communist Party of China	
	1992	All People's Owned Industrial Enterprise Management Mechanism Transformation Ordinance	
	1993	Corporate Minimum Wage Regulations	
		Notification on Implementation of Minimum Wage Guarantee System	
		Wage Payment Regulations	
		Notification on Opinions to Strengthen Macro Control of Total Corporate Wage Bills	
		Notification on Linking Total Wage Bills to Performance of State-owned Enterprises	

Phase	*Years*	*Wage Policy*	*SOE Reform*
	1995	Labor Law of the People's Republic of China	
		Opinions about Some Issues on the Enforcement of the Labor Law of the People's Republic of China	
2000s	2002	10th Five-Year Plan for Labor and Social Security	Promote to establish modern SOEs, encourage large SOEs to become global corporates
	2004	Minimum Wage Act	
	2007	Notification on Improvements of the Minimum Wage Act	
	2008	Labor Contract Act	
		Arbitration and Conciliation of Labor Disputes Act	

Source Authors' creation based on the regulations published by Chinese government pay that had been banned for more than 10 years. In 1983 and 1984, a wage policy was implemented in which bonuses had no upper limit and taxes were levied on bonuses when they exceeded a certain level.

The government then implemented a wage policy that linked total wage bills with corporate performance. Specifically, in 1985, the State Council promulgated the "*Notification on the Problem of Wage Reform of State-owned Enterprises*" and introduced a system in which the total wage bills of SOEs were linked to the business performance of a corporation. In 1986, the State Council implemented "*Some Provisions on Promoting Corporate Reforms and Strengthening Corporate Vitality.*" They specified that "the government does not prescribe a unified payment system, and a corporate itself can decide payment systems within a range of total wage accounts decided by the government."

Wage policies for linking total wage bills to business performance were published in 1987 and 1989. In 1987, the State Council implemented a regulation of "*Attempt to Link Total Wage Bills to Corporate Performance*"; and the government promoted a system in which total wage bills were linked to the business performance of SOEs. As a result, SOEs were able to establish and operate a wage system within the corporates according to their business performance. Furthermore, in 1989, the State Council promulgated and implemented the "*Notification on Opinions to Further Link Wage Bills to Corporate Performance*" to promote wage-determinate system reform. SOEs gained some autonomy over wage and employment decisions based on hard budget constraints from the government. Overall, during the 1980s, the mechanisms for deciding workers' wages became better aligned with corporate business performance (i.e., profit), and workers' human capital (i.e., education attainment levels) was more highly rewarded than that in the planned economy period (Gustafsson & Li, 2000; Meng & Kidd, 1997).

11.2.2 Wage Policy Reform in the 1990s

Corporate governance reforms in the SOEs were enforced by the Chinese government during the 1990s. The government published a set of new policies to extend SOEs' autonomy in determining workers' wage levels and employment.

First, the government controlled the total wage bills of SOEs and simultaneously promoted the implementation of wage policies that give SOEs autonomy and authority to determine the wage levels of their employees. For example, in 1990, the State Council promulgated "*Opinions on Establishing a 10-year Plan for National Economy and Social Development of the Central Committee of Communist Parity of China and the 8th 5-year Plan*" and "*Outline for Setting up A 10-year plan for the National Economy and Social Development of the Central Committee of the Communist Party of China and the 8th Five-Year Plan of the Central Committee of the Communist Party of China*," which states that "the government should control the total wage bills of the state-owned sector, and at the same time, the corporates can determine the wage levels of employees." In June 1992, the State Council promulgated the "*All People's Owned Industrial Enterprise Management Mechanism Transformation Ordinance*." Traditionally, SOEs have no autonomy and are under government control regarding the wages and employment of workers. The ordinance was the first to give SOEs comprehensive rights, including wage and employment decisions, with certain restrictions.

However, the autonomy right of wage determination in SOEs significantly reduced the profits of SOEs paid to the government, while the wages of managers and workers increased significantly. To address this problem, the Ministry of Labor promulgated the "*Notification on Opinions to Strengthen Macro Control of Total Corporate Wage Bills*" in July 1993, in October of the same year, the Ministry of Labor promulgated the "*Notification on Linking Total Wage Bills to Performance of State-owned Enterprises*," and in November 1995, the National Bureau of Statistics promulgated the "*Regulations on the Composition of Total Wage Bills*." These legislations clearly stipulated specific details regarding the composition of total wage bills, and the government controlled the total wage bills of SOEs and reinforced the implementation of unified managed wage policies.

Furthermore, in the 1990s, the enactment and implementation of laws on labor employment and wage systems were promoted. For example, in November 1993, the Ministry of Labor promulgated "*Corporate Minimum Wage Regulations*," "*Notification on Implementation of Minimum Wage Guarantee System*," and "*Wage Payment Regulations*." In January 1995, the Ministry of Labor and Social Security promulgated the "*Labor Law of the People's Republic of China*," and a comprehensive law on labor policy was enacted and implemented in China. In August 1995, the Ministry of Labor and Social Security promulgated "*Opinions about Some Issues on the Enforcement of the Labor*

Law of the People's Republic of China" to promote the implementation of the law.

11.2.3 Wage Policy Reform in the 2000s

During the 2000s, China's government enforced the establishment of a labor policy and strengthened its macro-control over the labor market.

In January 2002, the Ministry of Labor and Social Security announced the "*10th Five-Year Plan for Labor and Social Security*," in which the problems included the egalitarianism of wage distribution in SOEs and the expansion of the wage gaps between monopoly and competitive sectors. To settle this discrepancy, the government established the modern corporate wage system, which aimed to set the rate of sustainable wage growth, adjust wage levels based on market mechanisms, and permit workers to participate in the wage decision process. At the same time, the government promoted wage determination based on both market mechanisms and corporate performance, and proposed a collective wage determination system for both SOEs and non-SOEs.

The government also promulgated the "*Minimum Wage Act*" in January 2004 and the "*Notification on Improvements of the Minimum Wage Act*" in June 2007. The application target of the minimum wage and the setting of the minimum wage standard were clearly defined.

The "*Labor Contract Act*" and the "*Arbitration and Conciliation of Labor Disputes Act*" were published in January and May 2008. These laws defined the conditions governing wage determination, employment, and labor disputes.

During the current period of economic transition, in the public sector, the government has reformed wage systems and promoted wage determination based on market mechanisms, but it has retained control over corporate wage bills and workers' basic wage levels. On the contrary, in the private sector (e.g., POEs and FOEs), wages are primarily decided by market mechanisms.

Regarding the wage policy and SOEs' reform, the following questions have attracted attention: How large is the wage gap between public and private sectors? What determines the wage gap between public and private sectors during the 2000s? We will conduct an empirical study to answer these questions in the following section.

11.3 Methodology

11.3.1 Models

To measure wage structure, we use an OLS model based on variable mean values and a quantile regression model (Koenker & Bassett, 1978) derived from the wage distribution. These models are expressed as Eqs. (11.1) and (11.2).

$$lnW_i = a + \beta_P Pub + \beta_X X_i + u_i \tag{11.1}$$

$$lnW_{\theta i} = a_\theta + \beta_{\theta P} Pub + \beta_{\theta X} X_i + u_{\theta i} \tag{11.2}$$

In Eqs. (11.1) and (11.2), i denotes workers, θ is an indicator of the wage percentile, and lnW indicates the dependent variable (logarithm value of hourly wage). X are factors affecting wages, and β are the estimated coefficients of X. Further, a is a constant, and u is the error term. β_P and $\beta_{\theta P}$ denote the wage gap between the public and private sectors when the other factors (X) are held constant.

To clarify the differences in wage structure between the two sectors, wage functions by sector groups are estimated. To overcome sample selection bias, we used the selection bias-correction model (Lee, 1983), as shown in Eqs. (11.3) and (11.4). Equation (11.3) expresses the probability that a worker chooses to work in the public or private sector.[4] The choice of public sector employment is expressed as $P_i^* = 1$ and that of private sector employment is expressed as $P_i^* = 0$. X shows factors identical to those expressed in Eqs. (11.3) and (11.4). Z is an identification variable, and the age dummy variables are used as the identification variable in this study. Using the estimated results of the distribution and density functions in Eq. (11.4), the correction item (δ) is calculated. The selection bias-correction wage functions expressed by Eqs. (11.5) and (11.6) can be estimated using the correction term (δ).

$$E\left(\varepsilon_{pubi}\middle|P_i^* = 1\right) \text{or } E\left(\varepsilon_{prii}\middle|P_i^* = 0\right) \tag{11.3}$$

$$P_i^* = b_i + \gamma_x X_i + \gamma_z Z_i + \varepsilon_i \tag{11.4}$$

$$lnW_i = a + \beta_P Pub + \beta_X X_i + \beta_\delta \delta_i + u_i \tag{11.5}$$

$$lnW_{\theta i} = a_\theta + \beta_{\theta P} Pub + \beta_{\theta X} X_i + \beta_\delta \delta_i + u_{\theta i} \tag{11.6}$$

Then, the Blinder–Oaxaca decomposition method (Blinder, 1973; Oaxaca, 1973) is used to investigate the determinants of the wage gap, which are expressed by Eqs. (11.7) and (11.8).

$$\overline{lnW}_{pub} - \overline{lnW}_{pri} = \beta_{pub}\left(\overline{X}_{pub} - \overline{X}_{pri}\right) + \left(\beta_{pub} - \beta_{pri}\right)\overline{X_{pri}} \tag{11.7}$$

$$\overline{lnW}_{pub} - \overline{lnW}_{pri} = \beta_{pri}(\overline{X}_{pri} - \overline{X}_{pub}) + (\beta_{pri} - \beta_{pub})\overline{X}_{pub} \tag{11.8}$$

In Eqs. (11.7) and (11.8), $\overline{lnW_{Pub}}$ and $\overline{lnW}_{pri}$ are average logarithm value of hourly wage in public or private sector, respectively; $\overline{X}_{pub}$ and $\overline{X}_{pri}$ are variable mean values in public or private sector, respectively. β_{pub} and β_{pri} are the estimated coefficients. The wage gaps between public and private sectors are decomposed into two parts as explained $[\beta_{pub}(\overline{X}_{pub} - \overline{X}_{pri})$ or $\beta_{pri}(\overline{X}_{pri} - \overline{X}_{pub})]$ and unexplained components $[(\beta_{pub} - \beta_{pri})\overline{X}_{pri}$ or $*(\beta_{pri} - \beta_{pub})\overline{X}_{pub}]$.[5] The explained components include differences in human capital endowments (e.g., the differentials of years of schooling); and the unexplained components include the differences in wage determination systems (e.g., difference in return to education), discrimination, and individual attributes or abilities not presently measurable. The larger the unexplained component, the greater the influence of the difference in wage determination systems, and vice versa.

11.3.2 Data

This study uses the data from Chinese Household Income Project Survery (CHIPs) of 2002 and 2018: CHIPs 2002 and CHIPs 2018. These surveys were conducted by the Economic Research Institute of the Chinese Academy of Social Sciences, Beijing Normal University, and the National Bureau of Statistics (NBS) in 2003 and 2019. The samples of the CHIPs comprise urban residents, rural residents, and migrants. This study uses the data for urban residents and migrants. CHIPs 2002 covers 11 provinces, and CHIPs 2018 covers 15 provinces. CHIPs 2002 encompasses 27,694 individuals and 5,003 households; and CHIPs 2018 encompasses 36,259 individuals and 8,180 households. Based on the questionnaires items in the CHIPs, the samples can be divided into the public and private sectors: (1) the public sector, which contains government offices and government related organizations ("*Shiye danwei*"), and SOEs; (2) the private sector, which contains COEs, FOEs, and POEs.

The logarithm value of the hourly wage is the dependent variable. Wages include base wage, bonuses, and allowances; financial assets and public transfer income are excluded. Monthly working hours are calculated using daily working hours and monthly working days. Hourly wage calculations are based on the total wages and working hours.

The independent variable settings are as follows. In wage functions, ownership dummy variables are divided into six categories: government organizations, SOEs, COEs, FOEs, POEs, and other types of ownership enterprises excepting the SOEs, COEs, FOEs and POEs. As indicators of human capital, we use years of schooling and years of experience.

For the other control variables, (i) dummy variables for female workers, Han ethnicity, and being married are used as individual attributes. (ii) Occupational dummy variables (manager, technician, clerk, operator, and other occupations) and industry dummy (construction, manufacturing, sales, service, and other industrial sectors) variables are used to control the influence of occupational and industry sector disparities on wages (Ma, 2018b, 2018c). (iii) Ma (2019) and Ma and Iwasaki (2021a) pointed out that there is maintains the wage premium of the Communist Party of China, the party membership dummy variable is also constructed. (iv) In addition, it is likely that labor market situations, such as labor supply and demand, and labor policy implementation, such as minimum wage levels, differ among regions (Li & Ma, 2015; Ma & Li, 2020). The region dummy variables (East, Central, and West regions) are used to control for these regional disparities.

Analysis objects are limited to employees aged 16–59 years, and self-employed and family workers are excluded. The descriptive statistics of the variables used in the analysis are summarized in Table 11.8.

11.4 Results

11.4.1 Results of Descriptive Statistics

Table 11.2 displays the results of the descriptive statistics of variables by public and private sectors. The results show that worker characteristics differ between these two sectors. For example, the years of schooling are longer and the percentages of party members and managers are higher for public sector workers than for private sector workers in both 2002 and 2018. Table 11.2 shows that there are wage gaps between the public

Table 11.2 Description statistics of variables

	2002			*2018*		
	Public	*Private*	*Gap*	*Public*	*Private*	*Gap*
Logarithm value of hourly wage	1.692	1.249	0.443	3.052	2.705	0.347
Years of schooling	12.015	10.541	1.474	14.451	11.363	3.088
Years of experience	28.806	28.191	0.615	21.136	22.348	−1.212
Female worker	0.418	0.473	−0.055	0.417	0.446	−0.029
Han ethnicity	0.959	0.957	0.002	0.959	0.959	0.000
Married	0.899	0.849	0.050	0.881	0.852	0.029
Party	0.360	0.147	0.213	0.363	0.067	0.296
Occupation						
Manager	0.402	0.307	0.095	0.391	0.183	0.208
Technician	0.244	0.121	0.123	0.387	0.161	0.226
Clerk	0.280	0.327	−0.047	0.076	0.147	−0.071
Operator	0.067	0.223	−0.156	0.068	0.322	−0.254
Other occupations	0.008	0.022	−0.014	0.078	0.186	−0.108
Industry sector						
Construction	0.032	0.036	−0.004	0.023	0.095	−0.072
Manufacturing	0.218	0.359	−0.141	0.097	0.185	−0.088
Sales	0.054	0.266	−0.212	0.025	0.276	−0.251
Service	0.470	0.295	0.175	0.107	0.230	−0.123
Other industrial sectors	0.226	0.044	0.182	0.748	0.214	0.534
Regions						
East	0.353	0.460	−0.107	0.389	0.457	−0.068
Central	0.373	0.292	0.081	0.390	0.339	0.051
West	0.274	0.248	0.026	0.220	0.204	0.016
Observations	6.278	2.820		4.427	19.780	

Note The public sector comprises government organizations and SOEs; and the private sector includes COEs, POEs, FOEs, and other types of ownership enterprises, including mixed ownership enterprises
Source Authors' creation based on the data from CHIPs of 2002 and 2018

and private sectors ($\overline{lnW}_{pub} - \overline{lnW}_{pri}$) in both 2002 and 2018, and the wage gap decreased from 0.443 in 2002 to 0.347 in 2018.

Figure 11.2 displays the kernel density distribution of the logarithm value of the hourly wage in 2002 and 2018. The wage distributions in 2002 and 2018 resemble the normal distribution shapes, and the mean values of the logarithm value of hourly wages in the public sector are higher than those in the private sector.

Figure 11.3 shows the logarithm value of hourly wages in the public and private sectors, and the wage gaps. Across all wage percentiles

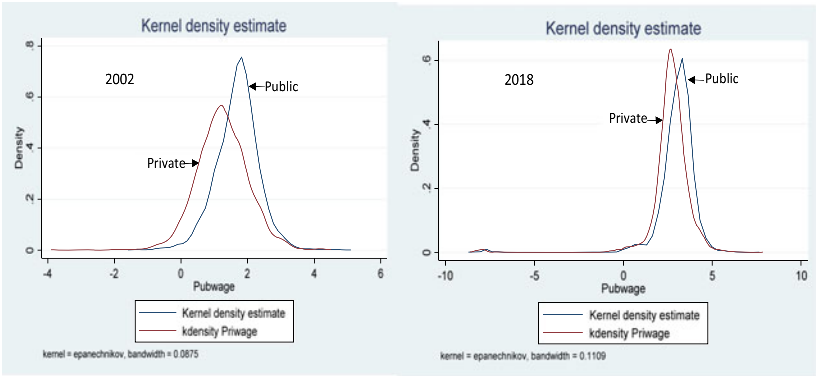

Fig. 11.2 Kernel density distribution of wage in public and private sectors (*Note* The public sector comprises government organizations and SOEs; and the private sector includes COEs, POEs, FOEs, and other types of ownership enterprises, including mixed ownership enterprises. *Source* Authors' creation based on the date from CHIPs of 2002 and 2018)

(10th–90th percentile), public sector wages exceeded private sector wages in both 2002 and 2018. The wage gaps are larger in the low-wage percentiles than those in the middle- and high-wage percentiles in 2002 and 2018. Although wage gaps appear across all wage percentiles, they are larger for low-wage (e.g., less skilled and educated) groups than for the other groups.

11.4.2 Determinants of the Probability of Working in Public Sector

Table 11.3 displays the results of the probability function of working in the public sector. The main findings are as follows.

First, when compared with the younger generation (the group aged 16–29 years), the probabilities of working in the public sector are higher for both middle-aged and older generations. This suggests that there is generational disparity in working in the likelihood of the public sector. This can be explained by the following reasons. First, from the labor demand-side perspective, because the influence of market mechanisms on corporate management is greater for firms in the private sector, according to market mechanism, employers in the private sector may prefer to

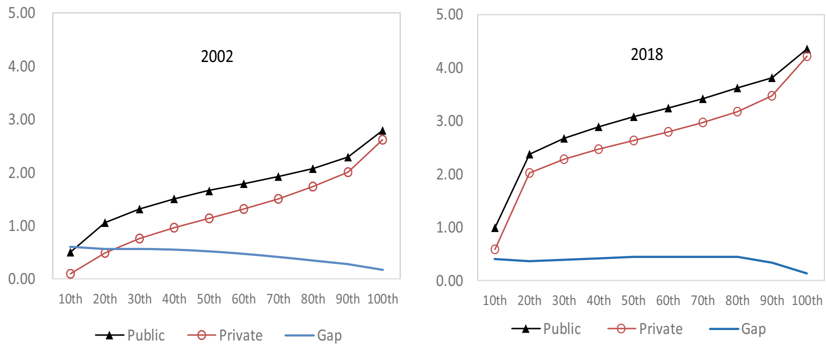

Fig. 11.3 Wage gaps between public and private sectors by wage percentiles (*Note* The value on the horizontal axis is the wage percentiles from the 10th decile to the 99th decile; Public: public sector comprising government organizations and SOEs; Private: private sector including POEs, FOEs, COEs, and other types of ownership enterprises, including mixed ownership enterprises; The other variables [i.e., education, years of experience, sex, occupation, industry sector, etc.] were not controlled. *Source* Authors' creation based on the data from CHIPs of 2002 and 2018)

recruit the younger generation who have higher educational qualifications, and therefore higher labor productivity, than middle-aged and older generations. The Higher Education Expansion Policy was promoted by the Chinese government in 1999, which caused a significant increase in the proportion of well-educated individuals among the younger generation (Ma, 2018a; Ma & Iwasaki, 2021b). The second reason is from the labor supply side: younger workers may prefer to enter the private sector for quick promotion of their work career.

Second, compared with the low-education group (primary school and lower), the probability of working in the public sector is higher for both middle- and high-education groups, particularly for the highly educated group (e.g., college, university, and above). This may be because most highly educated individuals prefer to work in the public sector for long-term employment and complete social security; simultaneously, the employment standards of national civil service are raised, and government organizations prefer to recruit highly educated workers.

Third, for the other factors, (1) Communist Party of China membership positively affects the probability of entering the public sector. (2) The

Table 11.3 Results of probability of working in public sector

	2002		*2018*	
	Coef	*t-value*	*Coef*	*t-value*
Age (Ref.: 16–29 years)				
Age 30–39	0.117**	2.07	0.100***	2.69
Age 40–49	0.329***	5.73	0.406***	10.46
Age 50–59	0.607***	9.07	0.639***	15.01
Education (Ref.: Primary school)				
Junior high	0.304***	3.54	0.240***	3.87
Senior high	0.697***	8.20	0.874***	14.23
College	1.134***	12.70	1.302***	20.48
University and above	1.418***	14.21	1.788***	27.83
Female	−0.023	−0.77	−0.010	−0.41
Party member	0.391***	10.83	0.782***	24.29
Married	0.104*	1.81	0.094**	2.40
Han ethnicity	0.030	0.42	0.058	0.98
Regions (Ref.: East)				
Central	0.259***	7.21	0.192***	6.06
West	0.300***	8.97	0.263***	9.87
Constants	−0.869***	−7.45	−2.214***	−24.14
Observations	9.448		15.881	
Log likelihood	−5254.718		−7403.534	
Pseudo R^2	0.103		0.222	

Notes ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
Source Authors' creation based on the data from CHIPs of 2002 and 2018

probability is higher for married workers than for single workers. (3) To compare workers in the East regions, the probabilities of entry into the public sector are higher for both the central and western regions. This may be because the proportion of the number of SOEs is lower for the East regions than for the Central and West regions. (4) The gender gap and ethnic gap (Han vs. minority) in the probability of entering the public sector are not statistically significant.

11.4.3 Wage Gaps Between Public and Private Sectors

The estimated results of the wage function are summarized in Table 11.4 (selection bias correction model) and Fig. 11.4 (QR model). Two models were used: Model 1 uses the years of schooling, years of experience, and regional dummy variables as dependent variables; and Model 2 adds other factors, including sex, marital status, ethnicity, party membership, occupation, and industry sector dummy variables to Model 1. The main findings are as follows.

The results of Table 11.4 show that to compare the results in Model 1 (Estimation 1), the wage gaps between sectors become slightly smaller in Model 2 (Estimation 2), suggesting that although other factors, including individual demographic factors, party membership, workplace factors (occupation, industry sectors), may affect wage gaps, the influence of human capital factors on wage gaps is greater. In addition, when comparing the results between 2002 and 2018, based on the results of Model 2, in 2002, compared with the government organizations, the wage level is 10.6, 39.1, 31.4, and 37.2% lower for SOEs, COEs, POEs, and other types of ownership enterprises, but it is 13.7% higher for FOEs; in 2018, the wage level is 19.8% and 19.0% lower for COEs and other types of ownership enterprises, and the wage gaps between government

Table 11.4 Results of wage gaps between ownership sectors in China

	2002		*2018*	
	Coef	*t-value*	*Coef*	*t-value*
【Estimation 1】				
Ownership type (Ref.: Government)				
SOE	−0.159***	−10.01	0.015	0.43
COE	−0.476***	−17.51	−0.227***	−3.63
FOE	0.058	1.34	0.108	1.85
POE	−0.409***	−21.30	−0.958**	−2.08
Other	−0.518***	−12.46	−0.219***	−5.93
【Estimation 2】				
Ownership types (Ref.: Government)				
SOE	−0.106***	−5.76	−0.015	−0.42
COE	−0.391***	−13.65	−0.198***	−3.16
FOE	0.137***	3.09	0.090	1.49
POE	−0.314***	−14.39	−0.043	−1.39
Other	−0.372***	−8.46	−0.190***	−4.91

Note ***$p < 0.01$, **$p < 0.05$. In Other: other types of ownership enterprises excepting the SOEs, COEs, POEs and FOEs Model 1, years of schooling, years of experience, and regional dummy variables are estimated; in Model 2, years of schooling years, years of experience, female worker, Han ethnicity, marital status, party membership, occupation, industry, and region variables are estimated; they are not presented in the Table. 11.3. The selection bias correction model is used.
Source Authors' creation based on the data from CHIPs of 2002 and 2018

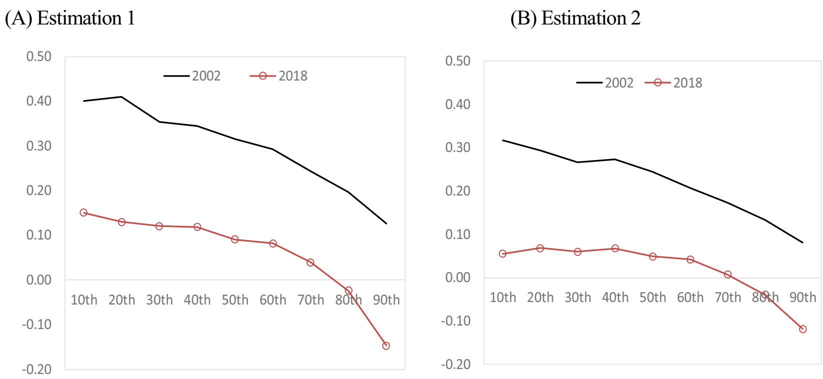

Fig. 11.4 Wage gaps between public and private sector by wage percentiles (*Note* The values in the horizontal axis are the wage percentiles from 10 to 90 deciles; The estimated coefficients of the public sector dummy variables are shown in the figure. The quantile regression model is used; In Estimation 1, years of schooling, years of experience, and region variables are controlled; in Estimation 2, years of schooling years, years of experience, female worker, Han ethnicity, marital status, party membership, occupation, industry, and region variables are controlled. *Source* Authors' creation based on the data from CHIPs of 2002 and 2018)

organizations and SOEs, POEs, and FOEs are not statistically significant. This indicates that with the advanced economy-oriented reform, the wage gaps between ownership sectors have become smaller.

Figure 11.4 displays the wage gaps between the public and private sectors by wage percentiles. Results of both Estimates 1 and 2 indicate that the wage level is higher for the public sector than for the private sector in low- and middle-wage groups (wage percentiles from 10 to 70th), while it is higher for the private sector in high-wage groups (80th and 90th percentiles wage groups). To compare the wage gaps throughout wage distributions, it is shown that the lower the wage distribution, the larger the wage gaps in both 2002 and 2018.

11.4.4 Wage Structure in Public and Private Sectors

The estimated results of wage functions based on variable mean values by the public and private sectors are reported in Table 11.5.

Table 11.5 Estimated results of wage function by sectors

(a) 2002

	Public		*Private*		*Gap*
	Coef	*t-value*	*Coef*	*t-value*	
Years of schooling	0.015***	3.11	0.047***	4.72	−0.032
Years of experience	0.035***	7.71	0.013	1.56	0.022
Years of exp._sq	−0.001***	−6.67	0.000	−0.96	−0.001
Female	−0.070***	−4.80	−0.107***	−4.00	0.037
Han	−0.055	−1.57	−0.032	−0.50	−0.023
Married	0.043	1.43	−0.014	−0.27	0.057
Party	−0.044***	−2.11	−0.058	−1.13	0.014
Occupation (Ref.: Manager)					
Technician	−0.118***	−6.34	0.036	0.81	−0.154
Clerk	−0.150***	−7.05	−0.085**	−2.30	−0.065
Operator	−0.359***	−10.91	−0.201***	−5.19	−0.158
Other occupations	−0.410***	−5.20	−0.103	−1.14	−0.307
Industry sector (Ref.: Manufacturing)					
Construction	0.018	0.44	0.129*	1.79	−0.111
Sales	0.001	0.02	−0.186***	−4.64	0.187
Service	0.225**	11.88	−0.061*	−1.73	0.286
Other industrial sectors	0.164***	7.32	−0.025	−0.38	0.189
Regions (Ref.: East)					
Central	−0.511***	−25.95	−0.520***	−13.64	0.009
West	−0.365***	−18.46	−0.445***	−12.01	0.08
Correction term	−0.664***	−9.23	0.486***	4.99	−1.15
Constants	1.579	11.69	0.514***	3.38	1.065
Observations	6.172		2.818		
Adj R^2	0.278		0.215		

(b) 2018

	Public		*Private*		*Gap*
	Coef	*t-value*	*Coef*	*t-value*	
Years of schooling	0.084***	3.05	0.028**	2.21	0.056
Years of experience	0.016**	2.41	0.013***	2.83	0.003
Years of exp._sq	−2.263E-04	−1.55	−0.000***	−4.04	0.000
Female	−0.080**	−2.44	−0.222***	−9.95	0.142
Han	−0.194**	−2.47	0.173***	3.24	−0.367
Married	0.131**	2.27	0.144***	4.02	−0.013
Party					
Occupation (Ref.: Manager)	−0.042	−0.43	−0.071	−0.84	0.029
Technician	−0.211***	−5.85	−0.247***	−6.72	0.035
Clerk	−0.156**	−2.30	−0.265***	−6.65	0.109
Operator	−0.237***	−3.35	−0.380***	−10.63	0.143
Other occupations	−0.401***	−6.36	−0.259***	−7.06	−0.142
Industry sector (Ref.: Manufacturing)					
Construction	−0.001	−0.01	0.251***	5.74	−0.252
Sales	−0.065	−0.56	−0.001	−0.03	−0.064
Service	−0.129*	−1.77	0.001	0.04	−0.130
Other industrial sectors	−0.137**	−2.43	0.051	1.46	−0.188
Regions (Ref.: East)					
Central	−0.281***	−5.85	−0.177***	−6.22	−0.104
West	−0.142***	−2.99	−0.165***	−5.35	0.023
Correction term	−0.257	−1.29	0.369**	2.49	−0.626
Constants	2.373***	3.39	2.319***	14.66	0.054
Observations	4.427		10.780		
Adj R^2	0.131		0.081		

Note $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.10$
Source Authors' creation based on the data from CHIPs of 2002 and 2018

First, the correction terms are statistically significant for both the private and public sectors in 2002, and statistically significant for the private sector in 2018. This indicates that there is a sample selection bias in the OLS model, and the selection bias correction model used in this study is appropriate.

Second, the rate of return on education in the public sector increases from 1.5% in 2002 to 8.4% in 2018, while in the private sector, it decreases from 4.7% in 2002 to 2.8% in 2018. The results indicate that the influence of human capital on wages increased greatly in the public sector as the market-oriented reform advanced. The reform has changed the incentive mechanism in the public sector: human capital has become much more important in wage determination in the public sector in recent decades.

Third, the gender wage gap is larger in the private sector than in the public sector in both 2002 and 2018. For example, in 2018, the wage level in the public sector is 8% lower for female workers than for male workers, while in the private sector, it is 22.2% lower for female workers than for female workers. This can be explained as follows: in the planned economy period, the Chinese government enforced the promotion of employment equality policies in the public sector, and according to the path-dependent hypothesis, the influences of these policies are maintained in the public sector, leading to a lower gender wage gap in the public sector than in the private sector under the transition period (Ma, 2021).

Finally, wage levels differ by occupation, industry sector, and region, and their influences on wage levels differ among public and private sector.

11.4.5 Decomposition Results of Wage Gaps Between Public and Private Sectors

Although Table 11.2 suggests that the human capital, demographic factor, and workplace factors differ by public and private sectors, and Table 11.5 indicates that the wage structure (mechanism of wage determination) differs by these two sectors, it is not clear how the differential of human capital endowment and differences in wage structure affect the wage gaps. We use the Blinder–Oaxaca model to decompose these two components. The results for total samples are summarized in Table 11.6 (wage gaps between the public and private sectors). Regarding the heterogeneous sectors, we also conducted a decomposition analysis by ownership types in the private sector, and the results are reported in

Table 11.7 (wage gaps between the public sector and COEs), Table 11.8 (wage gaps between the public sector and POEs), and Table 11.9 (wage gaps between the public sector and FOEs).

First, according to the results in Table 11.6 on wage gap between public and total private sectors including COEs, POEs, and FOEs, it is shown that the contribution rate of explained components increased from 45.1% in 2002 to 115.8% in 2018, while the contribution rate of unexplained components decreased from 54.9% in 2002 to 15.8% in 2018.

Table 11.6 Decomposition results of the wage gaps between public and private sectors

	Value		*Percentage (%)*	
	Explained	*Unexplained*	*Explained*	*Unexplained*
2002				
Wage gap = 0.443	0.200	0.243	45.1	54.9
Education	0.073	−0.387	16.5	−87.4
Experience	0.009	0.269	2.0	60.7
Gender	0.004	0.021	0.9	4.6
Ethnicity	0.000	−0.012	0.0	−2.6
Married	0.004	0.057	1.0	12.9
Party	0.017	−0.004	3.8	−0.8
Occupation	0.063	−0.097	14.3	−21.8
Industry	0.070	0.143	15.9	32.2
Region	−0.040	0.019	−9.3	4.2
Constant	0.000	0.234	0.0	52.9
2018				
Wage gap = 0.347	0.401	−0.055	115.8	−15.8
Education	0.367	0.704	105.9	203.0
Experience	−0.009	0.161	−2.6	46.3
Gender	0.002	0.063	0.7	18.2
Ethnicity	0.000	−0.350	0.0	−100.8
Married	0.004	−0.005	1.2	−1.5
Party	0.023	−0.002	6.5	−0.6
Occupation	0.068	0.043	19.7	12.5
Industry	−0.040	−0.112	−11.6	−32.3
Region	−0.015	−0.029	−4.1	−8.2
Constant	0.000	−0.528	0.0	−152.4

Note 1. The Blinder-Oaxaca model is used; 2. The public sector includes government organizations and state-owned enterprises; the private sector includes collectively owned enterprises, privately owned enterprises, foreign-owned enterprises, and other ownership types of enterprises
Source Authors' creation based on CHIPs of 2002 and 2018

Table 11.7 Decomposition results of the wage gaps between public sector and collectively owned enterprises

	Value		*Percentage (%)*	
	Explained	*Unexplained*	*Explained*	*Unexplained*
2002				
Wage gap = 0.499	0.167	0.332	33.4	66.6
Education	0.091	0.203	18.3	40.7
Experience	−0.030	0.451	−5.9	90.4
Gender	0.011	−0.030	2.3	−6.0
Ethnicity	0.000	0.080	−0.1	16.0
Married	−0.001	−0.037	−0.2	−7.4
Party	0.013	−0.012	2.7	−2.5
Occupation	0.063	0.000	12.5	0.0
Industry	0.069	−0.005	13.9	−1.0
Region	−0.049	−0.049	−9.9	−9.8
Constant	0.000	−0.269	0.0	−54.0
2018				
Wage gap = 0.405	0.277	0.128	68.4	31.6
Education	0.301	0.799	74.3	197.0
Experience	−0.032	0.257	−7.9	63.5
Gender	0.000	0.108	0.0	26.6
Ethnicity	0.002	0.079	0.6	19.5
Married	−0.001	−0.074	−0.3	−18.3
Party	0.013	−0.007	3.3	−1.8
Occupation	0.065	−0.103	16.0	−25.4
Industry	−0.020	−0.150	−4.9	−36.9
Region	−0.052	0.027	−12.7	6.5
Constant	0.000	−0.807	0.0	−199.1

Source Authors' creation based on the data from CHIPs of 2002 and 2018

The results indicate that the influence of the difference in endowment on the wage gap increased significantly in the current period. In terms of the effects of each factor, education (16.5% in 2002, 105.9% in 2018) and occupation (14.3% in 2002, 19.7% in 2018) in explained components, and years of experience (60.7% in 2002, 46.3% in 2018) in unexplained components are the main factors affecting the wage gap. The contribution rates of return to schooling increased from −87.4% in 2002 to 203.0% in 2018, which indicates that the return to schooling in the public sector increased dramatically, which widened the wage gap.

Table 11.8 Decomposition results of the wage gaps between public sector and privately owned enterprises

	Value		*Percentage (%)*	
	Explained	*Unexplained*	*Explained*	*Unexplained*
2002				
Wage gap = 0.485	0.219	0.266	45.1	54.9
Education	0.076	−0.427	15.7	−88.2
Experience	0.013	0.045	2.6	9.4
Gender	0.002	0.023	0.4	4.7
Ethnicity	0.000	−0.034	0.0	−7.1
Married	0.004	0.054	0.9	11.2
Party	0.018	−0.004	3.7	−0.8
Occupation	0.066	−0.107	13.6	−22.2
Industry	0.070	0.193	14.4	39.8
Region	−0.031	0.028	−6.3	5.8
Constant	0.000	0.496	0.0	102.3
2018				
Wage gap = 0.359	0.419	−0.060	116.7	−16.7
Education	0.380	0.742	105.9	206.7
Experience	−0.011	0.167	−3.0	46.4
Gender	0.003	0.062	0.7	17.4
Ethnicity	0.000	−0.358	0.0	−99.8
Married	0.004	−0.006	1.1	−1.8
Party	0.023	−0.004	6.4	−1.0
Occupation	0.071	0.034	19.7	9.5
Industry	−0.040	−0.134	−11.1	−37.4
Region	−0.011	−0.034	−3.0	−9.4
Constant	0.000	−0.529	0.0	−147.4

Source Authors' creation based on the data from CHIPs of 2002 and 2018

Second, for the wage gaps between the public sector and COEs that are closest to the SOEs, the results in Table 11.7 indicate that the contribution rates of the explained components increased greatly from 33.4% in 2002 to 68.4% in 2018, while the unexplained components decreased from 66.6% in 2002 to 31.6% in 2018. In terms of the influence of each factor, education (18.3% in 2002, 74.3% in 2018) and occupation (12.5% in 2002, 16.0% in 2018) in explained components, and education (40.7% in 2002, 197.0% in 2018), years of experience (90.4% in 2002, 63.5% in 2018) in unexplained components are the main contributors. These

Table 11.9 Decomposition results of the wage gaps between public sector and foreign-owned enterprises

	Value		*Percentage (%)*	
	Explained	*Unexplained*	*Explained*	*Unexplained*
2002				
Wage gap = 0.111	0.130	−0.241	−167.1	216.7
Education	−0.015	−0.925	13.1	831.9
Experience	0.092	0.289	−82.9	−260.1
Gender	0.001	0.021	−0.8	−19.3
Ethnicity	0.000	−0.371	0.0	333.3
Married	0.019	0.193	−16.8	−173.8
Party	0.018	0.021	−16.1	−18.6
Occupation	0.039	−0.070	−35.4	63.0
Industry	0.079	0.046	−71.4	−41.5
Region	−0.103	0.030	93.5	−27.1
Constant	0.000	0.524	0.0	−471.1
2018				
Wage gap = 0.019	0.112	−0.093	581.1	−481.1
Education	0.133	−0.316	692.5	−1639.4
Experience	0.047	−0.163	246.2	−845.6
Gender	−0.001	0.005	−4.8	25.7
Ethnicity	−0.001	−0.334	−7.3	−1732.9
Married	0.017	0.023	87.6	121.7
Party	0.019	0.027	99.7	138.9
Occupation	0.010	0.132	50.6	686.7
Industry	−0.065	−0.011	−335.9	−56.8
Region	−0.047	0.033	−247.5	168.8
Constant	0.000	0.511	0.0	2651.7

Source Authors' creation based on the data from CHIPs of 2002 and 2018

results indicate that human capital factors such as education, years of experience, and occupation-specific knowledge are the primary determinants of wage gaps between the public sector and COEs in both 2002 and 2018.

Third, regarding the wage gaps between the public sector and POEs, for the number of firms that has become the largest in China in recent decades, the results in Table 11.8 are similar to that for wage gaps between the public and private sectors (Table 11.6). Specifically, the contribution of explained components increased greatly from 45.1% in 2002 to 116.7% in 2018, while the contribution rates of unexplained components decreased from 54.9% in 2002 to −16.7% in 2018. In addition, education (15.7% in 2002, 105.9% in 2018) and occupation (13.6% in 2002, 19.7% in 2018) in explained components, and education (−88.2% in 2002, 206.7% in 2018), years of experience (9.4% in 2002, 46.4% in 2018) in unexplained components are the main contributors. These results reveal that human capital factors such as education, years of experience, and occupation-specific knowledge are the primary determinants of wage gaps between the public sector and POEs in both 2002 and 2018, and the influence of the differences in human capital endowment between these two sectors on wage gaps increases from 2002 to 2018.

Fourth, for the wage gaps between the public sector and FOEs (Table 11.9), the wage gap changed greatly from 2002 to 2018; in 2002, the wage level was higher for FOEs than for the public sector in 2002, and reverse happened in 2018, which suggests that the wage levels in the public sector increased significantly in the latest year. The differences in human capital endowment between the two sectors contributed to the wage gap in both 2002 and 2018, and the influences changed from 2002 to 2018. Specifically, the contribution rate of the explained components increased greatly from −167.1% in 2002 to 581.1% in 2018, while the contribution of unexplained components decreased from 216.7% in 2002 to −481.1% in 2018. To consider the effect of each factor, education (13.1% in 2002, 692.5% in 2018) and years of experience (−82.9% in 2002, 246.2% in 2018) in explained components, and education (831.9% in 2002, −1639.4% in 2018) and occupation (63.0% in 2002, 686.7% in 2018) in unexplained components are the main contributors. These results reveal that human capital such as education, years of experience, and occupation-specific knowledge are the primary determinants of wage gaps between the public sector and FOEs in both 2002 and 2018, and the influence of the differences in human capital endowment between these two sectors on wage gaps increases from 2002 to 2018.

Finally, when comparing the change in contributors of wage gaps between sectors, the results show that the contributions of explained components increased greatly, while it declined for unexplained components from 2002 to 2018 for each wage gap (e.g., public vs. COEs, public vs. POEs, public vs. FOEs). For the effects of each factor, the contributions of differences in education endowment and return to education increased greatly; it is largest for the wage gap between the public sector and FOEs. This indicates that in the early 2000s, the FOEs attracted a large number of highly educated workers, as the wage level was higher in FOEs than in the public sector. However, as market-oriented reform advanced, the influence of market mechanisms on wage determination increased even in the public sector, and wage levels increased significantly in the public sector. Furthermore, other factors are advantaged much more in the public sector as follows: the social security systems (e.g., public pension, public medical insurance, housing funding system) and corporate welfare are operational and enforced by the government in the public sector; the majority of government organizations or SOEs implement the long-term employment system, which may secure workers' work and life in the long term. Therefore, from the labor supply perspective, most highly educated workers prefer to be employed in the public sector, which has increased the competition for entry into the public sector. For instance, the examination standard for becoming a civil servant was made higher during the 2000s. Only those who have a graduate degree or above and have passed the national civil service examination can enter government organizations or large SOEs in the current period. As a result, the influence of both education levels and return to education on wages has become greater in the public sector than in the private sector.

11.5 Conclusions

Under the market-oriented reform period, China is experiencing large changes in wage policies and wage systems, which affects the change in public and private sector wage gaps. This study uses the corrected wage function model and decomposition methods, and estimates changes in the wage structure and determinants of the wage gaps between the public and private sectors in 2002 and 2018. The major conclusions are as follows.

First, keeping human capital constant, wage gaps between the public and private sectors are maintained in China, but they declined from 2002 to 2018 (Table 11.5). The wage gap is larger for the low-wage group than for the middle- and high-wage groups in both 2002 and 2018 (Fig. 11.4).

Second, when wage differentials are decomposed into explained components, which include the human capital endowment effect, and unexplained components, the former increased while the latter decreased from 2002 to 2018 (Table 11.6). The influences of both differences in human capital endowment and return to human capital on the wage gaps increased from 2002 to 2018, while the latter increased significantly. The results demonstrate that the influence of market mechanisms on wage determination has become larger in the public sector in recent decades.

Third, to compare the change in contributors of wage gaps between sectors (Tables 11.7–11.9), the results show that the contributions of explained components increased greatly, while it declined for unexplained components from 2002 to 2018 for each wage gap between ownership sectors (public vs. COEs, public vs. POEs, public vs. FOEs). The contributions of differences in education attainment level and return to education increased greatly for each wage gap; it is largest for the wage gaps between the public sector and FOEs. These results show that the influence of market mechanisms on wage determination became significant in the public sector as market-oriented reform advanced.

The policy implications can be considered as follows. Even during the market-oriented reform period, although the influence of market mechanisms has increased, the government still partially controls the wage determination systems in the public sector. As a result, market mechanisms are unable to function adequately. The government should promote further corporate governance reforms (such as ownership reform in large SOEs) and deregulation of the monopoly sector (i.e., monopolized industry sector) in the future. With these reforms, the influence of market mechanisms on wage determination can eventually become greater, and the distortion of labor pricing and labor force allocation can be corrected. To reduce the wage gap in China, active labor policies (such as vocational training policy, the Minimum Wage Act, and unemployment insurance policy) should also be promoted by the Chinese government.

Furthermore, regarding the wage gap between public and private sectors in Japan, according to the Wage Structure Basic Statistical Survey 2020 conducted by Ministry of Health, Labor and Welfare and the Survey on Wage of National Civil Servants 2020 conducted by National Personnel Authority and Ministry of Internal Affairs and Communications, Japan, the average monthly wage is 459.2 thousand yen for private-owned firms with employees more than 1000, 416.2 thousand yen for national civil servants, and 408.6 thousand yen for local government civil servants. It is shown that the average wage level is higher for large-size privately owned firms than for government organizations. The detailed survey data show that in 2020, compared with civil servants, the average wage level is lower for small- and medium-sized firms, but higher for large firms in Japan. The wage gap between public and private sectors is smaller in Japan than that in China. The probable reasons are: In Japan, the wage level of Japanese national civil servants is to be balanced with the private sector based on the "private sector standard method." The wage gap between public and private sectors is measured by the Laspeyres price indices including (i) job, (ii) work area, (iii) educational background, and (iv) age, based on the "Survey on Wage in Private Sector by Occupation" and "Survey on Wage of National Civil Servants" conducted by the National Personnel Authority every year. The wage levels in the public sector are adjusted according to the wage standards and situations in the private sector by the National Personnel Authority (Morikawa, 2013). To reduce irrational income inequality in China, a method to adjust wage levels in the public sector implemented in Japan may be considered by the Chinese government.

Finally, some research limitations should be noted. Although we use the employee information from the CHIPs, to investigate the determinants of wage gaps between the public and private sectors, it is considered that other factors in labor demand side, such as firm productivity, firm human resource management systems, and unobservable attributes of worker individuals and firms may affect the wage gaps. Using employer-employee matched data and longitudinal survey data to estimate the wage gaps has become a future research issue. Empirical study to estimate the causal relationship between the labor policies reform and changes of wage determine mechnism based on the longitudinal survey data and experimental or quasi-experimental methods has become a challege in the future research.

Notes

1. According to internal labor market theory (Piore, 1970) in institutional economics, the decisions on wage levels are also related to firms' internal practices (e.g., payment and employment systems). However, it is believed that firms set wage levels by referring to market wage levels.
2. For more information of the Minimum Wage Act in China and the empirical studies on the effect of the Minimum Wage Act on the gender wage gap in China, please see Li and Ma (2015) and Ma and Li (2020).
3. Lin et al. (1996) and Nakagane (1999) pointed out that the SOE reform was promoted after the 1990s, but it was "an incompleteness reform" (radical restructuring was not taken) because government retained the ownership of large SOEs.
4. Because this study focused on the wage gaps between the two sectors, it is assumed that sample selection bias may be maintained in the worker's choice of entry into the public or private sectors.

5. Although it is debated that there exists an index number problem in the Blinder-Oaxaca model, the estimated results are similar, using two kinds of indicators. Given space constraints, only the estimated results using Eq. (11.7) are presented in this chapter.

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CHAPTER 12

Communist Party of China Membership and Wage Gaps Between Party Members and Non-members

Xinxin Ma

12.1 Introduction

Unlike other developed countries (i.e., Japan, the United States, the United Kingdom, etc.) and transition economies (e.g., Russia and countries in Eastern Europe), despite the drastic transition from a planned economy system to a market economy, the de facto leadership of the Communist Party of China (CPC), remains dominant in China's political sphere because the government has performed a gradualist economic reform policy. According to reports published by China's Xinhua News Network Corporation, the CPC had 89.447 million members at the end of 2016, 45.9% of the members were well-educated, and there were

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_12

451.8 million primary party organizations. In both state-owned enterprises (SOEs) and privately owned enterprises (POEs), a firm must accept management, supervision, and guidance from a primary party organization within the firm (Ma, 2019; Ma & Iwasaki, 2021).[1] CPC members can be thought of as an elite in Chinese firms and society, so it is assumed that wage levels may be higher for CPC members than for nonmembers.

Regarding the wage premium of CPC membership, according to the human capital theory (Becker, 1964; Mincer, 1974), signaling hypothesis (Spence, 1973), social capital hypothesis, and discrimination hypothesis (Becker, 1957), when human capital (i.e., education) and social capital is higher for CPC members, or when there is discrimination against non-CPC members, a positive wage premium for CPC membership may arise. On the contrary, with the progress of market-oriented reform and a separation of the political and economic systems, the characteristics of CPC members, notably their belief in Marxist ideology and loyalty to the CPC organization, may become harmful factors for company management espousing profit and market principles (Ma & Iwasaki, 2021). In addition, since 2012, in order to eradicate the negative reputation caused by corruption and legal disputes among CPC members, the Xi Jinping government has enforced an anti-corruption campaign in China, where the extent of corruption in CPC organizations and graft by CPC members may illicit social criticism. Consequently, the direction of the impact of CPC membership on wage levels in China cannot be predicted from economic hypotheses because they contradict each other. An empirical study is therefore necessary.

An investigation into the wage premium of CPC membership could allow us to understand the features of Chinese economy reform and the institutional segmentation of the Chinese labor market. Although numerous studies have not focused on the wage premium of CPC membership, the wage function including the CPC membership dummy variable were estimated, but the results are mixed. Additionally, the empirical studies on the two issues: (i) what determines the probability of people's participation in CPC organizations, and (ii) how do the human capital and discrimination contribute to the wage gap between CPC members and nonmembers, are scarce. This study employed an empirical study to examine these issues.

The original contributions of this study are summarized as follows: First, few studies have directly investigated the determinants of the probability of participation in CPC organizations and the impact of

CPC membership on wage levels (Appleton et al., 2009; Ma, 2019; McLaughlin, 2017). This study develops a debate in this neglected area. Second, this is the first study of the wage gap between CPC members and non-CPC members that uses decomposition models to estimate separately the contributions to the wage gap of the explained component (the differences in endowment factors such as human capital) and the unexplained component (discrimination against non-CPC members). The problem of income inequality is increasingly severe in China (Li et al., 2017; Sicular et al., 2020). Therefore, to investigate the determinants of the wage gap between CPC members and nonmembers may contribute to understand the income inequality due to political status disparities in China deeply. Third, this study uses two periods survey data of 2002 and 2013 to provide original evidence on the issue over a period from 2002 to 2013 and to discuss the change of CPC membership and its impact on wage gaps under *Hu jintao* and *Wen jiabao* administration. In this period, a set of policies aimed to reduce income inequality were established and enforced by the Chinese government.

Three new findings emerged. First, the probability of gaining CPC membership is higher for a male worker, a well-educated worker, a worker in the public sector, the older generation, and a worker with parents in the public sector or in CPC organizations. Second, when the endogeneity problem is not addressed, the wage premium of CPC membership ranges from 7.6 to 37.4% for 2002 and from 4.4 to 31.8% for 2013. Third, based on the resulst from the Blinder-Oaxaca decomposition analysis, the explained component is the main factor that contributes from 55.9 to 66.2% (2002) and from 85.7 to 91.0 %(2013) to the wage gap between CPC and non-CPC members. The results indicate that as the transition of the economic system advanced, the observable and unobservable factors that determine the probability of gaining CPC membership contributed to the wage gap, and their influence increased from 2002 to 2013.

The remainder of this chapter is organized as follows. Section 12.2 introduces the research background: the situations of CPC in Chinese company. Section 12.3 summarizes the results of published empirical studies on the issues. Section 12.4 introduces the methodology of the study, including the models, data, and variables used. Section 12.5 reports and discusses the basic results and the results of the robustness checks. The conclusions are summarized in Sect. 12.6.

12.2 Background: The CPC in Chinese Companies

12.2.1 The CPC Organization in China

The CPC has been the dominant political party since 1949 and has led the national organization of China. The Chinese Constitution stipulates that "China is led by the Communist Party of China." According to Article 29 of the Constitution of the Communist Party of China (hereinafter abbreviated as the Constitution), the CPC is constructed on six levels like a pyramid: (1) the highest position is filled by the general secretary who is the supreme leader of the CPC organization; (2) seven members of the Political Bureau of the Central Committee; (3) 25 members of the Political Affairs Bureau; (4) a Central Committee, currently composed of 205 full members and 171 alternate members; (5) about 2,000 representatives of the CPC conference; and (6) the most numerous and ubiquitous CPC members and primary party organizations. In China, primary party organizations are found in the majority of workplaces and communities.

The selection process for CPC membership is arduous and protracted and CPC members can be thought of as an elite in China. Li and Walder (2001) have pointed out that as the marketization of economy systems advances during the transition period, CPC organizations have recruited individuals with high ability and loyalty to strengthen their governing power.

12.2.2 The Role of the CPC in Chinese Companies

Article 19 of the Company Law of the People's Republic of China, as amended in 2013, states that, regardless of the type of ownership, "companies must establish the party organization, and provide the necessary conditions for the activities of the CPC organization." According to the *Notice for the Party Organization in Companies*, established by the Central Committee of the Communist Party of China and the Ministry of Finance, if the fees of CPC members are not sufficient, a company must provide financial support to the CPC organization within the company. The company must accept management, supervision, and guidance from the CPC organization.

In the public sector, CPC organizations continue to control companies as they did during the planned economy period. For the private sector (i.e., POEs), Item 3 of Article 32 of the Constitution states that

> CPC organizations should comply with the government laws and regulations thoroughly; guide and monitor the firm to comply with these laws and regulations; guide the popular organizations such as the trade unions and the Chinese Communist Youth Association; unite the workers, maintain and protect interests of workers; and promote the better performance of firms.

CPC organizations continue to control the management of companies, even as market-oriented reform progresses. CPC membership is highly correlated with an influential role in companies in the public and private sectors.

12.3 Literature Review

Most previous studies have used a CPC membership dummy variable as a control variable in wage functions to estimate the wage premium of CPC membership (Appendix Table 12.5). The results of published empirical analyses are inconclusive.[2] Most studies show that CPC membership positively affects the wage level (i.e., Gustafsson & Li, 2000; Knight & Song, 2003; Li, 2003; Ma, 2018a, 2019; MacDonald & Hasmath, 2018; McLaughlin, 2017; Mishra & Smyth, 2015; Wang & Lien, 2018, etc.); however, there are some studies, such as those of Mishra and Smyth (2015), Wang et al. (2017), McLaughlin (2017), and Ma (2019), that have reported that the effect of party membership on wages is not statistically significant.

Most previous studies have used the ordinary least squares regression (OLS) model to estimate the wage premium of CPC membership. A few studies addressed the heterogeneity problem using a fixed-effects model (Appleton et al., 2005; Li et al., 2007). Few studies have used the instrumental variables (IV) method to address the endogeneity problem (McLaughlin, 2017; Mishra & Smyth, 2015). Therefore, it is necessary to examine the wage premium of CPC membership with effective checks on the robustness of the results. Contrary to Ma (2019), this study investigates the wage premium of CPC membership using a set of models to conduct robustness checks. These results provide new evidence.

12.4 Methodology and Data

12.4.1 Models

First, the probit regression model is utilized to investigate the determinants of joining a CPC organization.

$$\Pr(\text{CPC}_i = 1) = a + \beta_H H_i + \varepsilon_i \tag{12.1}$$

In Eq. (12.1), $\Pr(\text{CPC}_i = 1)$ is the dependent variable for the probability of joining a CPC organization. i represents the individual, H represents factors (e.g. education) which affect the probability of joining a CPC organization, β is the estimated coefficient, and ε is a random error term.

Second, the wage functions are estimated in order to estimate the wage premium of CPC members. The wage function for the OLS model is expressed as Eq. (12.2).

$$lnW_i = a + \beta_{\text{cpc}}\text{CPC}_i + \beta_X X_i + u_i \tag{12.2}$$

As the selection bias problem may persist in the OLS model (workers choose to apply by themselves or are selected by the CPC organization to become CPC members), the selection bias correction model (Lee, 1983) is used. The estimated results of the distribution function ($\Phi(\cdot)$) and the density function ($\varphi(\cdot)$) are used for the probit regression model. The dependent variable indicates the probability of becoming a CPC member, see Eq. (12.2). The correction terms for CPC members and non-CPC members are calculated ($\delta = \varphi(\cdot)/\Phi(\cdot)$). The corrected wage function is expressed by Eq. (12.2). The parents with CPC membership dummy variable is used as an identification variable for Eq. (12.3).

$$lnW_i = a + \beta_{cpc}\text{CPC}_i + \beta_X X_i + \beta_\delta \delta_i + u_i \tag{12.3}$$

In Eqs. (12.2) and (12.3), lnW is the logarithm value of the hourly wage, X represents factors (e.g. education, years of work experience) which may affect wage level, β is the estimated coefficient, and u is a random error term. When β_{cpc} is statistically significant and is a positive value, it indicates that when the other factors (e.g. human capital) are held constant the wage premium of CPC membership remains and the wage level is higher for the CPC member group than for the counterpart.

The QR model is used to investigate the wage premium of CPC membership through wage distributions from 10 to 90 percentiles, which is expressed as follows:

$$\max_{x(\theta)}\left[\sum_{h:lnW_{i\geq\beta(\theta)H_i}}\theta\left|lnW_i-\beta(\theta)H_i\right|+\sum_{h:lnW_{i\geq\beta(\theta)H_i}}(1-\theta)\left|lnW_i-\beta(\theta)H_i\right|\right]$$

$$\rho(\theta)\in(0,1) \tag{12.4}$$

In Eq. (12.3), θ represents the quantile of wages (10% quantile is expressed as 10th), and $\rho(\theta)$ is a check (or indicator) function. The QR model is designed for estimation using the optimal method, which minimizes the two error terms in the equation. β expresses the estimated coefficient, and u is a random error term. When β_{cpc} is statistically significant and positive, the wage premium of CPC membership remains, and the wage level is higher for the CPC member group than for its counterpart when other factors (e.g., human capital) are held constant.

Third, two kinds of decomposition model: (i) the Blinder-Oaxaca decomposition model; and (ii) the Oaxaca-Ransom decomposition model are used to investigate the contributions of the explained and unexplained components to the wage gap separately as follows.

The Blinder-Oaxaca decomposition model (Blinder, 1973; Oaxaca, 1973) based on variable means is expressed as Eq. (12.4) and Eq. (12.5).[3]

$$\begin{aligned}\overline{lnW}_{\mathrm{cpc}}-\overline{lnW}_{\mathrm{ncpc}}&=\beta_{\mathrm{cpc}}\left(\overline{X}_{\mathrm{cpc}}-\overline{X}_{\mathrm{ncpc}}\right)\\&\quad+\left(\beta_{\mathrm{cpc}}-\beta_{\mathrm{ncpc}}\right)\overline{X}_{\mathrm{ncpc}}\end{aligned} \tag{12.4}$$

$$\begin{aligned}\overline{lnW}_{\mathrm{cpc}}-\overline{lnW}_{\mathrm{ncpc}}&=\beta_{\mathrm{ncpc}}\left(\overline{X}_{\mathrm{ncpc}}-\overline{X}_{\mathrm{cpc}}\right)\\&\quad+\left(\beta_{\mathrm{ncpc}}-\beta_{\mathrm{cpc}}\right)\overline{X}_{\mathrm{cpc}}\end{aligned} \tag{12.5}$$

In Eqs. (12.4) and (12.5), $\overline{lnW}_{\mathrm{cpc}}$ and $\overline{lnW}_{\mathrm{ncpc}}$ are the logarithm values of the hourly wage of CPC members and non-CPC members; $\overline{X}_{\mathrm{cpc}}$ and $\overline{X}_{\mathrm{ncpc}}$ are variable mean values of CPC members and non-CPC members. β_{cpc} and β_{ncpc} are estimated coefficients in wage functions.[4] Based on the human capital theory (Becker, 1964; Mincer, 1974) and discrimination hypothesis (Becker, 1957), the decomposition model decomposes the wage gap between CPC members and non-CPC members into two parts: the endowment (known as "explained component") $[\beta_{\mathrm{cpc}}(\overline{X}_{\mathrm{cpc}}-\overline{X}_{\mathrm{ncpc}})$ or $\beta_{\mathrm{ncpc}}(\overline{X}_{\mathrm{ncpc}}-\overline{X}_{\mathrm{cpc}})]$ and the endowment return (known as the "unexplained component") [$(\beta_{\text{cpc}} - \beta_{\text{ncpc}})\overline{X}_{ncpc}$ or $(\beta_{\text{ncpc}} - \beta_{\text{cpc}})\overline{X}_{cpc}$]. The explained component expresses the differentials of individual characteristics such as the differences in human capital endowments. The unexplained component includes the differences in wage determination systems, discrimination, or individual attributes and abilities not at present measurable. The larger the estimated explained part is, the greater is the influence of human capital differences between CPC members and non-CPC members on the wage gap, and vice versa.

The Oaxaca-Blinder decomposition method is commonly used to decompose the wage gaps. Cotton (1988), Neumark (1988), and Oaxaca and Ransom (1994) note that the Oaxaca-Blinder decomposition method using the estimated coefficient and average values of two groups may lead to an index number problem. To address this problem, we use the Oaxaca-Ransom decomposition model (Oaxaca & Ransom, 1994), which can be expressed as Eq. (12.6).

$$\overline{lnW}_{\text{cpc}} - \overline{lnW}_{\text{ncpc}} = \beta^{*}\left(\bar{X}_{\text{cpc}} - \bar{X}_{\text{ncpc}}\right) + \left(\beta^{*} - \beta_{\text{ncpc}}\right)\ \bar{X}_{\text{ncpc}} + \left(\beta_{\text{cpc}} - \beta^{*}\right)\bar{X}_{\text{cpc}} \tag{12.6}$$

In Eq. (12.6), the β^{*} is a gender-neutral coefficient estimated based on wage functions using the entire sample including CPC members and non-CPC members. In the Oaxaca and Ransom model, $\beta^{*}(\overline{X}_{\text{cpc}} - \overline{X}_{\text{ncpc}})$ represents the wage gap resulting from a difference in endowment (explained component); $(\beta^{*} - \beta_{\text{ncpc}}\overline{X}_{\text{ncpc}})$ represents the gap caused by low endowment return of non-CPC members (known as "loss of non-CPC members"), and $((\beta_{\text{cpc}} - \beta^{*})\overline{X}_{\text{cpc}})$ represents the gap generated by too-high endowment return of CPC members (known as "gain of CPC members"). The sum of these two decomposition values stands for the wage gap resulting from differences in the endowment return (unexplained component).

12.4.2 Data and Variables

The analysis in this study uses data from the Chinese Household Income Project Survey (CHIPs) of 2002 and 2013. The CHIPs 2002 survey was conducted in 2003 and the most recent survey data (CHIPs 2013) was conducted in 2014. Both were conducted by the Institute of Economics, the China Academy of Social Science, Beijing Normal University, and the National Bureau of Statistics (NBS) of China. The CHIPs includes urban local residents, migrants, and rural residents. The proportion of CPC members in either migrants or rural residents is low, therefore only local urban resident samples are used in this study. The CHIPs includes information about individual and household characteristic factors, job status, and wages. CHIPs 2002 and 2013 give information about parents with CPC membership which can be used as the identification variables in the selection bais correction model. The CHIPs sample is a part of the samples in the NBS which cover the representative provinces or metropolises. The surveyed provinces or metropolises that occur in both CHIPs 2002 and CHIPs 2013 are used in the analyses. They include Beijing, Shanxi, Liaoning, Jiangsu, Anhui, Guangdong, Henan, Hubei, Chongqing, Sichuan, Yunnan, and Gansu in the Eastern, Central, and Western Regions of China.

The analytic objects were workers, and the unemployed samples were excluded from this calculation. The analytic objects were limited to local urban residents aged 16–60 years with consideration of the mandatory retirement system in the public sector.[5] Abnormal value samples,[6] no answer samples, and samples with missing values were deleted.

The dependent variable used in the probability function of participation in the CPC organization is a binary variable, which is equal to 1 when an individual is a CPC member. In the wage function and decomposition model, the dependent variable is the logarithm of the hourly wage. The hourly wage was calculated from wages and work hours. The wage includes basic wage, bonus, and cash subsidy.

The independent variables are those that are likely to affect the wage level: first, education and years of experience[7] were used as the indicator of human capital. A female dummy variable was constructed to control for the influence of gender disparity.

Second, five types of occupations (manager and engineer, operator, clerk, service, and others) and five types of industry sector dummy variables (manufacturing, construction, sales, service, and others) were used to control the occupational and industry sector disparities. Public[8] and private sector[9] dummy variables were employed to control the influence of ownership type on wages.[10]

Third, the eastern, central, and western Region dummy variables were constructed to control regional disparities.

Fourth, a binary dummy variable of having parents (mother or father of respondents) who were working or had worked in the public sector (i.e., government organizations) was constructed.

Appendix Table 12.6 summarizes the descriptive statistics for the total sample, CPC members, and nonmembers. It can be observed that differentials remain in the mean values of the variables between CPC members and nonmembers. Thus, these variables should be considered in empirical analysis. Figure 12.1 displays the Kernel density of wage distribution of CPC members and nonmembers. It is shown that the average wage level is higher for CPC members than those for nonmembers from 2012 to 2013.

12.5 Results

12.5.1 The Determinants of Participation in CPC Organizations

Table 12.1 reports the results for the determinants of a worker joining a CPC organization after analysis using the probit regression model. The five main findings are summarized as follows.

First, when other factors are constant, the probability of joining a CPC organization is lower for a female worker than for a male worker: the gender gap is 10.3% in 2002 and 7.9% in 2002.

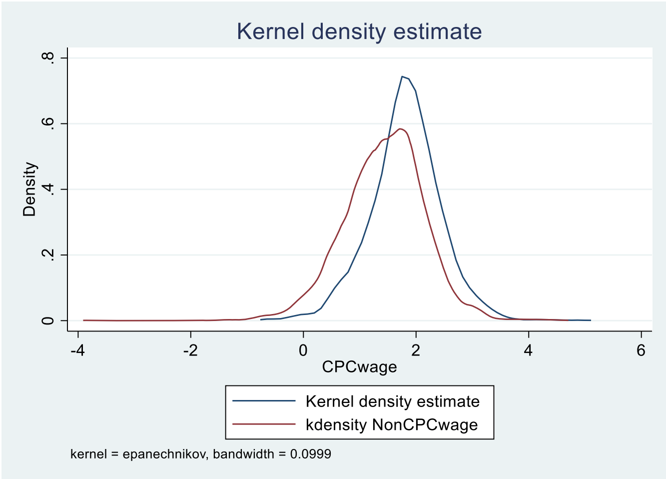
Second, more years of work experience and a higher level of education may increase the likelihood of joining a CPC organization.

Third, the probability of joining CPC organizations differs for each ownership sector. For example, the probability of a worker joining a CPC organization is lower for a worker in the private sector (e.g., POEs) than for a worker in the public sector: the gap between public and private sector is 13.2 and 11.7% in 2002, and 11.8 and 11.5% in 2013.

Fourth, the sector of industry and the region influence the probability of a worker joining a CPC organization.

Fifth, having parents with CPC membership may positively affect the statistical probability of becoming a CPC member. The results show that the probability of joining a CPC organization is higher for the group with parents with CPC membership than for the group with parents who do not have CPC membership: the gap is 4.0% in 2002, and 6.6% in 2013. It is thought that when a worker's parents are or were CPC members, they may gain access to CPC organizations more easily, obtain more information about CPC organizations, and derive more political and social capital from their parents. This may increase the children's probability of joining CPC organizations. The results suggest intergenerational transmission of CPC membership which may lead to the intergenerational transmission

(a) 2002



(b) 2013

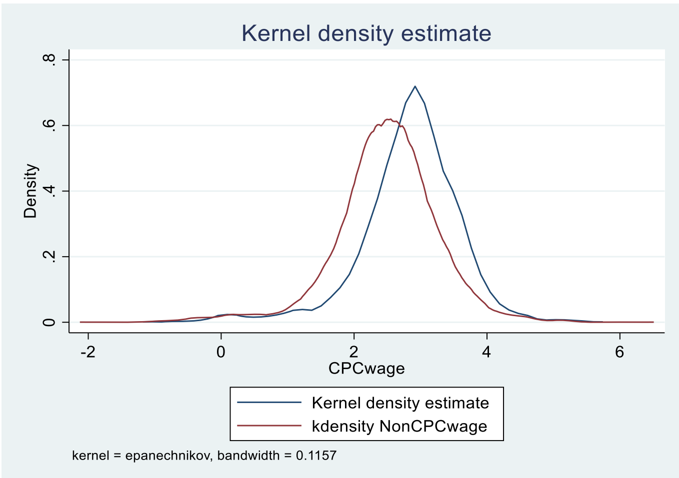


Fig. 12.1 Kernel density distribution of wages of CPC members and non-members (*Note* Blue line represents CPC members, red line represents non-members. *Source* Author' creation based on the data from CHIPs of 2002 and 2013)

Table 12.1 Results of probability of participation in CPC organizations

	(1) 2002		*(2) 2013*	
	dF/dx	*z-value*	*dF/dx*	*z-value*
Female	−0.105***	−10.65	−0.079***	−10.29
Age (Ref. Age 16–29)				
Age 30–39	0.208***	10.23	0.092***	6.56
Age 40–49	0.334***	17.14	0.140***	10.18
Age 50–59	0.509***	21.19	0.240***	13.89
Education (Ref. Primary)				
Junior high school	0.086**	2.49	0.199***	4.53
Senior high school	0.195***	5.47	0.323***	7.17
College	0.352***	8.67	0.476***	9.13
University	0.444***	9.92	0.627***	11.81
Occupation (Ref. Manufacturing)				
Manager and engineer	0.197***	13.36	0.039***	2.82
Clerk	0.181***	11.09	0.163***	9.68
Service worker	0.052**	2.20	0.049***	3.18
Other occupations	0.109***	2.36	0.046***	2.76
Ownership (Ref. Public)				
COE	−0.050**	−2.55	−0.021	−1.29
FOE	−0.132***	−4.28	−0.118***	−6.81
POE	−0.117***	−9.10	−0.115***	−11.96
Other ownership types	−0.028	−0.75	−0.081***	−7.46
Industry sector (Ref. Manufacturing)				
Construction	−0.056**	−2.12	−0.018	−0.91
Sales	−0.043**	−2.39	−0.089***	−5.70
Service	−0.052***	−4.13	−0.016	−1.03
Other industrial sectors	0.086***	5.19	0.008	0.61
Region (Ref. Western region)				
Central	−1.358E-04	−0.19	0.002	0.18
Western	0.014	0.69	0.028***	2.77
Parents CPC	0.040*	1.86	0.066***	4.01
Observations	9342		9415	
Pseudo R^2	0.205		0.247	
Log likelihood	−4608.049		−3669.077	

Note
1. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
2. Values of marginal effects (dF/dx) are shown in the table
Source Author' creation based on the data from CHIPs of 2002 and 2013

of political and economic status. Having a parent with CPC membership is used as an identification variable in the selection bais correction model.

12.5.2 The Wage Premium of CPC Membership

The wage functions are used to investigate the wage premium of CPC membership. The results based on the OLS and the Lee models are summarized in Table 12.2. Four kinds of analysis are employed using different independent variables. The main findings are as follows.

First, the results from the OLS model show that when other conditions are not controlled (Model 1) the wage premium of CPC membership is 37.4% (2002) and 31.8% (2013) and they statistically significant at the 1% level (Model 1). When the individual characteristics (education,

Table 12.2 The wage premium of CPC membership

Methods	*Variables*	*(1)*	*(2)*	*(3)*	*(4)*
OLS	**2002**				
	CPC	0.374***	0.128***	0.093***	0.076***
		(24.06)	(8.11)	(5.89)	(4.93)
	2013				
	CPC	0.318***	0.044**	0.022	0.022
		(16.44)	(2.23)	(1.09)	(1.10)
Lee model	**2002**				
	CPC	0.085***	0.079***	0.078***	0.075***
		(5.17)	(4.89)	(4.96)	(4.84)
	Correction term	0.799***	0.409***	0.259***	0.059*
		(36.40)	(11.27)	(4.87)	(1.97)
	2013				
	CPC	0.026	0.026	0.025	0.024
		(1.21)	(1.26)	(1.20)	(1.19)
	Correction term	0.762***	0.122	−0.036***	−0.049
		(27.78)	(2.88)	(−0.63)	(−0.65)

Note
1. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
2. Model (1): the independent variable is only the CPC member dummy variable; Model (2): the independent variables include the CPC member dummy variable, female, experience years, and education; Model (3): the independent variables include the CPC member dummy variable, female, years of experience and education, occupation, industry sector, and regions; Model (4) the independent variables include the CPC member, female, years of experience, education, occupation, industry, and ownership. The t-values or z-values are expressed in parentheses
Source Author' creation based on the data from CHIPs of 2002 and 2013

experience year, gender) are controlled, the wage premium of CPC membership decreases 4.4 percentage points to 12.8% (2002) and is statistically significant at the 1% or 5% level (Model 2). When occupation, industry, and ownership are controlled the wage premium of CPC membership decreases to 9.3% (Model 3 for 2002) and 7.6% (Model 4 for 2002). It is statistically significant at 1% level for 2002, whereas it is not statistically significant for 2013. During the 2000s although CPC membership positively affects wage levels when other factors (i.e. human capital) are constant, the wage premium of CPC membership on wage levels decreased from 2002 to 2013. It indicates that the influence of the market mechanism on wage determination increased with the economy system transition.

Second, the results from the selection bias correction model show that when the CPC membership positively affect wage in 2002, while it is not significant in 2013, which suggest as the economy system transition advanced, the influence of CPC membership on wage has become smaller. To compare with the results from the OLS model, the wage premium of CPC membership becomes smaller when addressing the selection bias, it is ranged from 7.5~8.5% in 2002, the selection correction items are statistically significant at 1% levels, which suggests that OLS may overestimate the wage premium of CPC membership.

Figure 12.1 shows the estimations using the QR model. For 2002, the wage premium of CPC membership was highest in the wage lowest group (10 percentile) and was higher for the low-wage group (10–30 percentiles) than for the middle- and high-wage group. In comparison, for 2013, the wage premium of CPC membership was higher for middle-level wage group (40–60 percentiles). Furthermore, the wage premium of CPC membership in each percentile is lower for 2013 than that for 2002. This result confirms the conclusion that the wage premium of CPC membership decreased from 2002 to 2013 as the market-oriented economic reform progressed.

12.5.3 Decomposition Results of the Wage Gap Between CPC Members and Nonmembers Based on Blinder-Oaxaca Decomposition Model

Table 12.3 reports the decomposition results of wage gaps between CPC members and non-CPC members using the Blinder-Oaxaca decomposition model (Blinder, 1973; Oaxaca, 1973). Decomposition 1 uses the

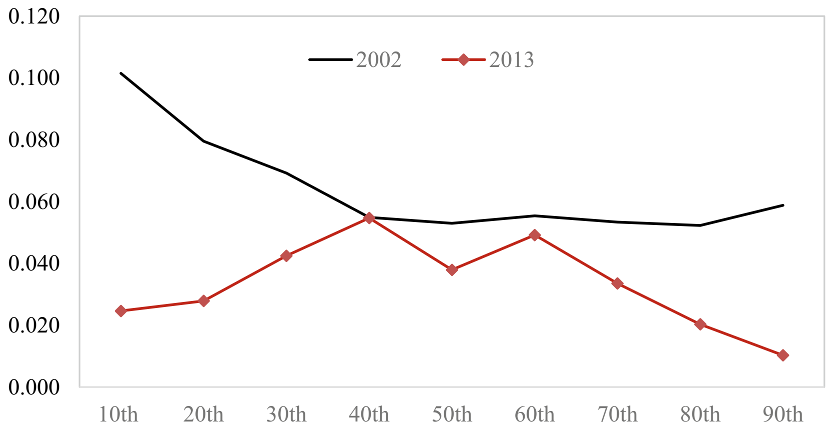


Fig. 12.2 Wage premium of CPC membership by wage percentile (*Note* (1) The quantile regression model is used. 10th expresses at 10% wage percentile. (2) The coefficients of CPC member dummy variables are summarized in Fig. 12.2. The covariate variables include the CPC member, female, experience years, education, occupation, industry, ownership, and region dummy variable are estimated, but the results are not expressed in Fig. 12.2. *Source* Author's creation based on the data from CHIPs of 2002 and 2013)

basic human capital model that includes only gender, education, and experience year variables. Decomposition 2 is an analysis adding the other factors which may influence the wage levels (i.e., occupation, industry, ownership, and regional variables). As the tendency of results for Decomposition 1 is similar to those for Decomposition 2, we summarize the findings based on the results of Decomposition 2 in the following.

Firstly, the results indicate the influence of the explained component (66.2% in 2002, and 91.0% in 2013) on the wage gap is greater than the unexplained component (33.8% in 2002, and 9.0% in 2013). It is shown the endowment differentials between CPC members and non-CPC members are the main factor that contributes to the wage gap between these two groups, and as the economic system transition advances, the influence of the endowment differential on the wage gap increases. It indicates the influence of the market mechanism on the wage gap increased from 2002 to 2013.

Table 12.3 Basic decomposition results of wage gap between CPC members and nonmembers based on Blinder-Oaxaca model

(a) 2002

	(1) Value		*(2) Percentage*	
	Explained	*Unexplained*	*Explained (%)*	*Unexplained (%)*
[Decomposition1]				
Total	0.218	0.172	55.9	44.1
Female	0.007	0.044	1.8	11.3
Years of experience	0.055	−0.003	14.1	−0.8
Education	0.156	−0.561	40.0	−143.8
Constants	0.000	0.693	0.0	177.7
[Decomposition2]				
Total	0.258	0.132	66.2	33.8
Female	0.007	0.030	1.8	7.7
Years of experience	0.041	−0.037	10.5	−9.5
Education	0.102	−0.639	26.2	−163.8
Occupation	0.056	−0.046	14.4	−11.8
Industry	0.023	0.053	5.9	13.6
Ownership	0.038	0.027	9.7	6.9
Region	−0.009	−0.021	−2.3	−5.4
Constants	0.000	0.765	0.0	196.2

(b) 2013

	(1) Value		*(2) Percentage*	
	Explained	*Unexplained*	*Explained (%)*	*Unexplained (%)*
[Decomposition1]				
Total	0.305	0.051	85.7	14.3
Female	0.034	0.021	9.6	5.9
Years of experience	0.006	−0.251	1.7	−70.5
Education	0.265	−0.089	74.4	−25.0
Constants	0.000	0.370	0.0	103.9
[Decomposition2]				
Total	0.324	0.032	91.0	9.0
Female	0.030	0.018	8.4	5.1
Years of experience	0.007	−0.194	2.0	−54.5

(continued)

Table 12.3 (continued)

(b) 2013

	(1) Value		*(2) Percentage*	
	Explained	*Unexplained*	*Explained (%)*	*Unexplained (%)*
Education	0.172	−0.215	48.3	−60.4
Occupation	0.050	−0.017	14.0	−4.8
Industry	−0.002	−0.116	−0.6	−32.6
Ownership	0.064	−0.104	18.0	−29.2
Region	0.003	−0.114	0.8	−32.0
Constants	0.000	0.774	0.0	217.4

Note The Blinder-Oaxaca decomposition model was used
Source Author' creation based on the data from CHIPs of 2002 and 2013

Secondly, the results of the detailed decomposition indicate that (1) education is the largest factor in both the explained and the unexplained components. The differential of educational level widens the wage gap (26.2% in 2002 and 48.3% in 2013), whereas the return of education on wage reduces the wage gap (−163.8% in 2002 and −60.4% in 2013). The influence of the differentials of education attainment on the wage gap increased from 2002 to 2013. It indicates that more well-educated workers join the CPC organization, or the CPC organizations tend to recruit well-educated workers as new CPC members during the 2000s. It seems like that as the economic system changes, CPC members have become intelligent much more in China.

The results of the detailed decomposition indicate that (2) the differentials of the number of years of work experience widen the wage gap (10.5% in 2002 and 2.0% in 2013), while the return to years experience reduces the wage gap (−9.5% in 2002 and −54.5% in 2013).

(3) The differentials of occupational distributions between these two groups contribute to the wage gap widening (14.4% in 2002 and 14.0% in 2013), the differentials of distribution of ownership types contribute to widen the wage gap (9.7% in 2002 and 18.0% in 2013.)

(4) The results of the detailed decomposition indicate that the differentials of the proportion of female workers widen the wage gap (1.8% in 2002 and 8.4% in 2013). The results indicate that when the proportion of female workers is higher for the non-CPC member group, the

wage may be lower for the non-CPC member group than for the counterpart. This may contribute to the wage gap between the CPC members and nonmembers. In fact, although gender equality employment policies were implemented in China and female employment in the public sector was greatly promoted by the government (Ma, 2018b), the proportion of female members in the CPC organizations remains less than that of male members (Ma & Iwasaki, 2021).

12.5.4 Decomposition Results of the Wage Gap Between CPC Members and Nonmembers Based on Oaxaca-Ransom Decomposition Model

To consider the index number problem, the Oaxaca and Ransom decomposition model (Oaxaca & Ransom, 1994) is used. The decomposition results are summarized in Table 12.4.

In general the explained components of the results from the Oaxaca and Ransom decomposition model are greater for both 2002 and 2013 than the explained component of the results from the Oaxaca-Blinder model. Thus, the main conclusion is again confirmed that the main factor contributing to the wage gap between CPC members and non-CPC members is the endowment differences between these two groups. For example, in 2002, the value of the explained component is 66.2% for the Blinder-Oaxaca model, and 85.0% for the Oaxaca and Ransom model; in 2013, the value of the explained component is 98.3% for the Blinder-Oaxaca model, and 91.0% for the Oaxaca and Ransom model. The results indicate that although the index number problem persists in the results of the Blinder-Oaxaca decomposition model, the problem is not severe, and these results are robust.

12.6 Conclusions

This study estimates the impact of CPC membership on wage levels. It examines the determinants of joining CPC organizations and investigates the determinants of the wage gap between CPC members and non-CPC members. It uses data from the CHIPs of 2002 and 2013. An empirical study is employed using wage function, the probit regression model, and the decomposition methods of the Blinder-Oaxaca model, and the Oaxaca and Ransom model.

Table 12.4 Decomposition results of wage gap between CPC and Non-CPC using Oaxaca-Ransom decomposition model

(a) 2002

	(1) Blinder-Oaxaca model		*(2) Oaxaca-Ransom model*			
	Explained (%)	*Unexplained (%)*	*Explained (%)*	*Unexplained*		
				(a) loss (%)	*(b) gain (%)*	*(c) total (%)*
Total	66.2	33.8	85.0	4.4	10.6	15.0
Female	1.8	7.7	4.0	1.2	4.2	5.4
Years of experience	10.5	−9.5	13.4	5.6	−18.0	−12.4
Education	26.2	−163.8	34.9	−9.3	−163.3	−172.6
Occupation	14.4	−11.8	15.4	−1.3	−11.5	−12.8
Industry	5.9	13.6	6.0	2.7	10.8	13.5
Ownership	9.7	6.9	13.4	0.4	2.9	3.3
Region	−2.3	−5.4	−2.1	−1.4	−4.2	−5.7
Constants	0.0	196.2	0.0	6.4	189.9	196.3

(b) 2013

	(1) Blinder-Oaxaca model		*(2) Oaxaca-Ransom model*			
	Explained (%)	*Unexplained (%)*	*Explained (%)*	*Unexplained*		
				(a) loss (%)	*(b) gain (%)*	*(c) total (%)*
Total	91.0	9.0	95.3	0.6	4.1	4.7
Female	8.4	5.1	10.1	0.4	3.6	4.0
Years of experience	2.0	−54.5	3.1	−7.6	−34.8	−42.5
Education	48.3	−60.4	57.0	3.9	6.7	10.5
Occupation	14.0	−4.8	14.9	0.6	−3.1	−2.5
Industry	−0.6	−32.6	3.9	−1.6	−26.4	−28.1
Ownership	18.0	−29.2	6.0	−6.2	−8.6	−14.8
Region	0.8	−32.0	0.3	−6.6	−26.4	−32.9
Constants	0.0	217.4	0.0	17.7	93.1	111.0

Note

1. The Oaxaca and Ransom decomposition model is used

2. Gain: gain of CPC members; Loss: loss of non-CPC members; Total = gain of CPC members + loss of non-CPC members

Source Author' creation based on the data from CHIPs of 2002 and 2013

Three new findings emerge. First, the probability of joining CPC organizations is higher for a male worker, a well-educated worker, and a worker with more years of work experience than for others in both 2002 and 2013. Having parents with CPC membership may increase the probability of their children becoming CPC members.

Second, the wage premium of CPC membership persists in the 2000s. Based on the results for the OLS model, the range of the wage premium of CPC membership is from 7.6 to 37.4% for 2002 and from 4.4 to 31.8% for 2013. When the sample selection bias is addressed the range of wage premium of CPC membership is 7.5 to 8.5% for 2002 and it is not statistically significant in 2013. This indicates that the wage premium of CPC membership may be overestimated if the sample selection bias is not addressed.

Third, although both the explained and unexplained components contribute to widen the wage gap, the influence is greater for the former which suggests the main factor contributing to the wage gap between CPC members and non-CPC members is the endowment differences between these two groups.

The results indicate that although in the 2000s CPC membership positively affects wage levels, and the wage premium of CPC membership decreased from 2002 to 2013. For the determinants of the wage gap between CPC and non-CPC, most results show that the influence of endowment differences (i.e., human capital) is the main factor and it is greater for 2013 than 2002. The results indicate that as the economic system transition advances, the influence of market mechanisms on wage determination becomes greater and the wage premium of CPC membership decreases. Although the CPC leadership remains dominant in the political sphere, the influence of market mechanisms on wage determination increased from 2002 to 2013. It can be expected that with the progress of market-oriented reform, the influence of unexplained components including the discrimination against non-CPC members on the wage gap between CPC members and non-CPC members may decrease, and the influence of differences of explained component including the human capital may increase. However, it should be noted that the wage data used in this analysis only includes the basic wage, bonuses, and allowances which are reported. It is well known that other income such as the income from corruption may not be reported and cannot be measured, which may cause the income gap between CPC and non-CPC members to be underestimated.[11] Furthermore, the endogeneity problem may maintain in results which should be considered in future research.

Acknowledgments The study is conducted as a part of a Chinese economy project (Title: Empirical Research on the Changing Chinese Economy Upgrading, Expansion, Structural Reform) "Studies on Transformations of International Systems and their impact on Japan's mid & long-term competitiveness" undertaken at the Research Institute of Economy, Trade and Industry (RIETI). I am grateful for the helpful comments and suggestions of Ichiro IWASAKI (Hitotsubashi University), Makoto YANO (Kyoto University), Tetsuya WATANABE (RIETI), Asei ITO (The University of Tokyo), Kai KAJITANI (Kobe University), and seminar participants.

Appendix

See Tables 12.5 and 12.6.

Table 12.5 Summary of wage premium of CPC membership in literature

Author	*Data*	*Model*	*Wage premium of CPC*
Gustafsson and Li (2000)	CHIPs 1988 and 1995	OLS	1988: Male: 5.6%; Female: 10.2% 1995: Male: 7.7%; Female: 10.1%
Li (2003)		cohort, OLS	No significant
	CHIPs 1995	OLS	7.3~11.0%
Knight and Song (2003)	CHIPs 1988 and 1995	OLS	1988: 4.1%; 1995: 8.6%
Yueh (2004)	CHIPs 1995 and 1999	Heckman	1995: 10.04~10.37% 1999: 15.77~16.45%
Appleton et al. (2005)	CHIPs 1988,1995, 1999, 2002	FE	1988: 6.8%; 1995: 14.6%; 1999: 18.1%: 2002: 15.2%

(continued)

Table 12.5 (continued)

Author	*Data*	*Model*	*Wage premium of CPC*
Bishop et al. (2005)	CHIPs 1988 and 1995	OLS	1988: 13.0%; 1995: 9.51%
		QR	1988: 3.31~10.35%
			1995: 2.22~12.085
Li et al. (2007)	Twin survey	Total: OLS	10.0~12.4%
		FE	No significant
		Twins: OLS	−29.80%
		FE	No significant
Shu et al. (2007)	SWSC 2000		Total: 11.3%
			Male: 10.6%
			Female: 14.5%
Braunsterin and Brenner (2007)	CHIPs 1995 and 2002	OLS	1995: Male: 7.3%, Female: 11.2%
			2002: Male: 6.4%, Female: 10.9%
Bishop and Liu (2008)	CHIPs 1988, 1995	OLS	Male: 3.25~4.11%
			Female: 7.07~12.60%
Guo and Hammitt (2009)	CHIPs 1995	OLS	3.2~7.7%
Deng and Li (2009)	CHIPs 1988, 1995 and 2002	OLS	1988: 6.1%; 1995: 7.9%; 2002: 8.4%
Appleton et al. (2009)	CHIPs 1988, 1995 and 1999	Heckman	1988: 10%; 1995: 14%; 1999: 14%
Gao and Smyth (2010)	CULS 2005	OLS	Male: 6.52~7.83%
			Female: no significant (+)
Gao and Smyth (2011)	CASS survey 2007	OLS	12.46~14.90%
Laura and Poncet (2010)	CHIPs 1995	OLS	7.0~10.0%
Li et al. (2012)	CGSS 2010	OLS	9.80%
			When controlled other factors: no significant
Xiu and Gunderson (2013a)	CHIPs 1995 and 2002	OLS	Total: 7.4~12.6%
			Male: 6.7~11.6%

(continued)

Table 12.5 (continued)

Author	*Data*	*Model*	*Wage premium of CPC*
Xiu and Gunderson (2013b)	LHSCCC	OLS	Female: 9.1~14.4% Male: 7.1~12.7%
Mishra and Smyth (2014)	CEES 2007	GMM	Female: 14.2~19.8% 15.80%
Xing (2014)	CHIPs 2002	OLS	Urban residents: natives 14.4% migrants 14.7% Rural residents: local −13.1%, migrants in rural survey 11.9%, migrants in urban survey: no significant (−)
Mishra and Smyth (2015)	CEES 2007	OLS, IV	OLS: 14.2~14.5% IV: no significant (−)
Kwon et al. (2015)	CHIPs 1988, 1995, 2002 and 2007	OLS	1988: 7~8%, 1995: 10~11%, 2002: 7~8%
Bian et al. (2015)	CFCS 1999	OLS	5.8~8.0%
Wang et al. (2017)	CGSS 2003–2010	OLS	No significant
McLaughlin (2017)	CHIPs 2002	OLS	9.0~17.4%
		IV	32.8% or no significant
Ma (2018a)	CHIPs 2002 and 2013	Maddala model	2002: Migrant 21.4%, Urban 20.7% 2013: Migrant: no significant, Urban: –24.1%
Wang and Lien (2018)	Original migrants survey	OLS	16.13%
		QR	5.35~20.16%
MacDonald and Hasmath (2018)	CHES 2011	OLS	2.42~6.42%

Note OLS: Ordinary least squares model; IV: the instrumental variable mehod; QR: quantile regression model; FE: fixed effects model; GMM: generalized method of moments; Heckman: Heckman two-step selection method
Source Author's creation

Table 12.6 Descriptive statistics of variables

(a) 2002

	(a) Total		*(b) CPC*		*(c) Non-CPC*		*Gap (Means)*
	Mean	*SE*	*Mean*	*SE*	*Mean*	*SE*	*(b)−(c)*
Party	0.291	0.454					
Log. of wage	1.538	0.724	1.815	0.625	1.425	0.731	0.390
Female	0.441	0.496	0.322	0.467	0.489	0.500	−0.167
Years of experience	28.671	9.829	31.152	8.956	27.654	9.989	3.498
Age							
Aged 16–29	0.132	0.339	0.042	0.202	0.169	0.375	−0.127
Aged 30–39	0.319	0.466	0.268	0.443	0.340	0.474	−0.072
Aged 40–49	0.398	0.489	0.437	0.496	0.382	0.486	0.055
Aged 50–60	0.151	0.358	0.253	0.435	0.109	0.312	0.144
Education							
Primary	0.023	0.150	0.006	0.078	0.030	0.170	−0.024
Junior high school	0.230	0.421	0.117	0.321	0.277	0.448	−0.160
Senior high school	0.409	0.492	0.337	0.473	0.439	0.496	−0.102
College	0.232	0.422	0.345	0.476	0.185	0.389	0.160
University	0.106	0.307	0.195	0.396	0.069	0.253	0.126
Occupation							
Manager and engineer	0.367	0.482	0.543	0.498	0.295	0.456	0.248
Clerk	0.204	0.403	0.264	0.441	0.179	0.383	0.085
Manufacturing worker	0.288	0.453	0.134	0.341	0.351	0.477	−0.217
Service worker	0.120	0.325	0.044	0.204	0.151	0.359	−0.107
Other occupations	0.021	0.143	0.015	0.121	0.024	0.151	−0.009
Ownership type							
Public	0.667	0.471	0.826	0.379	0.602	0.489	0.224
COEs	0.071	0.257	0.047	0.212	0.081	0.272	−0.034
FOEs	0.023	0.149	0.011	0.104	0.028	0.164	−0.017
POEs	0.214	0.410	0.095	0.293	0.262	0.440	−0.167
Other onwenship types	0.025	0.157	0.021	0.144	0.027	0.163	−0.006
Industry sector							

(continued)

Table 12.6 (continued)

(a) 2002

	(a) Total		*(b) CPC*		*(c) Non-CPC*		*Gap (Means)*
	Mean	*SE*	*Mean*	*SE*	*Mean*	*SE*	*(b)−(c)*
Construction	0.033	0.178	0.030	0.170	0.034	0.182	−0.004
Manufacturing	0.255	0.436	0.206	0.405	0.276	0.447	−0.070
Sales	0.122	0.328	0.066	0.248	0.145	0.352	−0.079
Service	0.419	0.493	0.403	0.491	0.426	0.495	−0.023
Other industrial sectors	0.171	0.375	0.295	0.456	0.119	0.324	0.176
Regions							
Eastern	0.391	0.488	0.375	0.484	0.397	0.489	−0.022
Central	0.345	0.475	0.355	0.479	0.341	0.474	0.014
Western	0.264	0.441	0.270	0.444	0.262	0.440	0.008
Parent CPC membership	0.052	0.223	0.055	0.207	0.045	0.229	0.010
Observations	9342		2741		6601		

(b) 2013

	(a) Total		*(b) CPC*		*(c) Non-CPC*		*Gap (means)*
	Mean	*S.E*	*Mean*	*S.E*	*Mean*	*S.E*	*(b)−(c)*
Party	0.189	0.392					
Log. of wage	2.191	0.784	2.482	0.744	2.123	0.777	0.359
Female	0.44	0.496	0.322	0.467	0.467	0.499	−0.145
Years of experience	28.942	11.193	29.344	10.658	28.848	11.313	0.496
Age							
Aged 16–29	0.168	0.373	0.091	0.288	0.185	0.389	−0.094
Aged 30–39	0.278	0.448	0.273	0.445	0.279	0.449	−0.006
Aged 40–49	0.351	0.477	0.360	0.480	0.349	0.477	0.011
Aged 50–60	0.203	0.403	0.276	0.447	0.187	0.39	0.089
Education							
Primary	0.058	0.234	0.004	0.067	0.071	0.257	−0.067
Junior high school	0.289	0.453	0.092	0.289	0.335	0.472	−0.243

(continued)

Table 12.6 (continued)

(b) 2013

	(a) Total		*(b) CPC*		*(c) Non-CPC*		*Gap (means)*
	Mean	*S.E*	*Mean*	*S.E*	*Mean*	*S.E*	*(b)−(c)*
Senior high school	0.294	0.456	0.231	0.422	0.309	0.462	−0.078
College	0.179	0.383	0.247	0.432	0.163	0.369	0.084
University	0.180	0.384	0.426	0.494	0.122	0.328	0.304
Occupation							
Manager and engineer	0.225	0.417	0.337	0.473	0.198	0.399	0.139
Clerk	0.144	0.351	0.320	0.466	0.103	0.304	0.217
Manufacturing worker	0.200	0.400	0.104	0.305	0.223	0.416	−0.119
Service worker	0.301	0.459	0.143	0.35	0.338	0.473	−0.195
Other occupations	0.130	0.336	0.096	0.295	0.138	0.344	−0.042
Ownership type							
Public	0.372	0.483	0.730	0.444	0.288	0.453	0.442
COEs	0.045	0.207	0.045	0.208	0.045	0.207	0.000
FOEs	0.028	0.165	0.011	0.104	0.032	0.176	−0.021
POEs	0.256	0.437	0.099	0.299	0.293	0.455	−0.194
Other occupations	0.299	0.458	0.114	0.318	0.342	0.474	−0.228
Industry sector							
Construction	0.053	0.225	0.029	0.169	0.059	0.236	−0.030
Manufacturing	0.147	0.354	0.098	0.297	0.158	0.365	−0.060
Sales	0.197	0.398	0.048	0.213	0.232	0.422	−0.184
Service	0.183	0.387	0.131	0.337	0.195	0.396	−0.064
Other industrial sectors	0.420	0.494	0.694	0.461	0.356	0.479	0.338
Regions							
Eastern	0.419	0.493	0.424	0.494	0.418	0.493	0.006
Central	0.360	0.480	0.355	0.479	0.361	0.480	−0.006
Western	0.221	0.415	0.221	0.415	0.221	0.415	0.000
Parent in public sector	0.049	0.215	0.101	0.301	0.037	0.188	0.064
Observations	9415		1961		7454		

Source Author' creation based on the data from CHIPs of 2002 and 2013

Notes

1. Article 19 of *The Company Law of the People's Republic of China* (revised in 2013) states: "In a company, an organization of the Communist Party of China shall be established to carry out the activities of the party in accordance with the charter of the Communist Party of China. The company provides the necessary conditions for the activities of the party organization."
2. For the systematic literature review and a meta-analysis on the wage premium of CPC membership, please refer to Ma and Iwasaki (2021).
3. To simplify the expression of the decomposition equations, all constant items are omitted.
4. The published debate suggests an index number problem with the Blinder-Oaxaca model. The estimated results may vary according to the type of comparison group used. Given the space constraints and because the two sets of decomposition results are almost identical, only the estimated results using Eq. (12.4) are presented in this study.
5. The retirement age is 45 for female workers, 50 for male workers, 55 for female cadres, and 60 for male cadres.
6. Variable values in the range of the "mean value ± three times S.D." are defined as abnormal values.
7. Years of experience = age-years of schooling−6.
8. The public sector comprises government offices, government-related organizations (*Shiye Danwei*), and state-owned enterprises (SOEs).
9. The private sector includes collectively owned enterprises (COEs), privately owned enterprises (POEs), and foreign-owned enterprises (POEs).
10. For empirical studies on the wage gap between the public and private sectors in China, please refer to Demurger et al. (2012) and Ma (2018a, 2018b).
11. For recent studies on the corruption of CPC members, please refer to Kim et al. (2018).

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CHAPTER 13

Trends of Labor Union Effect on Wage

Tsukasa Matsuura and Tianyao Jiang

13.1 Introduction

Many studies have found that the influence exerted by labor unions' "collective voice" has grown weak in Western countries, with working conditions increasingly guided by managers' direct communications with employees (Bryson, 2004; Bryson et al., 2013). This has been cited as the reason for the decline in union members and unionization rates in Western countries. In weakening union power, income inequality has become a serious problem in many developed countries. Using micro-data on union membership in the United States, Farber et al. (2021) demonstrated that income inequality was negatively correlated with union density over the past 100 years. Japan has also witnessed a similar trend

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_13

with the power of unions to negotiate their working conditions with managers eroding over time. As seen in Fig. 13.1, the unionization rate in Japan has dropped from 34% in 1970 to 15% in 2019. Japan has also witnessed a decline in union membership since the middle of the 1990s.

In sharp contrast, unions in China have continued to wield power over management mainly because of government regulations that require managers to organize unions at the firm level. Consequently, the number of union members and the unionization rate has increased in China since 2000, reaching 2.8 million and 36%, respectively, in 2021, as seen in Fig. 13.2. Thus, we investigate why the trends of unionization rates are different between China and Japan.

Notably, the union systems in China and Japan are radically different. For example, China's Communist Party exerts power on each union at the firm level through the All-China Federation of Trade Unions (ACFTU). Moreover, unions organized in each firm are required to join the ACFTU since the Communist Party orders the policy for each union through the ACFTU. In Japan, several national centers of trade unions represent each union organized in offices and plants. Still, they do not exert a strong influence in guiding an individual union's behavior.

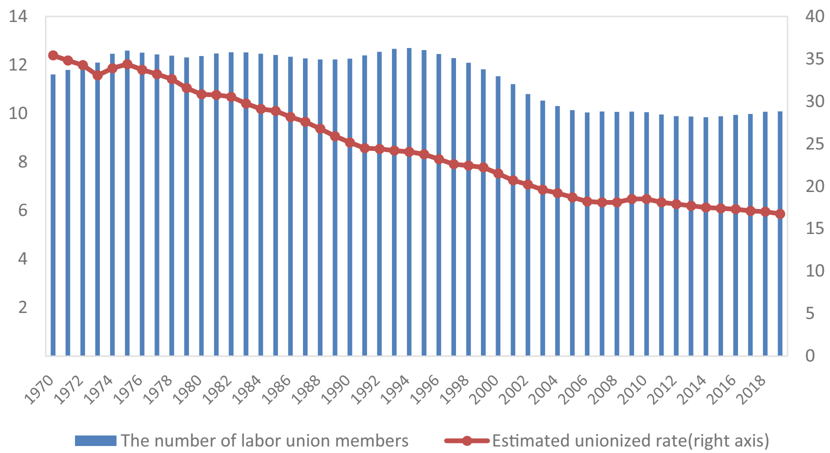

Fig. 13.1 Trends in number of labor union members and unionization rate: Japan (*Source* Authors' creation based on the data from Ministry of Health, Labor and Welfare, Basic Survey on Labor Unions)

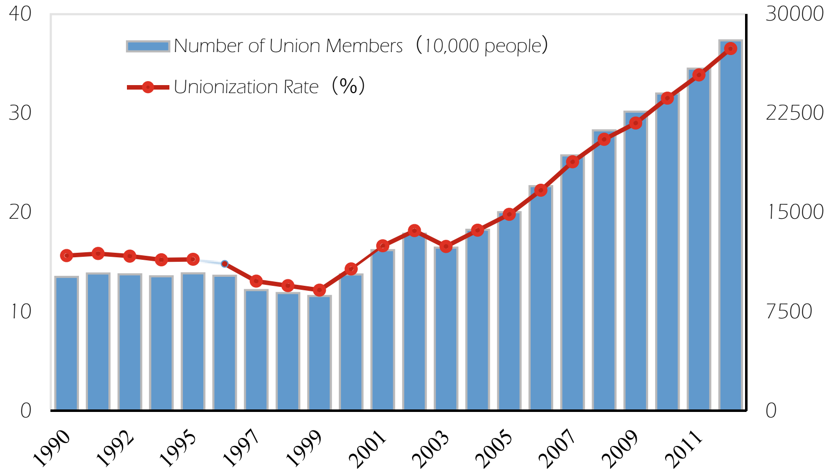

Fig. 13.2 The number of labor union members and unionization rate: China (*Source* Authors' creation based on the data from Chinese Trade Unions Statistics Yearbook)

The question of how unions are organized and they wield their power is important, considering the wide-ranging impact of unions. There is extensive literature analyzing union effects in Western countries. Some studies have examined union effects on a firm's performance and working conditions in terms of profitability, labor productivity, turnover rate, wage, working hours, and fringe benefits (Booth, 1995; Freeman & Medoff, 1984). Another study demonstrated that income inequality is lower for union members than non-union members (Freeman, 1980).

This study compared the labor union effect on wage level and the trend of union effects in China and Japan. We first explored the differences in union effects at the country level. However, we could not find any study that empirically examined these differences between China and Japan using comparative analysis; however, some papers presented the union effect on wages for the two countries individually. Few studies used household panel surveys to examine the union effect on wage, especially in China. Further, we came across just a few studies that analyzed the union effect on wage in China using a fixed effects model based on household panel data; however, some studies controlled provincial fixed effects to estimate union effects. Moreover, few studies analyzed the trend of union effect on wages. Therefore, we used the interaction term of union dummy and year trend to investigate whether the union effect on wages was stronger during the 2010s.

Further, we looked at the policy implications of our results. Specifically, if the union effects turned out to be stronger in China than Japan, it would mean that government encouragement in organizing unions may be a useful strategy for increasing wages in other countries as well. However, if union effects were not stronger in China, it would render such government encouragement futile and unnecessary.

This chapter is organized as follows: Sect. 13.2 surveys previous studies on union effects on wages in China and Japan, Sect. 13.3 compares the differences in union systems in China and Japan at the country level, Sect. 13.4 explains the dataset and estimation models, Sect. 13.5 estimates the models, and Sect. 13.6 concludes the paper.

13.2 Labor Union System in China and Japan

13.2.1 History of Labor Unions in China

Historically, unions were not powerful enough to negotiate with managers in China. Chirot (1980) argued that the Communist state created vertical functional institutions and placed them under central control to express class interests. Therefore, unions played only the role of a "transmission belt" that provided a two-way conduit between the Party center and the workers. The union was assigned two functions: by top-down transmission, mobilization of workers for labor production for the nation's collective good; and by bottom-up transmission, protection of workers' rights and interests (Chan, 2014). This dual characteristic, which Pravda and Ruble call the "classic dualism" of Communist-state trade unions, was inherently contradictory (Pravda & Ruble, 1986). The unions' "transmission belt" role was especially pronounced before the introduction of market economy in China. However, after its introduction, their role has changed and become more important. Since the Chinese government could control workers directly through the "working unit" before the country's economic reform, trade unions had few chances to play a role in the system. Wu (2021) showed that since the Chinese government ceased to intervene in labor markets directly, firms have become independent to some extent, accompanied by reform of China's state-owned enterprises following the wider economic reform.

Subsequently, employees are not directly managed by the government but by enterprises. This means that the direct connections between the government and workers, which were established during the planned economy period, have been lost. In this environment, labor unions are expected to play the role of a "transmission belt" that constructs the connection among government, enterprises, and workers.

According to Chan (2014), the ACFTU was in crisis by the second half of the 1990s. As state enterprises either collapsed or transformed into other ownership forms, union membership declined. To resolve the membership crisis that employers have conflicts with employees by increase in privately owned enterprises, the ACFTU established plenty of branches in enterprises of the booming private sector at the end of the twentieth century (Chan, 2007; Hong & Warner, 1998).

In sum, before the introduction of market economy in China, the Communist Party was seen as the representative of workers' benefits in the Chinese constitution, although unions were organized by employees independently and negotiated with managers and the government on their behalf. By this premise, the position of labor unions in China is sometimes vague. They did not function, especially before the introduction of the market economy. However, the unions made their presence known when enterprises were generally privatized. In environments where the Communist Party of China cannot control employees directly, the Party is responsible for listening to employees' voices, helping them, and resolving conflicts between employers and employees through unions. Thus, unions might be required more than before, unlike in Western countries where unions have not worked sufficiently. However, their freedom is less prominent than in Western countries. This is because unions in China are obliged to follow the government run by the Communist Party of China.

13.2.2 Disparity of Labor Union Systems Worldwide and Features of Chinese Labor Union

Studies have listed four ways in which union systems in Western countries are organized differently compared to other parts of the world: First, Western employees can choose whether they want to form a union or not, and union formation is usually met with strong resistance from the management. Second, there can be more than one union in a company. Third, employees can join the union of their own volition. Fourth, the company's management is typically excluded from the union (Gunderson et al., 2016).

Meanwhile, there are several comparative studies that have focused on the institutional complementarity of corporate governance and employment practices in Japan and Western countries (Aoki, 1994). They have found that Japanese unions share many of the features of their Western counterparts, albeit with some differences, specifically in terms of employment practices. First, many board members in Japan are promoted by employees. Moreover, as Jacoby (2005) has shown, top executives tend to have sympathy with unions and try to maintain good relations with them since they themselves have held important positions in the unions in the past. Thus, industrial relations in Japan are harmonious (Morikawa, 2010; Tachibanaki & Noda, 2000). Second, while top executives have been known to be averse to "interference" from outsiders, they tend to favor enterprise unions, whose membership is given importance in the company. However, managers in family firms tend to regard unions as organizations that can attract "outsider interference." As a result, unions are unlikely to exist in family firms (Matsuura & Noda, 2013).

In contrast, there are four major ways in which Chinese firms differ from their Western counterparts (Gunderson et al., 2016): First, the ACFTU faces pressure from the government to organize unions and ensure harmonious relations within companies. Thus, union formation is decided by "top-down" pressure. However, managers do not completely follow the commands of the government. For example, Lui and Li (2014) have presented one case where a Human Resources manager was appointed by his employers as the chairman of their company's union; interestingly, all union members at the company were middle-level managers, and most employees did not even know that a union existed in the company. Second, most employees join unions under top-down pressure from employers and managers despite Article 3 of the Union Act making union membership voluntary. Third, only one union is allowed per firm, and it does not have the right to hold strikes. Nonetheless, there has been one notable case where individual workers did resort to an illegal strike, which prompted the government to organize an "official union" (Liu & Li, 2014).

Thus, in striving to ensure institutional complementarity between unions with corporate governance, China and Japan adopt very different approaches. The role of corporate governance is important here as it has a direct bearing on unionization and union effects in all countries.

13.3 Literature Review

While studies focusing on union effects have been conducted in China, most have used firm- or province-level data and few have used household panel surveys. From a survey of 1,268 firms in 2006, Yao and Zhong (2013) found that the presence of unions is significantly associated with 10% higher wage rates. Using firm-level data based on the First National Economic Census in 2004, Ge (2014) demonstrated that unions' presence in the private sector improves wage levels. In contrast, Budd et al. (2014), using provincial-level data from the 1994 to 2008 period, found that union density does not affect wage levels. Based on their analyses of household data, Gunderson et al. (2016) deconstructed the income gap into explained and unexplained factors depending on the difference in the composition of variables using the Oaxaca–Blinder decomposition technique. For their study, they relied on China Family Panel Studies (CFPS) data, which we have also used in our current analysis. Studies have also analyzed the union effect on wages by ownership and found that the presence of unions is associated with 22.3% higher wages in government institutions; no such effect has been observed in state-owned enterprises and foreign-owned companies. Yao and Gunderson (2021) have found the presence of unions to be associated with a 6.4–9.4% wage increase based on CFPS data in 2010. They have also found that these effects do not disappear even with controlled provincial measures' establishment and compensation.

Besides wage, studies have also determined the effects of labor unions on the performance of companies and working conditions: Ge (2007) showed that labor unions have a positive effect on productivity, but a negative effect on profitability. Using firm data collected during the Private Enterprise Survey in China in 2006, Lu et al. (2010) also found that unions significantly increase labor productivity, but have an insignificant effect on profitability. Using firm-level cross-sectional data, Meanwhile, Yao and Zhong (2013) showed that unionized firms are positively associated with pension coverage.

In Japan, Tachibanaki and Noda (2000) found a positive effect of unions on wages only among women.[1] Hara and Kawaguchi (2008) analyzed wage differences between unionized and non-unionized employees using a Cotton-Neumark decomposition method based on household survey. Using firm-level survey data, Morikawa (2010) found that labor unions are positively associated with labor productivity. Using firm longitudinal survey data, Okamoto and Matsuura (2020) confirmed that unions have a positive effect on wages. Meanwhile, Noda and Hirano (2013) focused on the union effect on downsizing, not wages, and found unions to be negatively associated with downsizing before 1997, but positively associated after 1997.

13.4 Methodology: Data and Model

The present analysis is based on a panel study conducted in China and Japan. For China, we used four-period longitudinal data from CFPS for 2010, 2014, 2016, and 2018. The CFPS is a longitudinal survey that was launched by the Institute of Social Science Survey, Peking University, in 2010. The baseline national survey uses a stratified multi-stage sampling method to gather information from 14,798 households (33,600 adults and 8,990 children) across 25 provinces. The response rate for the survey is 87.9%. As working hours were not covered in 2012, we use the sample for 2010, 2014, 2016, and 2018 data set for this study. Further, we analyzed the five-period longitudinal data including 2012 data without considering working hours for robustness check.

For Japan, we used data from the Japan Household Panel Survey (JHPS) and Keio Household Panel Survey (KHPS) for the 2004–2018 period. The KHPS, which has been conducted annually since 2004, covers approximately 4,000 households and 7,000 people nationwide. The JHPS was introduced in 2009 and covers 4,000 men and women across Japan. The current study used all samples except those covering non-employed and self-employed people. The estimation model used in this study was:

$$\mathrm{LnWage}_{it} = \beta_0 + \beta_1 \mathrm{Union}_{it} + \beta_X X_{it} + u_{it} \tag{13.1}$$

$$\mathrm{LnWage}_{it} = \beta_0 + \beta_1 \mathrm{Union}_{it} + \beta_2 \mathrm{Union}_{it} \times \mathrm{Year} + \beta_X X_{it} + c_i + \varepsilon_{it} \tag{13.2}$$

We focused on the variable β_1 for Eq. (13.1), which identifies the union effect on wages and β_2 for Eq. (13.2), which identifies the trend of union effect during the periods. We used the logarithm of "personal income after taxes in the last year" as the dependent variable for China, while we used the logarithm of "earnings from work over the last year" as the dependent variable for Japan.[2] The labor union dummy was the main independent variable. In China, we set the union dummy by assigning "1" for those who chose "labor union" to answer the question, "Are you a member of the following organizations?" and "0" for all others for the years 2010, 2012, and 2014. Meanwhile, we assigned "1" for those who answered "yes" to the question, "Are you a member of a trade union?" for the years 2016 and 2018. In Japan, we used the question, "Are you a member of a labor union?" as the main independent variable. Five choices were provided for this question: (1) there is no labor union in the workplace; (2) there is a labor union in the workplace, but I am not a member; (3) I am a member of a labor union in the workplace; (4) I am a member of a labor union outside the workplace; (5) Not applicable. Here, we set the binary variable defining (3) and (4) as "1." We use the pooled ordinary least squares (POLS), fixed effects, and random effects models.[3]

Next, we compared the distribution of annual income in China and Japan. The wage distribution in China is shown in Fig. 13.3. It is evident that the wage dispersion is large in both urban and rural areas. In urban areas, the average annual income for union members is 50,762 yuan and the median is 40,000 yuan, while the average annual income for non-union members is 33,874 yuan, with a median of 25,400 yuan. In rural areas, the average annual income for union members is 45,202 yuan and the median is 40,000 yuan, while the average annual income for non-union members is 27,586 yuan, with a median of 21,900 yuan. It is evident that the wage dispersion is large in both urban and rural areas. Figure 13.4 shows the distribution of annual income in Japan. The average annual income for union members is 4.99 million yen and the median is 5 million yen, which is close to normal distribution. For non-union members, the mean and median are 3.44 million yen and 2.80 million yen, respectively; thus, their distribution is skewed to the left. The wage dispersion is also smaller for union members in Japan.

13.5 Results

13.5.1 Descriptive Statistics in China and Japan

In this section, we focus on unions' impact on wages. The descriptive statistics for China are shown on the left side of Table 13.1. The union membership rate is 9.5%, which is lower than that for aggregate data (Fig. 13.1). Budd et al. (2014) found an average union membership rate of 24% using province-specific data. However, as Yao and Gunderson

Fig 13.3 Wage distribution: China (*Source* Authors' creation)

(2021) insisted, the reason for this high membership rate might be that Chinese workers are sometimes automatically deemed as union members without their knowledge (Bai, 2011; Lui, 2010). Moreover, descriptive statistics indicate that personal income is higher for union members, although their working hours are less than those of non-unionized workers. Additionally, the percentage of the elderly cohort, incidence of marriage, and well-educated are higher among union members.

The right side of Table 13.1 shows the results for Japan. Of the total workers, 18.9% are union members. Wages are significantly higher, and dispersion is smaller for union members than non-union members. The average age is higher for non-union workers (47.1 years) than union workers (43.6 years). There are few differences in marital status and urban residence dummies. The weekly working hours are slightly longer for union workers (43.4 hours) than non-union workers (38.7 hours).

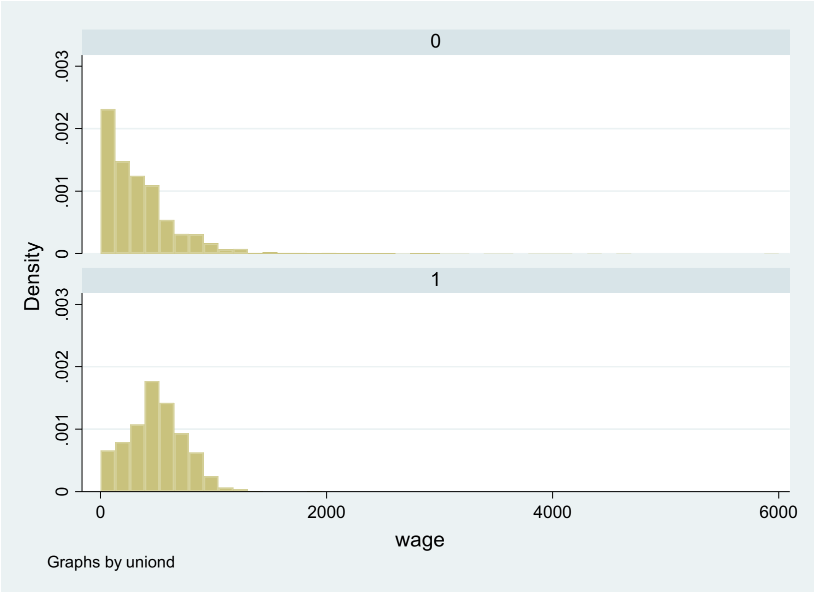

Fig 13.4 Wage distribution: Japan (*Source* Authors' creation)

13.5.2 Union Effect on Wages in China and Japan

Table 13.2 shows the results for the four-period panel data for 2010, 2014, 2016, and 2018 in China. The coefficients of union are positively significant in all full sample models, including both genders, as columns (1)–(3) show. Union members earn 27% higher wages than non-union members for pooled OLS model, although wage premiums are 5.2% for the fixed effects model. These results suggest that labor unions in China may be less effective after controlling time consistent individual effects. Focusing on gender differences in the union effect, we have divided the sample by gender. The results of columns (4)–(6) are for males and (7)–(9) are for females. Hausman's test suggests fixed effects models accepted for both genders. The results of columns (5) and (8) show the wage of union members is 7.5% higher than non-union members for males. In contrast, the coefficient of the union dummy is not significant for females in the fixed effects method. These results indicate that the wage premium of union members is exclusively for males.

Table 13.1 Descriptive statistics of variables: China 2010, 2014, 2016, 2018 and Japan

	China				*Japan*			
	Union		*Non-Union*		*Union*		*Non-Union*	
	Mean	*Std. dev*	*Mean*	*Std. dev*	*Mean*	*Std. dev*	*Mean*	*Std. Dev*
Wage	51,878.61	41,647.14	32,038.44	33,732.88	504.332	259.310	346.774	312.955
Age 20	0.180	0.384	0.314	0.464	0.098	0.298	0.075	0.264
Age 30	0.275	0.446	0.280	0.449	0.273	0.445	0.187	0.390
Age 40	0.319	0.466	0.257	0.437	0.312	0.464	0.292	0.455
Age 50	0.226	0.419	0.150	0.357	0.317	0.465	0.446	0.497
Married	0.824	0.381	0.776	0.417	0.752	0.432	0.735	0.442
Years of education	13.072	3.350	10.336	3.968	13.829	2.065	13.466	2.079
Working hour	46.028	13.609	51.614	17.528	43.444	14.895	38.759	18.918
City	0.859	0.348	0.637	0.481	0.271	0.444	0.292	0.455
Observations	2,510		23,998		8,287		35,325	

Source Authors' creation

Table 13.2 Union effect on wage (2010, 2014, 2016, 2018): China

	(1) *Total*	(2)	(3)	(4) *Male*	(5)	(6)	(7) *Female*	(8)	(9)
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Union	0.271***	0.0523**	0.223***	0.199***	0.0749**	0.181***	0.345***	0.0149	0.274***
	(0.0170)	(0.0246)	(0.0179)	(0.0209)	(0.0301)	(0.0214)	(0.0280)	(0.0424)	(0.0300)
Age 30	0.226***	0.108***	0.208***	0.166***	0.0852**	0.159***	0.245***	0.129***	0.221***
	(0.0158)	(0.0285)	(0.0148)	(0.0194)	(0.0366)	(0.0189)	(0.0242)	(0.0454)	(0.0228)
Age 40	0.130***	0.0436	0.135***	0.0322	−0.0140	0.0355*	0.197***	0.0939	0.193***
	(0.0175)	(0.0464)	(0.0166)	(0.0221)	(0.0593)	(0.0210)	(0.0258)	(0.0748)	(0.0256)
Age 50	0.0685***	−0.112*	0.0637***	−0.0954***	−0.134*	−0.0894***	0.107***	−0.125	0.0917***
	(0.0202)	(0.0641)	(0.0194)	(0.0239)	(0.0803)	(0.0234)	(0.0347)	(0.106)	(0.0330)
Married	0.0860***	0.148***	0.103***	0.245***	0.186***	0.248***	−0.0308	0.0877	−0.0110
	(0.0163)	(0.0341)	(0.0152)	(0.0207)	(0.0428)	(0.0191)	(0.0247)	(0.0559)	(0.0237)
Years of education	0.0590***	0.0198***	0.0582***	0.0466***	0.0274***	0.0458***	0.0637***	0.00639	0.0638***
	(0.00183)	(0.00749)	(0.00172)	(0.00229)	(0.00943)	(0.00215)	(0.00287)	(0.0123)	(0.00267)
Working hour	0.00175***	0.00235***	0.00191***	−0.0000547	0.00189***	0.000356	0.00237***	0.00339***	0.00260***
	(0.000359)	(0.000498)	(0.000309)	(0.000433)	(0.000596)	(0.000371)	(0.000597)	(0.000883)	(0.000520)
Urban	0.104***	0.0644**	0.116***	0.113***	0.0865**	0.125***	0.133***	0.0306	0.142***
	(0.0125)	(0.0287)	(0.0122)	(0.0149)	(0.0357)	(0.0148)	(0.0202)	(0.0476)	(0.0197)
Industry, Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman test		423.65***			135.79***			245.63***	

(continued)

Table 13.2 (continued)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
		Total			*Male*			*Female*	
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
R-squared	0.1915	0.2886	0.2714	0.2032	0.2942	0.2854	0.2077	0.2905	0.2643
Observations	26,508	26,508	26,508	15,439	15,439	15,439	11,069	11,069	11,069

Note
1. Clustered robust standard errors in parentheses
2.***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source Authors' creation

However, this might be because an individual's change in union status could not be sufficiently identified due to the short-length data. To deal with this problem, we analyzed the five-period panel data, adding data from 2012, although variables for working hours were not available. The results are presented in Table 13.3. The coefficients for labor unions are positively significant in all models. The wage for union members is 26.1% higher than that for non-union members in pooled OLS model. The results of columns (2) and (3) control time consistent unobserved effects. The result of the Hausman test suggests fixed effect model is accepted. The result of column (2) shows the wage for union members is 4.5% higher than that for non-union members in the fixed effect model. Next, we divide the sample by gender. Columns (4)–(9) in Table 13.3 present these results. These are almost the same as the ones in Table 13.2.

Although most studies have used provincial panel data or firm-based data, our results confirm the positive effect of labor unions on wages using household panel data. We have verified that labor union membership positively affects wages for Chinese males, even after controlling for covariates and fixed effects. However, the union effect is not different from other studies using household data (Gunderson et al., 2016; Yao & Gunderson, 2021).

Table 13.4 shows the results for Japan. Columns (1)–(3) show the results for the total sample, including both genders. The coefficients for unions are positively significant for the OLS, fixed effects, and random effects models. Column (1) shows the wage of union members is 37.6% higher than non-union members in pooled OLS model. Hausman's test suggests fixed effects model is accepted. The wage of union members is 15.5% higher than that of non-union members in the fixed effects model. Next, we focus on gender differences between males (see columns [4]–[6]) and females (see columns [7]–[9]). Although the effect of labor unions is stronger for females than for males in the OLS and random effects models, the effect of labor unions is almost the same for both genders (males [13.1%] and females [13.9%]) in the fixed effects model (see columns [5] and [8]). Hara and Kawaguchi (2008), who used cross-sectional household data, have found that the wage effect is 7–17% for both genders. This effect is not different for both genders after controlling most demographic variables.

In sum, union members' wages are significantly higher than non-union members for both countries. However, the coefficient for labor unions is not significant for Chinese females in the five-period fixed effects

Table 13.3 Union effect on wage (2010, 2012, 2014, 2016, 2018): China

	(1) *Total*	(2)	(3)	(4) *Male*	(5)	(6)	(7) *Female*	(8)	(9)
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Union	0.261***	0.0446**	0.194***	0.206***	0.0765***	0.174***	0.316***	−0.00717	0.217***
	(0.0160)	(0.0206)	(0.0165)	(0.0198)	(0.0253)	(0.0199)	(0.0261)	(0.0352)	(0.0277)
Age 30	0.185***	0.0732***	0.165***	0.134***	0.0515*	0.117***	0.205***	0.0895**	0.183***
	(0.0147)	(0.0240)	(0.0138)	(0.0179)	(0.0306)	(0.0175)	(0.0226)	(0.0387)	(0.0213)
Age 40	0.0766***	0.0237	0.0870***	−0.0169	−0.0121	−0.0145	0.155***	0.0406	0.156***
	(0.0164)	(0.0383)	(0.0155)	(0.0204)	(0.0489)	(0.0195)	(0.0245)	(0.0620)	(0.0241)
Age 50	0.0283	−0.116**	0.0166	−0.138***	−0.129**	−0.142***	0.0955***	−0.140	0.0747**
	(0.0188)	(0.0523)	(0.0183)	(0.0221)	(0.0655)	(0.0219)	(0.0327)	(0.0867)	(0.0314)
Married	0.0834***	0.0946***	0.0970***	0.234***	0.157***	0.236***	−0.0318	0.00875	−0.0191
	(0.0151)	(0.0278)	(0.0143)	(0.0191)	(0.0349)	(0.0178)	(0.0232)	(0.0458)	(0.0224)
Years of education	0.0581***	0.0116*	0.0570***	0.0465***	0.0133*	0.0455***	0.0635***	0.00756	0.0635***
	(0.00169)	(0.00600)	(0.00158)	(0.00212)	(0.00742)	(0.00196)	(0.00265)	(0.0101)	(0.00248)
Urban	0.105***	0.0590**	0.121***	0.120***	0.0689**	0.133***	0.132***	0.0394	0.145***
	(0.0117)	(0.0243)	(0.0115)	(0.0139)	(0.0302)	(0.0139)	(0.0190)	(0.0404)	(0.0186)
Industry, Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

	(1)	(2) Total	(3)	(4)	(5) Male	(6)	(7)	(8) Female	(9)
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Hausman test		637.80***			259.43***			319.78***	
R-squared	0.1744	0.2256	0.2091	0.1862	0.2294	0.2176	0.1933	0.2274	0.2061
Observations	33,468	33,468	33,468	19,703	19,703	19,703	13,765	13,765	13,765

Note
1. Clustered robust standard errors in parentheses
2.***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source Authors' creation

Table 13.4 Union effect on wage: Japan

	(1) Total	*(2)*	*(3)*	*(4) Male*	*(5)*	*(6)*	*(7) Female*	*(8)*	*(9)*
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Union	0.376***	0.155***	0.219***	0.211***	0.131***	0.161***	0.446***	0.139***	0.248***
	(0.0164)	(0.0100)	(0.00961)	(0.0143)	(0.0107)	(0.00990)	(0.0288)	(0.0190)	(0.0175)
Age 30	0.200***	0.193***	0.211***	0.352***	0.305***	0.327***	0.0993***	0.0434*	0.0625***
	(0.0201)	(0.0148)	(0.0137)	(0.0259)	(0.0171)	(0.0154)	(0.0283)	(0.0250)	(0.0220)
Age 40	0.341***	0.336***	0.362***	0.560***	0.451***	0.477***	0.157***	0.189***	0.186***
	(0.0235)	(0.0198)	(0.0168)	(0.0292)	(0.0224)	(0.0185)	(0.0318)	(0.0343)	(0.0266)
Age 50	0.404***	0.387***	0.428***	0.484***	0.510***	0.502***	0.213***	0.217***	0.239***
	(0.0243)	(0.0248)	(0.0194)	(0.0309)	(0.0282)	(0.0213)	(0.0332)	(0.0430)	(0.0302)
Married	0.0978***	0.00162	0.0270**	0.376***	0.186***	0.274***	−0.229***	−0.173***	−0.270***
	(0.0180)	(0.0150)	(0.0126)	(0.0222)	(0.0178)	(0.0143)	(0.0250)	(0.0248)	(0.0191)
Years of education	0.0915***		0.103***	0.0593***		0.0661***	0.0552***		0.0612***
	(0.00436)		(0.00413)	(0.00420)		(0.00407)	(0.00704)		(0.00683)
Working hour	0.0251***	0.00658***	0.00962***	0.00854***	0.00394***	0.00491***	0.0252***	0.00956***	0.0131***
	(0.000556)	(0.000185)	(0.000183)	(0.000552)	(0.000205)	(0.000199)	(0.000865)	(0.000333)	(0.000321)
City	0.0346*	−0.000615	−0.00987	0.0554***	0.0263	0.0239	0.0273	−0.0406	−0.0252
	(0.0187)	(0.0190)	(0.0140)	(0.0187)	(0.0208)	(0.0149)	(0.0234)	(0.0344)	(0.0215)

	(1)	(2) Total	(3)	(4)	(5) Male	(6)	(7)	(8) Female	(9)
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Industry, Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman test		14,393.82 ***			585.80 ***			1751.81 ***	
Observations	34,971	34,971	34,971	19,775	19,775	19,775	15,196	15,196	15,196
R-squared	0.434	0.099		0.334	0.110		0.404	0.142	

Note
1. Clustered Robust Standard Errors in Parentheses
2.***p < 0.01, **p < 0.05, *p < 0.1
Source Authors' creation

model. Despite rapid unionization in China, the coefficients for the union dummy indicate that the union effect in China is smaller than in Japan after controlling time consistent unobserved effects.

13.5.3 Trend of Union Effect on Wage in China and Japan

In the previous section, our estimations show union effects on wages are larger in Japan than in China. However, the unionization rate increases rapidly in China but decreases in Japan. To explain this, we examine the hypothesis the trend of union effects on wages is different for both countries.

Table 13.5 shows the results for four periods in China: 2010, 2014, 2016, and 2018. Columns (1)–(3) in Table 13.4 present the results using samples for both genders. In OLS model, the coefficient for interaction term "union × year" is positively significant in the total sample case, showing that the union effect is stronger during 2010s. However, in the fixed effects model, the coefficient of interaction term changes from positively significant to negatively significant, showing that union effects become weaker during the 2010s in China, considering unobserved time consistent effects. We divide the sample by genders, focusing on gender difference, as columns (4)–(9) in Table 13.4 show. The interaction term coefficients are not significant for both genders in the fixed effects model, although these coefficients are negative.

We examined the wage effect on wage distribution for robustness check using five-period panel data (2010, 2012, 2014, 2016, 2018), although the variable for working hours was unavailable. The results are presented in Table 13.6. In the five-period panel data, the results are almost the same for the three periods. The coefficient of the interaction term in columns (1) and (7) indicates that the union effect becomes especially stronger for Chinese females during the periods. However, these effects disappear in the fixed effects model (see columns [2], [5], and [8]). These results indicate that although union effects on wages seemed stronger during the 2010s in OLS models, these effects disappear considering fixed effects. Union effects were weaker during the 2010s in some fixed effects models.

Table 13.7 presents the results for Japan. Columns (1)–(3) show the results of the total sample model. In pooled OLS model, the coefficients for interaction terms "union × year" are positively significant, indicating that unions' effects on wages are smaller by year. It might be the reason

Table 13.5 The trend of union effect on wage: (China 2010, 2014, 2016, 2018)

	(1) Total	*(2)*	*(3)*	*(4) Male*	*(5)*	*(6)*	*(7) Female*	*(8)*	*(9)*
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Union	-18.78**	26.55*	−2.655	-10.19	16.18	−1.614	-14.01	36.18	2.924
	(9.151)	(13.98)	(10.30)	(11.52)	(17.02)	(12.30)	(14.72)	(24.07)	(17.51)
Uniond_year	0.00945**	−0.0131*	0.00143	0.00516	−0.00799	0.000890	0.00712	−0.0179	−0.00132
	(0.00454)	(0.00693)	(0.00511)	(0.00571)	(0.00844)	(0.00610)	(0.00730)	(0.0119)	(0.00869)
Age 30	0.226***	0.107***	0.208***	0.166***	0.0842**	0.159***	0.245***	0.129***	0.221***
	(0.0158)	(0.0285)	(0.0148)	(0.0194)	(0.0367)	(0.0189)	(0.0242)	(0.0454)	(0.0228)
Age 40	0.130***	0.0441	0.135***	0.0324	−0.0149	0.0356*	0.197***	0.0978	0.193***
	(0.0175)	(0.0464)	(0.0166)	(0.0221)	(0.0593)	(0.0211)	(0.0258)	(0.0748)	(0.0256)
Age 50	0.0687***	−0.108*	0.0637***	−0.0953***	−0.132	−0.0894***	0.108***	−0.117	0.0917***
	(0.0202)	(0.0641)	(0.0194)	(0.0239)	(0.0803)	(0.0234)	(0.0347)	(0.106)	(0.0330)
Married	0.0855***	0.146***	0.103***	0.245***	0.186***	0.248***	−0.0310	0.0864	−0.0110
	(0.0163)	(0.0341)	(0.0152)	(0.0207)	(0.0428)	(0.0191)	(0.0247)	(0.0559)	(0.0237)
Years of education	0.0590***	0.0199***	0.0582***	0.0466***	0.0274***	0.0458***	0.0637***	0.00681	0.0638***
	(0.00183)	(0.00749)	(0.00172)	(0.00229)	(0.00943)	(0.00215)	(0.00287)	(0.0123)	(0.00267)
Working hour	0.00176***	0.00233***	0.00191***	−0.0000480	0.00188***	0.000358	0.00237***	0.00337***	0.00259***
	(0.000359)	(0.000498)	(0.000309)	(0.000433)	(0.000596)	(0.000371)	(0.000597)	(0.000883)	(0.000520)
Urban	0.104***	0.0631**	0.116***	0.113***	0.0858**	0.125***	0.133***	0.0287	0.142***
	(0.0125)	(0.0287)	(0.0122)	(0.0149)	(0.0357)	(0.0148)	(0.0202)	(0.0476)	(0.0197)
Industry, Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(continued)

Table 13.5 (continued)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
		Total			*Male*			*Female*	
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Hausman test		418.68***			124.08***			236.40***	
R-squared	0.1916	0.2889	0.2713	0.2032	0.2943	0.2854	0.2078	0.2909	0.2644
Observations	26,508	26,508	26,508	15,439	15,439	15,439	11,069	11,069	11,069

Note
1. Clustered robust standard errors in parentheses
2.***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source Authors' creation

Table 13.6 The trend of Union effect on wage (China 2010, 2012, 2014, 2016, 2018)

	(1) *Total*	(2)	(3)	(4) *Male*	(5)	(6)	(7) *Female*	(8)	(9)
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Union	-21.01**	8.735	-8.730	−5.853	6.584	−2.293	-28.94**	6.020	-13.73
	(8.488)	(11.30)	(9.431)	(10.65)	(13.89)	(11.38)	(13.72)	(19.22)	(15.94)
Uniond_year	0.0106**	−0.00431	0.00443	0.00301	−0.00323	0.00122	0.0145**	−0.00299	0.00692
	(0.00421)	(0.00561)	(0.00468)	(0.00528)	(0.00689)	(0.00565)	(0.00681)	(0.00954)	(0.00791)
Age 30	0.185***	0.0729***	0.165***	0.135***	0.0510*	0.117***	0.204***	0.0896**	0.183***
	(0.0147)	(0.0240)	(0.0138)	(0.0179)	(0.0307)	(0.0175)	(0.0226)	(0.0387)	(0.0213)
Age 40	0.0768***	0.0239	0.0871***	−0.0168	−0.0124	−0.0144	0.155***	0.0414	0.155***
	(0.0164)	(0.0383)	(0.0155)	(0.0204)	(0.0489)	(0.0195)	(0.0245)	(0.0620)	(0.0241)
Age 50	0.0284	−0.115**	0.0163	−0.138***	−0.129**	−0.143***	0.0958***	−0.139	0.0744**
	(0.0188)	(0.0523)	(0.0183)	(0.0221)	(0.0655)	(0.0219)	(0.0327)	(0.0868)	(0.0314)
Married	0.0829***	0.0943***	0.0969***	0.234***	0.157***	0.236***	−0.0321	0.00867	−0.0192
	(0.0151)	(0.0278)	(0.0143)	(0.0191)	(0.0349)	(0.0178)	(0.0231)	(0.0458)	(0.0224)
Years of education	0.0581***	0.0116*	0.0570***	0.0465***	0.0133*	0.0455***	0.0635***	0.00758	0.0635***
	(0.00169)	(0.00600)	(0.00158)	(0.00212)	(0.00742)	(0.00196)	(0.00265)	(0.0101)	(0.00248)
Urban	0.105***	0.0586**	0.121***	0.120***	0.0687**	0.133***	0.132***	0.0390	0.145***
	(0.0117)	(0.0243)	(0.0115)	(0.0139)	(0.0302)	(0.0139)	(0.0190)	(0.0404)	(0.0186)
Industry, Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hausman test		612.08***			255.02***			293.83***	
R-squared	0.1745	0.2257	0.2090	0.1862	0.2294	0.2176	0.1935	0.2274	0.2059
Observations	33,468	33,468	33,468	19,703	19,703	19,703	13,765	13,765	13,765

Note
1. Clustered robust standard errors in parentheses
2.***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source Authors' creation

for decreasing the unionization rate in Japan that union effects on wages become weaker. However, this effect disappears after controlling time consistent unobserved effect by fixed effects model, as column (2) shows.

Furthermore, column (5) presents a positive interaction term, indicating that the union effect gradually increases for Japanese males in the fixed effects model. These results suggest that unions' effects on wages for males might become more significant in the 2010s after considering endogeneity in Japan. It cannot explain why the unionization rate decreases in Japan.

In sum, we examine whether the union effect on wage has changed during the 2010s, focusing on the interaction term "union × year" in China and Japan. The results of the OLS model show that the interaction term is positively significant in China, while it is negatively significant in Japan. It means union effects are more substantial in China while weaker in Japan during the 2010s. It might explain the trend of unionization rate is entirely different for both countries. However, these effects disappear after controlling time consistent unobserved effects by fixed effects model. Furthermore, union effects for Japanese males became stronger during the 2010s in the fixed effects model. These results indicate that the union effects on wages cannot sufficiently explain why the unionization rate trend is entirely different for both countries.

13.6 Conclusion

We explored whether country differences in union systems in China and Japan were associated with differences in the union effect on working conditions in the two countries. We analyzed union effects on wages and the trend of union effects with the help of a household panel survey. We have drawn the following conclusions: First, the union impact on wages is 10% after controlling for fixed effects in Japan; the result is not different for males and females. In China, the impact of unions on wages is weaker than in Japan under the fixed effects models. These results suggest the unions can associate with the increase in wages for both countries. The impact of this union effect is more significant in Japan than in China after controlling time consistent unobserved results.

Second, the trend of union effects on wages for China is entirely different from Japan in total sample pooled OLS models. The coefficients for interaction terms are positively associated with wage increases in China, while the coefficients for interaction terms are negatively associated

Table 13.7 The trend of union effect on wage: Japan

	(1) *Total*	(2)	(3)	(4) *Male*	(5)	(6)	(7) *Female*	(8)	(9)
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Union	17.83***	−2.464	2.954	7.593	-9.651***	−3.608	25.79***	−3.107	6.923
	(5.741)	(3.301)	(3.327)	(5.433)	(3.526)	(3.439)	(9.935)	(6.373)	(6.244)
Union × Years	−0.00868***	0.00130	−0.00136	−0.00367	0.00486***	0.00187	−0.0126**	0.00161	−0.00332
	(0.00286)	(0.00164)	(0.00165)	(0.00270)	(0.00175)	(0.00171)	(0.00494)	(0.00317)	(0.00310)
Age30	0.200***	0.192***	0.211***	0.352***	0.302***	0.326***	0.101***	0.0427*	0.0637***
	(0.0201)	(0.0148)	(0.0138)	(0.0259)	(0.0171)	(0.0154)	(0.0283)	(0.0250)	(0.0220)
Age40	0.341***	0.335***	0.363***	0.560***	0.446***	0.476***	0.157***	0.188***	0.187***
	(0.0235)	(0.0198)	(0.0168)	(0.0292)	(0.0225)	(0.0185)	(0.0318)	(0.0343)	(0.0266)
Age50	0.403***	0.386***	0.429***	0.484***	0.505***	0.501***	0.214***	0.216***	0.239***
	(0.0243)	(0.0249)	(0.0195)	(0.0309)	(0.0282)	(0.0213)	(0.0332)	(0.0430)	(0.0302)
Married	0.0976***	0.00107	0.0273**	0.376***	0.184***	0.274***	−0.229***	−0.173***	−0.270***
	(0.0180)	(0.0151)	(0.0126)	(0.0222)	(0.0178)	(0.0143)	(0.0250)	(0.0248)	(0.0191)
Years of education	0.0914***		0.102***	0.0593***		0.0661***	0.0550***		0.0611***
	(0.00435)		(0.00413)	(0.00420)		(0.00407)	(0.00702)		(0.00683)
Working hour	0.0251***	0.00658***	0.00962***	0.00854***	0.00393***	0.00490***	0.0252***	0.00956***	0.0132***
	(0.000556)	(0.000185)	(0.000183)	(0.000552)	(0.000205)	(0.000199)	(0.000865)	(0.000333)	(0.000321)
City	0.0348*	−0.000713	−0.00978	0.0554***	0.0268	0.0239	0.0280	−0.0411	−0.0245
	(0.0187)	(0.0190)	(0.0140)	(0.0187)	(0.0208)	(0.0149)	(0.0234)	(0.0344)	(0.0215)
Industry, Year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

(continued)

Table 13.7 (continued)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*
		Total			*Male*			*Female*	
	POLS	*FE*	*RE*	*POLS*	*FE*	*RE*	*POLS*	*FE*	*RE*
Hausman test		440.81 ***			42.70				
R-squared	0.434	0.099		0.334	0.110		0.405	0.142	
Observations	34,971	34,971	34,971	19,775	19,775	19,775	15,196	15,196	15,196

Note
1. Clustered robust standard errors in parentheses
2.***$p < 0.01$, **$p < 0.05$, *$p < 0.1$
Source Authors' creation

with Japan. However, these union effects change considering fixed effects for both countries. While union effects became weaker for Chinese, the effect became stronger for Japanese males during the 2010s in the fixed effect model.

Thus, overall, the union effects on wages are more significant in Japan than in China. In China, unions are organized under pressure from the government to spontaneously stabilize industrial relations from within firms rather than through externals. Additionally, unions' activities are restricted as they are not allowed to strike. It might be why union effects are weaker in China than in Japan. As Yao and Zhong (2013) have pointed out, the unionization rate has increased rapidly in China possibly because the government orders enterprises to organize unions for social stabilization through the ACFTU. Thus, the unionization rate has increased rapidly in China instead of Japan and Western countries despite the weak union effect on wages.

There are some issues still unresolved. First, we cannot sufficiently explain why the trend of labor union effects on wages differs between countries. We showed that union effects are increasing in China while decreasing in Japan using pooled OLS models. However, the effects disappear after controlling fixed effects. Second, we have also not delved into what kinds of differences in union systems between countries have resulted in the differences in union effects on wages in China and Japan. Studies have shown that corporate governance structures have institutional complementarity with industrial relations, including employment practices. Thus, it will be worthwhile to examine whether the association between unionization and union effects on working conditions is influenced by corporate ownership structures using longitudinal data from China and Japan.

Notes

1. There are some previous studies focusing on unions' effect on wage in Japan before 2000 (Brunello, 1992; Tsuru & Rebitzer, 1995).
2. We do not use a no income sample.
3. We use cluster-robust standard errors.

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CHAPTER 14

Employment Equality Policy and Gender Gap in Labor Market

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14.1 Introduction

Experiences in developed countries show that with economic development and the implementation of policies such as the *Equal Employment Opportunity Law*, women's participation in the labor market and society has improved, which has contributed to reducing the gender gap in the labor market and households.

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_14

In China, although the gender gap during the planned economy period (1949–1977) was small, under the market-oriented reform period (post-1978) (also known as the "transition period"), the gender gap in the labor market has expanded (Gustafsson & Li, 2000; Li & Song, 2013; Li et al., 2011; Ma, 2021a; Song et al., 2017). The economic reform has had both direct and indirect effects on the expansion of the gender wage gap. For example, during the period of employment adjustment of state-owned enterprises (SOEs), the probability of becoming unemployed was greater for women than for men; there was a gender wage gap among re-employed workers, primarily because of discrimination against women (Knight & Li, 2004; Ma, 2008). In addition, because the gender wage gap in non-SOEs is larger than that in SOEs, the ownership reform promoted the rapid development of non-SOEs, leading to a further increase in the gender wage gap. Furthermore, unlike Japan and other developed countries, in which the trend of change in the gender wage gap has been from large to small, the change in the gender wage gap in China is a reverse phenomenon accompanying economic growth. During the market-oriented reform period, although the Chinese government has introduced a set of new policies addressing the gender gap in the labor market, the gender wage gap has widened (Ma, 2021a).

In contrast, since the 1980s, the Japanese government has enforced the implementation of *the Equal Employment Opportunity Law for Men and Women*, *Childcare/Nursing Care Leave Law*, *Basic Act for Gender Equality*, *Next Generation Law*, and *Law for Promotion of Women's Advancement*. It is expected that these policies may encourage more married Japanese women to participate in the labor market. In fact, the gender wage gap in Japan reduced from 1976 to 2017. However, most Japanese working women are non-regular workers (i.e., part-time workers), and the wage gap between regular and non-regular workers has increased in Japan.

According to the World Economic Forum and the World Bank's Gender Gap Index, the gender gaps in China and Japan are larger than those in other developed countries. Both Chinese and Japanese governments are trying to reduce the gender wage gap, but have been unable to address this problem completely. As Japan is a developed country with a large gender gap among other countries world over, this chapter conducts a comparative study on the issue between China and Japan.

This chapter is structured as follows: Sect. 14.2 introduces female employment promotion policies in China and Japan; Sect. 14.3 reviews the trends in the gender wage gap in China and Japan; Sect. 14.4 summarizes the results of empirical studies on the gender wage gap and uses the latest survey data to investigate the gender wage gap based on the Blinder-Oaxaca decomposition method in two countries; Sect. 14.5 concludes this study and discusses policy implications.

14.2 Female Employment Promotion Policies in China and Japan

14.2.1 Female Employment Promotion Policy in China

As the level of economic development, economic policies, and systems have transformed since 1949 when the People's Republic of China was established, economic historians usually divide the Chinese economy into a planned economy period (1949–1977) and a market-oriented reform period (post 1978). In the period of the planned economy, with the "socialism restructuring campaign," the ownership of all firms was transferred to the government, giving rise to SOEs and collectively owned enterprises (COEs). In other words, only the public sector sustained during the planned economy period in China. The Chinese government emphasized gender equality as an important socialist ideology. The government propagated it by implementing equal employment policies and related policies to promote women's employment, as demonstrated by the slogan "women hold half of the sky." Gender equality was clearly pronounced in the *Constitution* and *Labor Contract Law*. Therefore, the gender gap in employment, wages, and occupation was much smaller during that era (Gustafsson & Li, 2000; Li & Song, 2013; Ma, 2018a, 2018b, 2021a; Meng, 2000).

Under the market-oriented reform period, the influence of market mechanisms has increased, which has enhanced China's economic growth (Lin et al., 1994). With progressive economic transition and economic growth, female labor force participation has decreased, and the gender wage gap has expanded. To address the gender disparity problem, the Chinese government has enforced the equal employment policies (Table 14.1).

In 1986, the regulations to protect women's rights to participate in the labor market were implemented. During the period of pregnancy, maternity leave, and breastfeeding, the company should not dissolve the labor

Table 14.1 Female employment promotion policies in China

Year	*Policy*	*Main content*
1986	Provisional Regulations on Institution of Labor Contract System in State-Owned Enterprises	During pregnancy, maternity leave, and breastfeeding, the company must not dissolve the labor contract, and should give the same treatment as regular worker for the same type of work
1993	Law of the People's Republic of China on Protection of Rights and Interests of Women	Emphasize gender equality. Gender cannot be a basis for hiring; hiring standards for women cannot be raised
1994	Labor Law of the People's Republic of China	The distribution of remuneration shall be based on the distribution of work, and the principle of equal pay for equal work shall be implemented for both men and women
2009	Labor Law of the People's Republic of China (2009 Amendment)	Female employees, during the childbirth and childbearing period, can avail at least 90 days of maternity leave
2012	Special Rules on the Labor Protection of Female Employees	Maternity leave is extended to 98 days
2016	The regulations of provinces	The number of days for paternity leave range from 7 to 30. The most common span is 15 days

Source Authors' creation based on Chinese government regulations

contract and should provide the same treatment as the regular workers for the same type of work.

The *Law of the People's Republic of China on Protection of Women's Rights and Interests*, published in 1993, emphasizes gender equality. It states that no company can deny employment opportunities on the basis of gender or raise recruitment standards for women. This rule is confirmed by the *Labor Law of the People's Republic of China* published in 1994. The Labor Law also stipulates that the distribution of remuneration shall be based on the distribution of work, and the principle of equal pay for equal work shall be implemented for both men and women. The *Labor Law of the People's Republic of China (2009 Amendment)*, published in 2009, states that women can take at least 90 days of maternity leave during childbirth and childbearing period. The *Special Rules on the Labor Protection of Female Employees* was published in 2012. According to this law, maternity leave has been extended to 98 days.

Until recently, men's paternity leave has not been included in any national-level law or regulation in China. However, the governments of some provinces have established *men's paternity leave policies* since 2016. The number of days for paternity leave differs across provinces. In provinces such as Tianjin and Shandong, paternity leave is regulated for seven days. In Henan, Yunnan, Gansu, and some other provinces, paternity leave is 30 days, according to the policies and regulations of local governments. In some provinces, the span ranges from 7 to 30 days, with the most common span being 15 days.

14.2.2 Female Employment Promotion Policy in Japan

14.2.2.1 Policies to Prohibit Sexism and Support Positive Employment Actions

Women's employment promotion policy in Japan was based on the *Factory Act* enacted in 1911 (enforced in 1916). The *Factory Act* stipulates employment restrictions, such as prohibiting women from working over 12 hours a day and working late at night (between 10 pm and 4 am). The *Factory Act* has been reformed several times, but employment restrictions on women have been gradually broadened, and regulations have been tightened.

The *Labor Standards Law* enacted in 1947 after World War II, it basically followed the employment restrictions for women in the *Factory Law*. However, as Japan entered the high economic growth phase, the number of female workers increased, and balancing work and family life became important. Therefore, the *Working Women's Welfare Law* was enacted in 1972. In this era, most people thought women should do housework rather than participate in the labor market, and this law reflected these views. However, during the deliberation of the congress (House of Representatives), the law was revised and the phrase "reduce gender discrimination" was added as the basic principle. Some people perceived that "this sprouted and led to the enactment of the *Equal Employment Opportunity Law for Men and Women*, but it took another 10 years or more before the Equal Employment Opportunity Law was enacted."

In 1985, the *Working Women's Welfare Law* was amended to enact an *Equal Employment Opportunity Law for men and women*. This law had been under consideration for many years as a part of legislation in Japan to ratify the *World Action Plan* adopted in the United Nations Women's Year in 1975, and the Convention on the *Elimination of All Forms of*

Discrimination against Women in 1979. However, while the law calls for equal employment opportunities for men and women, it merely prohibits gender discrimination in education, training, and welfare, in addition to the mandatory retirement age, retirement, and dismissal for which judgment case rules have already been established. Prohibiting discrimination against women regarding recruitment, placement, and promotion has become an obligation for companies. The provisions for women's protection in the *Labor Standards Law* have remained unchanged, and gender equality has not improved; however, women's protection has also been preserved.

Many companies were forced to respond when the *Equal Employment Opportunity Law for Men and Women* came into force in 1986. As a result, many companies, especially larger ones, have introduced course-based employment management systems since 1986. This system is a type of double-track employment management, consisting of a general employment course for training executive candidates, and a general employment course for training professionals. The former can help a worker develop a working career and become a manager. However, while selecting the former course, a worker must take workplace rotation (for example, leaving Tokyo to the local city) according to the company's request or order. Job seekers can select courses voluntarily, and many job seekers are new school graduates. The company decides to hire for each course and manages the employment. However, in actual operation, most of the hires in the general employment course for training executive candidates were men, and most of the general employment course hires for training professionals were women, which did not meet the purpose of the law to reduce the gender gap in the workplace.

In 1995, ten years after the enforcement of the *Equal Employment Opportunity Law*, the government evaluated the policy. In the process, indirect discrimination, positive action, and sexual harassment issues were discussed, along with the prohibition of sex discrimination and abolition of women's protection provisions. The law was amended in 1997 to prohibit discrimination against women in recruitment, placement, and promotion and to abolish women's protection provisions, such as a ban on late-night work. A new provision has been established that allows the state to provide consultation and other assistance for the positive actions taken by employers (efforts to eliminate de facto differences between men and women). Furthermore, to prevent sexual harassment in the workplace, a new provision has been established that requires employers to consider employment management and maternal health management measures.

The *Equal Employment Opportunity Law* was revised in 2006. In this amendment, the prohibition of discrimination against women forbids gender discrimination. This amendment has changed the motto from "give women equal opportunities as men" to "give equal opportunities regardless of gender." Simultaneously, the revised law stipulates the prohibition of indirect discrimination. In addition, a ban on dismissal due to pregnancy, childbirth, and availing prenatal and postnatal leave have been added, and disadvantageous treatments other than dismissal have also been banned. Regarding sexual harassment prevention regulations in the workplace, men have been also added to the regulations, which became a mandatory provision.

During this period, the system was developed so that women could participate in the same fields as men other than the field of employment. Consequently, the *Basic Act for Gender Equality* was enacted in 1999. This law is philosophical, and emphasizes five philosophies. In 2014, the *Act on the Promotion of Female Advancement* was enacted, which aimed to further promote women's participation in society and increase the number of women in social status. This law evaluates the situation regarding women's advancement, plans efforts to promote women's advancement, and announces the contents and achievement targets for national and local governments and private companies with more than 300 employees.

14.2.2.2 Childcare Leave System and Work-Life Balance Policy

Article 11 of the *Working Women's Welfare Act* of 1972 stipulates an obligation to make efforts to provide childcare facilities. Although only a few companies allowed childcare leave, it took a long time for it to become popular. In 1975, the *Act on Childcare Leave* for Specific Occupations, which stipulates childcare leave for female teachers and female nurses, was enacted, but the target group was civil servants. Private companies were not covered. Subsequently, the Liberal Democratic Party and the Socialist Party took the lead in discussing the development of a childcare leave system in the congress, the government's legislation was also developed, and the *Childcare Leave Law* was enacted in 1991.

Unlike the *Working Women's Welfare Law* and *Childcare Leave Law* for Specific Occupations, which were applied only to women, the *Childcare Leave Law* states that both men and women can take childcare leave.

However, this law does not apply to daily employees and non-regular employees. In addition, childcare leave is taken only once when the child is under one-year old, and the childcare leave allowance is not paid, as per the "No Work No Pay Principle."

In 1995, it was amended to the *Childcare/Nursing Care Leave Law* (formally, "Act on the Welfare of Workers Carrying Childcare or Family Care, such as Childcare Leave"), which includes long-term care as the reason for the leave. At the same time, the childcare leave system has been fully applicable to all workers, including workers employed in small- and medium-sized enterprises, and 25% of pre-holiday wages are now paid from the employment insurance system as childcare leave benefits. As shown in Table 14.2, the rate of childcare leave benefits changed frequently.

In 2004, the *Childcare/Nursing Care Leave Law* was amended to include an exception that allows employees to extend their childcare leave up to one and a half years, in cases where children are unable to enter a nursery center. In addition, fixed-term contract workers who meet certain requirements can avail childcare leave.

Table 14.2 Changes in childcare leave benefits (employment insurance) in Japan

Implemented date	*Childcare leave benefit rate*			*Qualified person to take childcare leave*
	Basic benefit (%)	*Return to workplace benefit* (%)*	*Total (%)*	
April 1, 1992	–	–	0	
April 1, 1995	20	5	25	Regular worker
April 1, 2001	30	10	40	
April 1, 2005	30	10	40	Regular worker + a part of fixed-term contract worker**
April 1, 2007	30	20	50	
April 1, 2010	50	–	50	
April 1, 2014	6 (More than 180 days: 50%)	–	58.5–67	

Note
1. Return to work benefits are only paid when returning to the original company after childcare leave
2. **From January 2017, the applicable conditions for fixed-term contract workers have been relaxed
Source Authors' creation

According to the revised law of 2009, exemption from overtime working hours is obligatory, and if a worker raising a child under the age of three offers to work shorter hours (six hours a day), the company may, in principle, prevent it. In addition, when parents take childcare leave at the same time or in shifts, *Father and Mother Childcare Leave Plus* has been introduced, which allows employees to take childcare leave, until their children are one year and two months old.

According to the revised law of 2017, the age of a child not being able to enter nursery has been changed from from one and a half to two years old. At the same time, it has become possible to take children's nursing leave and nursing leave in half-day units (half of the prescribed working hours) instead of in one-day units. In addition, the prerequisites for fixed-term contract workers to take childcare leave have been relaxed as follows: (1) employees who have been employed in the past year or more at the time of application, and (2) the employment contract will not be terminated until the child is one and a half years old. In addition, the amendment also stipulates a review of the range of children subject to childcare leave and obligations to take preventive measures against maternity harassment.

According to the revised law of 2021, to encourage men to avail childcare leave, it is mandated that the company creates an employment environment that makes it easy to earn childcare leave, such as training on childcare leave, fathers' childcare leave, and establishment of a counseling system. At the same time, it is stated that the company should create childcare leave for men (postnatal father childcare leave) that male workers can take at the time of childbearing, thereby increasing the male workers' probability of taking childcare leave, and taking it twice. Furthermore, it is obligatory for companies with 1,000 or more employees to announce the status of taking childcare leave at least once per year. Fixed-term contract workers are also eligible for childcare leave unless their employment contract is terminated, or the child is one and a half years old.

Apart from the *Child Care and Nursing Care Leave Law*, the *Act on Advancement of Measures to Support Raising Next-Generation Children* was enacted in 2004, which aimed to encourage companies and governments to be more actively involved in balancing workers' family and work lives. The law makes it obligatory for companies to develop action plans for balancing employees' work and their parenthood responsibilities.[1]

Furthermore, to encourage companies to voluntarily support the next generation, companies that meet certain criteria, such as achieving the goals set in the action plan, would be certified by the Minister of Health, Labor, and Welfare. Initially, the law was effective only until 2015, but it was extended for another 10 years to be in force until 2025.

14.2.2.3 Policies for Part-Time Workers

In Japan, most part-time workers are students and married women, and there is a wide difference in working conditions, such as wages and welfare, from regular workers; most regular workers are men.

In Japan, policies for part-time workers were pronounced in the late 1960s, but the actual measures were not taken until the 1980s, when the establishment of a part-bank (an employment agency dedicated to part-time workers) and efforts to clarify working conditions were carried out.

The *Act on Improving Employment Management of Part-Time Workers* ("*Part-time Labor Act*") was enacted in 1993. This law encourages companies to improve employment management for part-time workers, who are considered second-class to regular workers, by ensuring proper working conditions for part-time workers, implementing education and training programs, and enhancing welfare programs.

The *Part-time Labor Law* was amended in 2007 to encourage companies to promote the conversion of part-time workers to regular workers and to balance the treatment of full-time (regular) and part-time workers. Furthermore, the 2015 amendment prohibits discriminatory treatment of part-time workers who have a fixed-term employment contract if they have the same job description and human resource management system as regular workers.

The *Work Style Reform Promotion Law* enacted in 2018 requires companies to pay equal pay for equal work, reduce discrimination in treatment between regular employees and part-time workers, shorten working hours, and extend holiday leave.

14.3 Gender Gap in Chinese and Japanese Labor Markets

In this section, we investigate the trends of the gender gap (mainly the gender wage gap) in China and Japan, and compare the situations between these two countries.

14.3.1 Gender Gap in China

According to international comparisons of data on the percentage of female wages to male wages, the gender wage gap in China was estimated to be 82.7% in 2002 (Song et al., 2017), while the same indicator in 2015 stood at 81.1% in the USA, 82.3% in the UK, 81.3% in Germany, 88.0% in Sweden, 67.6% in Korea, and 72.2% in Japan (Fig. 14.2). These figures indicate that the gender wage gap is larger in China than in the Nordic social democracies, but is much smaller than in Korea and Japan, and is almost the same as in most developed countries.

How has the gender wage gap changed during the market-oriented reform period in China? In theory, the market mechanism could contribute to reducing the gender wage gap because, in a competitive market, companies should determine wage levels based on a worker's productivity, which may reduce unreasonable discrimination. However, the growth of privately owned enterprises (POEs) would have a stronger tendency to discriminate against female workers than SOEs (Ma, 2021a). The proportion of employees in the private sector to the total number of workers in urban regions reached around 80% in 2020 (NBS, 2021). Furthermore, with the progress of state-owned enterprise reforms, which promote human resource management autonomy in SOEs, the influence of gender equality policies on employment and wage determination in the public sector has weakened. When discretionary power becomes stronger in the public sector, the organizational behaviors of SOEs resemble those of POEs, and the gender wage gap is likely to increase in SOEs as well. In China, from the latter half of the 1980s to the present, the rapid growth of POEs and the promotion of management autonomy in SOEs are likely to increase discrimination against female workers in both the sectors (Ma, 2021a). As the market-oriented economic reform may contribute to widening or reducing the gender wage gap, we cannot obtain a clear conclusion on the change in the gender wage gap during the economic transition period in China from an economic theory perspective. Official data and empirical studies have provided evidence on this issue.

As we could not obtain official data on the long-term change in the gender wage gap in China, we used the meta-analysis method to calculate the trends in the gender wage gap in China from the 1980s to the 2020s (Iwasaki & Ma, 2020). Iwasaki and Ma (2020) conducted a meta-analysis based on 90 English and 111 Chinese papers,[2] they calculated the partial correlation coefficient[3] based on the coefficient of gender dummy variables in wage functions. Figure 14.1 displays the calculation results. The slope of the black line in Fig. 14.1 is estimated to be negative and statistically significant at the 1% level, and its coefficient implies that, as the average estimation period approaches the present time year by year, the gender wage gap increases by 0.0027 in terms of the period.

According to human capital theory (Becker, 1964; Mincer, 1974), in a perfectly competitive market, the wage level of a worker is determined by the labor productivity, which is related to the worker's human capital (e.g., education attainment level, years of experience, etc.). Therefore, gender differences in educational attainment levels may affect the gender

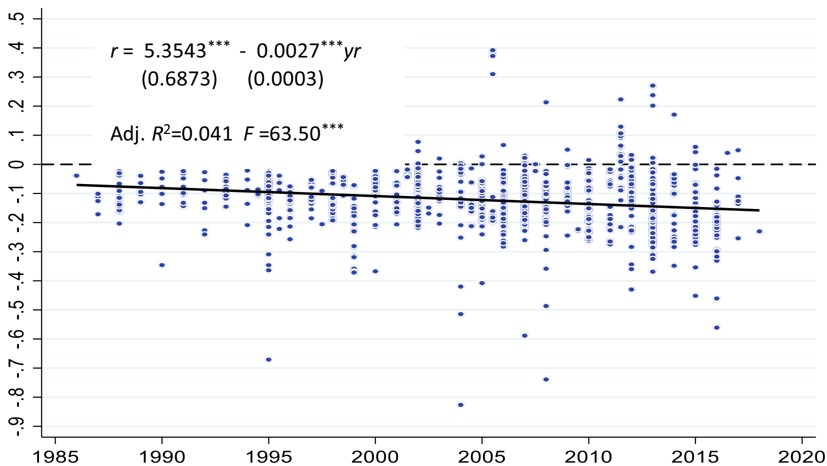

Fig. 14.1 Trends of gender wage gap in China (*Note* The value on the vertical axis is the estimated partial correlation coefficient in the meta-analysis, and the value on the horizontal axis is the estimation year [*yr*]. *Source* Authors' creation based on the Fig. 2 in Iwasaki and Ma [2020])

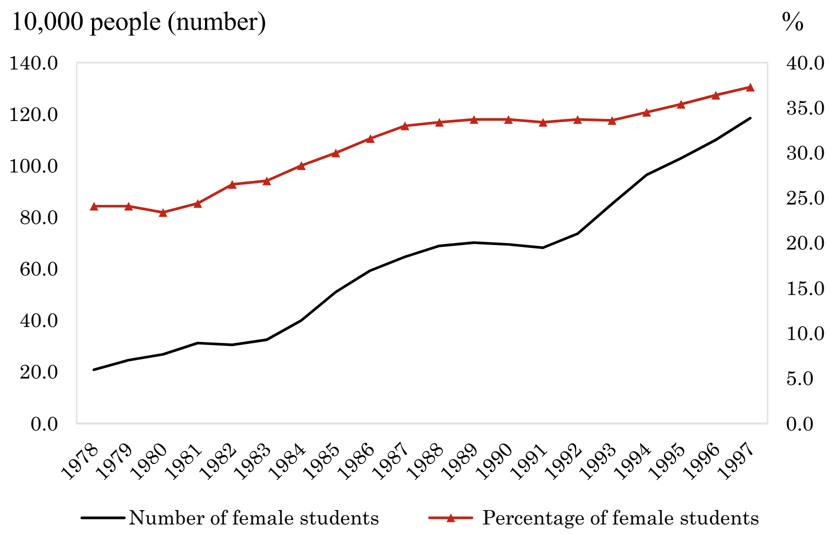

Fig. 14.2 Trends in the number and percentage of female university students in China (*Source* Authors' creation based on data from the *China Education Statistical Yearbook* for each year)

wage gap. Figure 14.2 shows the trends in the number and percentage of female university students in China, which increased between 1978 and 1997. Since 1999, the Chinese government has implemented a higher education expansion policy to promote the development of higher education in China (Ma, 2018b; 2021a). Thus, the number and percentage of female college students have increased by a large extent in the current period, which might reduce the gender differences in educational attainment and contribute to reducing the gender wage gap.

14.3.2 Gender Gap in Japan

Figure 14.3 displays the trends of the gender wage gap in Japan. The gender wage gap is calculated using the data on the regular monthly salary (excluding overtime pay) from the Basic Statistical Survey on Wage Structure conducted by the Ministry of Health, Labor, and Welfare. We calculated the wage of women when the number of men was 1; the wage of women, which was only about 59.6% of that of men in 1985, reached

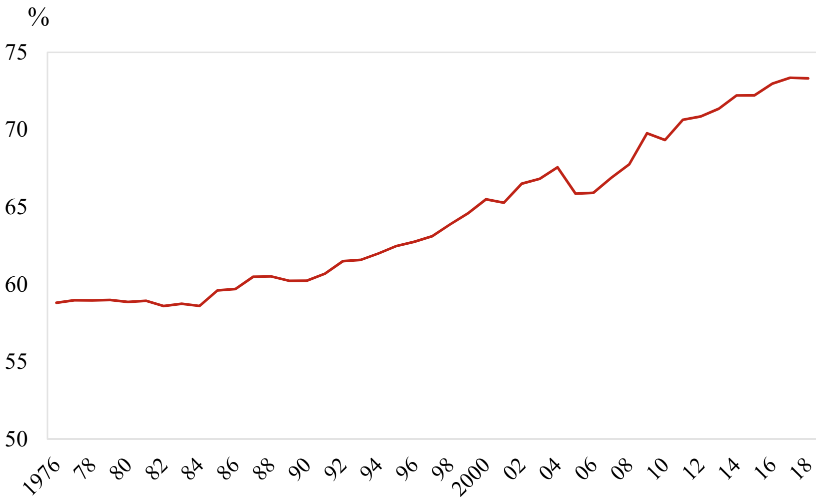

Fig. 14.3 Trends in gender wage gap in Japan (*Note* Male wage = 100, the "fixed salary" is used, which is the earning income excluding bonuses and allowances. *Source* Authors' creation based on data from the Wage Structure Basic Statistical Survey conducted by the Ministry of Health, Labor, and Welfare, Japan)

73.3% in 2018, and the gender wage gap did not change from 1976 to 1984. The wage gap has declined continuously since the mid-1980s. However, the wages of Japanese women are still only three-quarters of that of men, and the gender wage gap is still larger than that of China and other developed countries.

As described above, the wage gap may reflect the differences in workers' human capital accumulation. When the quality and quantity of school education and vocational training differ according to gender, a gender wage gap becomes inevitable.

Figure 14.4 shows the trends in the university enrollment rate in Japan from 1970 to 2018. The university enrollment rate of women was around 10% until the beginning of the 1990s, with a large gender difference. After the 1990s, the enrollment rate of women increased and the gender difference narrowed, but even in 2018, there was still a gender difference of about 6.3% in Japan.

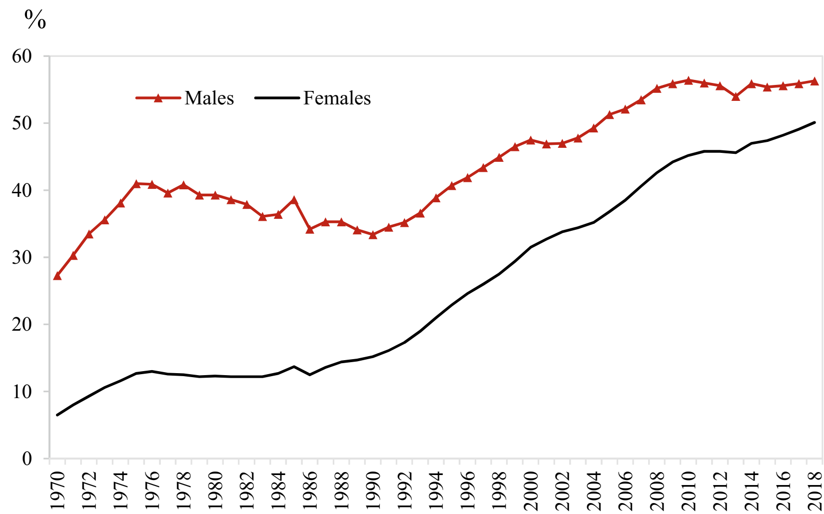

Fig. 14.4 University (undergraduate) enrollment rate (including high school graduates from previous years) in Japan (*Source* Authors' creation based on data from the School Education Basic Survey conducted by the Ministry of Education, Culture, Sports, Science, and Technology, Japan)

The gender difference in the enrollment rate of schools also affects the composition of workers' educational backgrounds. Table 14.3 shows the percentage of workers by educational background and the percentage of female workers in a particular educational background from 1982 to 2017. There was no significant change in the proportion of high school graduates, but the proportion of university graduates among workers increased. The percentage of female workers was higher among high school and junior college graduates, but the percentage of college graduates was only 30.7% in 2017.

Vocational training can also affect human capital accumulation and its quality and quantity may differ between men and women. The data from the Basic Survey on Capacity Development (Individual Survey) conducted by the Ministry of Health, Labor, and Welfare shows that 43.6% of men and 25.6% of women have taken OFF-JT provided by companies. In addition, the average OFF-JT attendance time (total) for men is 23.6 hours, while that for women is only 18.3 hours, suggesting that women have fewer opportunities to take vocational training compared to men in Japan.

Table 14.3 Share of workers by educational background in Japan

					Unit: %	
		1982	*1992*	*2002*	*2012*	*2017*
Senior high	Total	45.6	48.9	46.4	45.5	43.3
	Females	41.3	43.6	43.0	43.7	44.2
Junior college	Total	6.8	10.6	15.3	16.6	17.8
	Females	58.2	65.1	66.5	68.6	68.7
College	Total	12.3	16.1	21.5	27.7	30.9
	Females	12.5	16.1	21.6	27.6	30.7

Source Authors' creation based on data from the Employment Structure Basic Survey conducted by the Ministry of Internal Affairs and Communications, Japan

Mincer and Polacheck (1974) advocate that household gender role division has a significant influence on the human capital formation of workers. Under gender role division, to accommodate more housework and childcare, the labor supply is less for women than for men. In Japan, the curve of the female labor force participation rate by age group is an M-shaped curve (see Fig. 14.5), in which the female labor force participation rate aged 25–39 years is lower than that in other age groups. As employers anticipate that women easily give up their jobs for housework and family care (e.g., childcare, parent care), human capital investment is less efficient for women than men; therefore, companies tend to have lower incentives to provide vocational training to female workers.

Additionally, labor demand tends to be more biased toward men than toward women in secondary industries. Table 14.4 shows the changes in the share of workers by sector and the share of women in each sector. The share of women in the secondary sector is constant at around 30%, while the share of women in the primary and tertiary sectors has remained between 35 and 50%. The share of women has increased, especially in the tertiary sector, where the share of total workers (including men and women) has been increasing. Employment in the secondary sector is stable and wage levels are higher than in other sectors, while in the tertiary sector, the job change rate is higher and the wage level tends to be lower. The sector-wise stability of employment and the difference in wage levels also influence the gender wage gap.

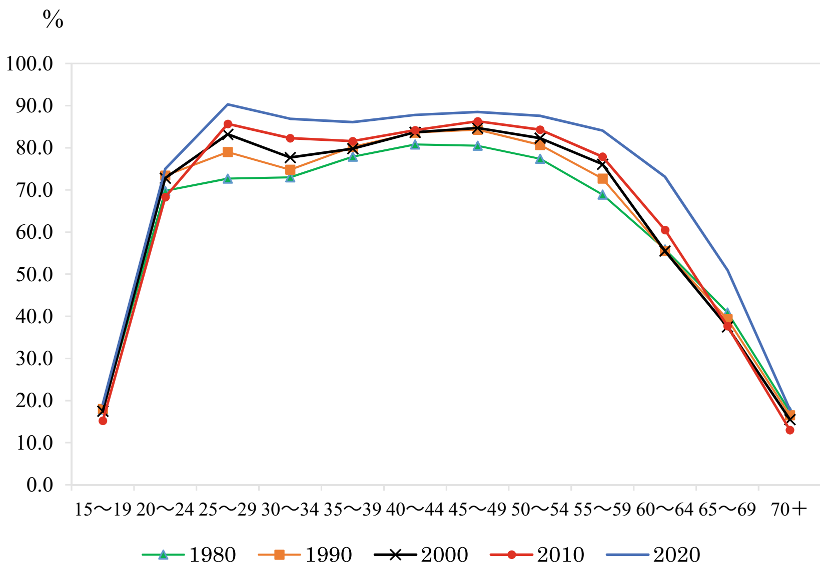

Fig. 14.5 Female labor force participation rate by age group in Japan (*Source* Authors' creation based on data from the Labor Force Survey conducted by the Statistics Bureau, Ministry of Internal Affairs and Communications, Japan)

Table 14.4 Share of workers by sector in Japan

		Unit: %				
		1980	*1990*	*2000*	*2010*	*2017*
Primary	Total	10.9	7.1	5.0	4.0	3.3
	Females	47.5	45.2	43.8	39.3	36.8
Secondary	Total	33.6	33.3	29.5	23.7	23.3
	Females	29.5	31.0	27.9	25.9	26.1
Tertiary	Total	55.5	59.6	65.5	72.3	73.3
	Female	41.1	43.7	46.4	48.5	50.0

Source Authors' creation is based on data from the Labor Force Survey conducted by the Statistics Bureau, Ministry of Internal Affairs and Communications, Japan

14.4 Empirical Studies on Gender Wage Gap in China and Japan

What determines the gender wage gap in China and Japan? The gender wage gap depends on either: (1) the gender differences in endowments (e.g., gender difference in education attainment, gender occupational segregation), or (2) gender differences in factor prices (e.g., the rate of return on human capital for the same job). For example, when we discuss the reduction of the gender wage gap in Japan, what we should discuss is how gender differences in endowment (e.g., education, occupation) have narrowed, and whether the gender difference in factor price, which is related to discrimination against women in the workplace, has narrowed. We introduce an empirical method to measure these two components.

14.4.1 Decomposition Methods of Gender Wage Gap

To investigate the influence of two types of components (gender endowment difference and gender difference in factor price) on the gender wage gap, numerous empirical studies based on the Blinder-Oaxaca decomposition method (Blinder, 1973; Oaxaca, 1973) have been used in empirical studies. In this method, the coefficients obtained from the wage functions for men and women are estimated separately (see Eqs. [14.1] and [14.2]), and the average values of the independent variables are used to decompose the gender wage gap.

$$\ln W_m = a_m + \beta_m X_m + u_m \tag{14.1}$$

$$\ln W_f = a_f + \beta_f X_f + u_f \tag{14.2}$$

In Eqs. (14.1) and (14.2), $\ln W_m$ and $\ln W_f$ are the average logarithmic wages of men and women; X_m and X_f denote a set of variables that affect wage levels (e.g., education, years of experience, occupation, industry, etc.); u_m and u_f are error items following a standard normal distribution with a mean of 0, respectively.

The Blinder-Oaxaca decomposition method is used to decompose the determinants of the gender wage gap into two channels: (i) the gender endowment difference (endowment effect), and (ii) the gender difference in the evaluated coefficient of each variable that are related to discrimination against women (factor price effect) (Becker, 1957). Equations (14.3) and (14.4) describe the model.[4]

$$\overline{\ln W}_m - \overline{\ln W}_f = \beta_\mathrm{m}\left(X_m - X_f\right) + (\beta_\mathrm{m} - \beta_\mathrm{f})X_f \tag{14.3}$$

$$\overline{\ln W}_m - \overline{\ln W}_f = \beta_\mathrm{f}\left(X_f - X_m\right) + (\beta_\mathrm{f} - \beta_\mathrm{m})X_m \tag{14.4}$$

In Eqs. (14.3) and (14.4), $\overline{\ln W}_m - \overline{\ln W}_f$ denotes the gender wage gap; $\beta_\mathrm{m}\left(\sum X_m - \sum X_f\right)$ or $\beta_\mathrm{f}\left(\sum X_f - \sum X_m\right)$ denotes the gender endowment difference; and $(\beta_m - \beta_f)\sum X_f$ or $(\beta_f - \beta_m)\sum X_m$ express the gender difference in factor price. $\sum X_f, \sum X_m$.

Furthermore, the change in the gender wage gap can be decomposed using Eq. (14.5).

$$\begin{aligned}
&\text{If } \Delta\overline{\ln W} = \overline{\ln W}_m - \overline{\ln W}_f,\\
&\Delta X = (X_m - X_f),\ \Delta\beta = \left(\beta_m - \beta_f\right),\\
&\Delta\overline{\ln W_t} - \Delta\overline{\ln W_s} = \sum \beta_{ft}(\Delta X_t - \Delta X_s)\\
&\quad + \sum \Delta\beta_t\left(X_{ft} - X_{fs}\right)\\
&\quad + \sum X_{ft}(\Delta\beta_t - \Delta\beta_s) + \sum \Delta X_t\left(\beta_{ft} - \beta_{fs}\right)\\
&\quad + \sum \Delta x_t \Delta\beta_t - \sum \Delta X_s \Delta\beta_s
\end{aligned} \tag{14.5}$$

The first and second terms on the right side are the decompositions of the changes in gender endowment difference. The first term shows the change in the gender endowment difference, the second term shows the change in the endowment of the women themselves, the third term shows the change in the gender difference in factor price, and the fourth term shows the change in factor price for women themselves. The subscripts t and s indicate the year: $t < s$. $\Delta\overline{\ln W_t} - \Delta\overline{\ln W_s} > 0$ indicates that the gender wage gap has narrowed.

We summarize the results of previous studies and conduct empirical studies based on these decomposition models in China and Japan in the following section.

14.4.2 Empirical Study for China

Numerous empirical studies have been conducted on the gender wage gap in China (Iwasaki & Ma, 2020). We only summarize the representative empirical studies for China, as follows.

Most empirical studies using the Blinder-Oaxaca method reported that both the endowment and factor price components contribute to the formation of the gender wage gap in China, and pointed out that the contribution rate of the factor price component is greater than that of the endowment component. These results suggest that workplace discrimination against women is the main factor contributing to the formation of the gender wage gap in China.

As the analyzed period, survey data, independent variables, and decomposition methods used are different, the results in different studies cannot be directly compared (Iwasaki & Ma, 2020). To reduce the measurement bias caused by using different survey data, we summarized the results based on data from the Chinese Household Income Project survey (CHIPs) of 1988, 1995, 2003, and 2013 for the urban local residents in Table 14.5.

The results in Table 14.5 indicate that the contribution rates of the factor price component were 52.49% in 1988 and 63.20% in 1995 (Gustafsson & Li, 2000); 52.0% in 1995, 69.0% in 2002, and 77.7% in 2007 (Li et al., 2011); 72.4% (1995), 75.0% (2002), 73.4% (2007), and 74.1% (2013) during the period 1995–2013 (Song et al., 2017); 40.1% in 2002 and 68.9% in 2013 (Ma, 2021a). Although the dependent variables were different in these studies, the results for the same survey year were

Table 14.5 Summary of the decomposition results of gender wage gap in China

Year		*Endowment*	*Price*
1988	Gustafsson and Li (2000)	0.475	0.525
1995		0.368	0.632
1995	Li et al. (2011)	0.480	0.520
2002		0.310	0.690
2007		0.220	0.777
1995	Song et al. (2017)	0.276	0.724
2002		0.250	0.750
2007		0.266	0.734
2013		0.259	0.741
2002	Ma (2021a, 2021b)	0.599	0.401
2013		0.311	0.689

Note The Blinder-Oaxaca decomposition method was used
Source Authors' creation based on Gustafsson and Li (2000), Li et al. (2011), Song et al. (2017), and Ma (2021a). The studies used the data from the CHIPs of 1988, 1995, 2003, 2007, and 2013

different, indicating that the contribution rate of the factor price component increased, while that of the endowment component declined during 1988–2013. This implies that although both the endowment component and factor price component contributed to the formation of the gender wage gap in China from 1988 to 2013, the influnece of the factor price component increased, which contributed to widening the wage gap during the period. The results may be caused by the reduction of gender differences in education (see Fig. 14.2) and the increase in discrimination against women in the workplace with the transition to a market-oriented economy.

For migrant workers, the contribution rates of the factor price component was 74.32–84.38% in 2008 (Li & Yang, 2010) and that for all residents and migrants in urban China was 49.18% in 1996 (Meng & Zhang, 2001). Moreover, the contribution rate of the factor price component by wage percentiles was 86.08–101.80% in 2006 and 45.31–91.73% in 2009 (Ma et al., 2013).

Some empirical studies have also focused on the effect of segmentation by sector on the gender wage gap in China. Wang (2005) and Li and Ma (2006) analyzed the influence of occupational segregation on the gender wage gap. Ma (2018a) found that the segmentation of the ownership sector (e.g., SOEs and POEs) affects the gender wage gap in urban China. Ge (2007) and Wang and Cai (2008) analyzed the influence of segmentation by industry type on the gender wage gap. They reported that the factor price component in intra-sector differentials drives the gender wage gap in China.

To investigate the gender wage gap in the current year, we used the latest survey data from the Chinese Household Income Project Survey CHIPs of 2018 to conduct the decomposition analysis. The results are summarized in Table 14.6. Comparing the results in Table 14.5, it is clear that even in the current year (2018), the contribution rate of the factor price component (69.3%) is even greater than that of the endowment component (30.7%), suggesting that discrimination against women in the workplace still exists and significantly contributes to widening the gender wage gap in China. The contribution rates of education in both the endowment and factor price components are negative values, suggesting that both the reduction of gender difference in educational attainment and the rise in the rate of return on education among women contribute to reducing the gender wage gap. In contrast, gender occupational segregation (18.8%) and discrimination against women during

Table 14.6 Decomposition results of gender wage gap in China

	Value		*Percentage*	
	Endowment	*Price*	*Endowment (%)*	*Price (%)*
Wage gap = 0.208	0.064	0.144	30.7	69.3
Education	−0.011	−0.089	−5.2	−42.6
Year of experience	0.015	0.134	7.3	64.3
Health	0.000	−0.028	0.0	−13.6
Han	0.000	−0.009	0.2	−4.5
CPC	0.006	−0.007	2.7	−3.2
Child	−0.001	0.073	−0.5	35.3
Occupation	0.039	−0.212	18.8	−102.1
Ownership	0.005	0.038	2.5	18.1
Industry	0.012	0.149	5.7	71.6
Region	−0.001	0.001	−0.8	0.5
Constant	0.000	0.094	0.0	45.6

Note The Blinder-Oaxaca decomposition model was used. CPC: membership in the Communist Party of China
Source Authors' calculations based on the data from CHIPs of 2018

the motherhood period (children: 35.3%) contributed to expanding the gender wage gap. The results indicate that although the Chinese government enforced equal employment policies and maternity leave regulations during the economic transition period, gender occupational segregation and motherhood penalties still exist in China.

14.4.3 Empirical Study for Japan

Table 14.7 summarizes the decomposition results from representative empirical studies on the gender wage gap in Japan. Each study used microdata from the Wage Structure Basic Statistical Survey conducted by the Ministry of Health, Labor, and Welfare, but the dependent and independent variables differed among these studies. Higuchi (1990) estimated the gender wage gap in 1978, 1983, and 1988, and used the actual wage value as the dependent variable instead of the logarithm value. Yoshioka (2015) uses $\ln W_f - \ln W_m$ as the index of the gender wage gap instead of $\ln W_m - \ln W_f$. Furthermore, it should be noted that the independent variables used in each study are also slightly different.

Table 14.7 Summary of the decomposition results of gender wage gap in Japan

Year		*Difference*	*Endowment*		*Price*	
		Value	*Value*	*Percentage (%)*	*Value*	*Percentage (%)*
1978年	Higuchi	0.61	0.35	57.3	0.26	42.7
1983年	(1990)	0.59	0.31	53.1	0.28	46.9
1988年		0.59	0.33	55.1	0.27	44.9
1990	Kawaguchi	0.48	0.20	40.3	0.30	59.7
2000	(2008)	0.41	0.14	35.0	0.26	65.1
2007	Yoshioka	0.41	0.22	53.2	0.19	46.8
2010	(2015)	0.38	0.20	52.5	0.18	47.5
2013		0.36	0.19	52.6	0.17	47.4

Note Higuchi (1990) estimated wages using actual values rather than logarithms. The Blinder-Oaxaca decomposition method was used in these studies
Source Authors' creation based on Higuchi (1990), Kawaguchi (2008), and Yoshioka (2015)

The results in Table 14.7 indicated that the gender wage gap has declined year on year, but there are no significant changes in the contribution ratios of gender endowment difference and gender difference in factor price. In other words, the results indicate that the improvement of the employment environment for women has the same effect on both the gender endowment difference and the gender difference, in factor price and that the gender wage gap has declined. However, the results were obtained from different studies, and there is an urgent need to draw conclusions here.

We then investigated the gender wage gap over the long term using the same estimation formula as above. We used data from the Wage Structure Basic Statistical Survey conducted by the Ministry of Health, Labor, and Welfare, Japan. Because it is difficult to obtain microdata retroactively, we used data aggregated by gender, age, educational background, industry, and company size. The subjects of the analysis are general workers and do not include part-time workers.[5] The dependent variable is the hourly wage (logarithm value), which is the monthly salary including overtime and bonuses, divided by the total monthly working hours.[6,7] Hourly wages are sadjusted based on the 2020 consumer price index (comprehensive) to enable comparisons over time. Age and its squared term, years of experience and its squared term, educational background dummy, industrial dummy, and company size dummy were used as the independent variables. The wage function was estimated using the OLS model and the number of workers was used as the weight. The results are shown in Table 14.8.

The results in Table 14.8 also indicate that the gender wage gap has declined from 1981 to 2018, but the changes in the contribution rates of the gender endowment difference and gender difference in factor price differ from those in Table 14.7. The results reveal that the gender endowment difference narrowed significantly, and its contribution to the gender wage gap decreased significantly. On the contrary, the gender difference in factor price has decreased year on year, but the change is small, and its contribution to the gender wage gap has become larger in the current period. The results suggest that the improvement in the employment environment for women had a significant effect on reducing the gender endowment difference rather than reducing the gender difference in factor price. Furthermore, to compare the effect size of gender endowment difference and gender difference in factor price by year, taking the value in 1981 as 1, we obtain 0.81 and 0.97 in 1990, 0.33 and 0.98 in 2000, 0.48 and 0.86 in 2010, 0.36 and 0.59 in 2018, respectively. It can be postulated that improving the employment environment for women had a significant effect on reducing the gender wage gap after the 2000, and there was no significant effect immediately after the enactment of the *Equal Employment Opportunity Law* and the *Childcare and Nursing Care Leave Law*.

The decomposition results based on the model expressed in Eq. (14.5) are summarized in Table 14.9.

Table 14.8 Decomposition results of gender wage gap in Japan

Year	*Difference*	*Endowment*		*Price*	
	Value	*Value*	*Percentage (%)*	*Value*	*Percentage (%)*
1981	0.543	0.259	47.70	0.306	56.35
1990	0.509	0.210	41.26	0.298	58.55
2000	0.382	0.088	23.04	0.299	78.27
2010	0.359	0.100	27.86	0.256	71.31
2018	0.305	0.092	30.16	0.182	59.67

Note The Blinder-Oaxaca decomposition method was used
Source Authors' calculations based on data from the Wage Structure Basic Statistical Survey conducted by the Ministry of Health, Labor, and Welfare, Japan

Table 14.9 Decomposition results of the change of gender wage gap in Japan

	Endowment		*Price*	
	$\beta(\Delta x - \Delta x')$ *Change in gender endowment difference*	$\Delta\beta'(x - x')$ *Change in endowment of women*	$X(\Delta\beta - \Delta\beta')$ *Change in gender difference in factor price*	$\Delta x'(\beta - \beta')$ *Change in factor price for women*
1981–1990	−0.002	0.068	−0.088	0.03
1990–2000	0.043	−0.054	−0.07	0.001
2000–2010	−0.079	0.088	0.023	−0.005
2010–2018	0.005	0.003	0.192	−0.11

Source Authors' calculations are based on data from the Wage Structure Basic Statistical Survey conducted by the Ministry of Health, Labor, and Welfare, Japan

First, from 1981 to 1990, the gender wage gap narrowed by approximately 0.34 points. The results of the change in the gender wage gap indicated that there was almost no change in gender endowment difference over time, and that the change in endowment of women themselves reduced the wage gap. In addition, the gender difference in the factor price contributed to the widening of the wage gap, whereas the change in the factor price for women contributed to its reduction. During this period, the *Equal Employment Opportunity Law* was implemented, which had a significant effect on women's endowment and factor prices, leading to a reduction in the gender gap during this period. However, it seems like that the influence of female employment promotion policies on the reduction of gender difference in factor price was not significant.

From 1990 to 2000, the *Child Care Leave Law*, *Part-time Labor Law*, and *Equal Employment Opportunity Law for Men and Women* were implemented. During this period, the gender wage gap narrowed by approximately 0.13 points. The change in gender endowment difference contributed to the reduction in the wage gap, while the change in the endowment of women themselves, and the change in the gender difference in factor price contributed to widening the gender gap.

The *Basic Act for Gender Equality* and the revision of the *Child Care and Nursing Care Leave Law* were enforced from 2000 to 2010. During this period, the gender wage gap narrowed by approximately 0.02 points. The changes in gender endowment difference contributed to the widening of the wage gap, while the changes in the endowment of women themselves, and the changes in the gender difference in factor price contributed to the reduction of the wage gap.

From 2010 to 2018, the *Act on the Promotion of Women's Advancement* was implemented and the *Child Care and Nursing Care Leave Act* was revised. During this period, the gender wage gap narrowed by approximately 0.05 points. The change in the factor price of women workers themselves contributed to the widening of the gender wage gap, but the changes in other factors contributed to the reduction of the wage gap. In particular, the change in gender difference in factor price significantly contributed to the reduction of the wage gap, suggesting that the implementation of the *Act on the Promotion of Women's Advancement* had a significant effect on reducing the gender difference in the factor price.

14.5 Conclusions

In this study, using published official data and survey data, we discuss the trends in the gender wage gap and investigate the determinants of the gender wage gap in China and Japan based on the Blinder-Oaxaca decomposition model. The two main conclusions are summarized as follows.

First, although the Chinese government enforced gender equality in the workplace and society during the planned economy period and enforced the implementation of equal employment policies during the transition period, the gender wage gap expanded from the 1980s to the 2010s. The decomposition results indicate that the contribution rate of the factor price component is greater than that of the endowment component, and the decomposition results based on the latest survey data from CHIPs of 2018 also confirm the conclusions. These results indicate that discrimination against women is the main contributor to the gender wage gap in China.

Second, in Japan, the gender wage gap has narrowed over the long term. The endowment components significantly contribute to a reduction in the wage gap. However, it can be interpreted that such a tendency is caused by the influence of the change in the endowment of women themselves, rather than the change in the gender difference in endowment. Additionally, after 2000, the gender difference in factor price also contributed to a reduction in the gender wage gap. The change was brought about by the change in the gender difference in the factor prices; but it became smaller in the recent period. The results indicate that the improvement in the environment for female employment thus far has contributed to reducing the gender difference in endowment (e.g., tenure years and gender occupational segregation), and then contributed to reducing the gender difference in factor price (e.g., the returns to education).

The results indicated that although the Chinese and Japanese governments enforced equal employment policies and maternity leave regulations to reduce the gender gap in the labor market, a gender gap still exists in both China and Japan. For example, the results in Table 14.4 indicate that occupational segregation and motherhood penalties are observed in China. It should be noted that these disadvantages for women in the workplace may be caused by self-selection behavior (e.g., women's voluntary choice to become part-time employees or occupations that can allow them to adjust their working hours for childcare) and discrimination against women in the workplace. As the Japanese experience has provided evidence that equal employment opportunity policies and family-friendly policies have contributed to the reduction of the gender wage gap over the long term, the Chinese government could learn from Japanese experiences and promote the establishment of a family-friendly working environment for married women. In particular, China has experienced population aging (Ma, 2021b) and to deal with the problem of decreased labor force, has been promoting female labor force participation. Japan, which is the country with the highest proportion of the older population worldwide, faces a similar problem.

To address the problem of discrimination against women in the workplace, the enforcement of equal employment opportunity policies, establishing a friendly working environment for married women, and supporting the career development of women in the motherhood period are important issues for both the Chinese and Japanese governments.

The self-selection behavior of married women may be caused by discrimination in the workplace; therefore, dealing with the issue of discrimination could help dealing with the self-selection issue. In this sense, combating the discrimination problem is important. Moreover, self-selection may be related to the attitudes on gender role division such as "men for work, and women for family." In particular, Confucianism has had a greater influence in both China and Japan, which enhances gender role attitudes in both countries. However, the gender role attitudes also may change with an increase of female labor force participation and the reduction of the gender wage gap in labor market. Therefore, the enforcement of equal employment opportunity policies and promotion of female employment have become important issues for both the Chinese and Japanese governments, which may reduce the gender gap in both the labor market and households from a long-term perspective.

Notes

1. However, companies with 100 or less employees are obliged to make efforts.
2. Using the electronic academic literature databases of EconLit and Web of Science, as well as the websites of leading academic publishers for English language literature and the Chinese National Knowledge Infrastructure (CNKI) database, which is the largest academic literature database in China for Chinese language literature, Iwasaki and Ma (2020) first searched for relevant studies published from 1990 to the first half of 2020. In these databases and websites, they carried out an AND search for article titles using "*China*" and "*wage*" as keywords and then obtained 212 English and 163 Chinese papers. Next, they closely examined the contents of these 375 studies and selected those that examined the gender dummy variable in the wage function. They selected 90 and 111 studies in English and Chinese, respectively, to conduct the meta-analysis. For detailed meta-analysis results and literature list, please refer to Iwasaki and Ma (2020).
3. The partial correlation coefficient in meta-analysis is calculated as

$$r_k = \frac{t_k}{\sqrt{t_k^2 + df_k}}, \quad k = 1, 2, \ldots, K.$$

   T_k and df_k denote the t value and degree of freedom of the *kth* estimate, respectively. The standard error of r_k is given by $\sqrt{\left(1 - r_k^2\right)/df_k}$. The t value is one of the female dummy variables and indicates the significance of the gender wage gap in estimations.
4. The constant is omitted for descriptive convenience.
5. General workers also include non-regular employees.
6. The gender wage gap index can also be used as a measure of the difference in regular salaries. Here, to compare the disparity that reflects the difference in overtime work and bonuses, the hourly wage was used, which was obtained by dividing the monthly salary including overtime pay and bonus by the total monthly working hours.

7. Monthly salary, including overtime pay, are called "salary paid regularly" in the Basic Survey on Wage Structure. We can also obtain information on the annual bonuses from the survey. We added the monthly bonus which is calculated as "the annual bonus was divided by 12" to the monthly salary. For the total monthly working hours, "non-scheduled working hours" were added to "scheduled working hours."

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CHAPTER 15

Public Pension Policy Reform and Labor Force Participation

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15.1 Introduction

In East Asia, developed countries such as Japan and the Republic of Korea have experienced population aging since the 1970s (Ma, 2021; United Nations, 2019). As a developing country, China has also experienced population aging since 2010; the 2000 and 2020 Chinese Population

A part of this chapter is a revised version of: Seike, A., & Ma, X. (2008). The determinants of employment of the elderly and its change: 1980–2004. In The Japan Institute for Labor Policy and Training (JILPT) (Ed.), *Situations and issues of continued employment of older adults, reports of labor policy research no.100*. JILPT, Tokyo (in Japanese).

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_15

Censuses show that the proportion of the population aged over 65 years has increased from 10.33% in 2000 to 13.5% in 2020 (National Bureau of Statistics, 2021), and is projected to reach 14% by 2025 (United Nations, 2019). Figure 15.1 shows an international comparison of population aging. The ratio of the population aged 65 and above to the total population is higher in East Asian countries than in other countries (i.e., the United Kingdom, France, and the United States). To compare China with Japan, in 2015, the ratio of the population aged 65 and above to the total population was 13.0% for China and 26.5% for Japan. These ratios are forecasted to become 29.8% for China and 38.3% for Japan in 2060 (United Nations, 2019).

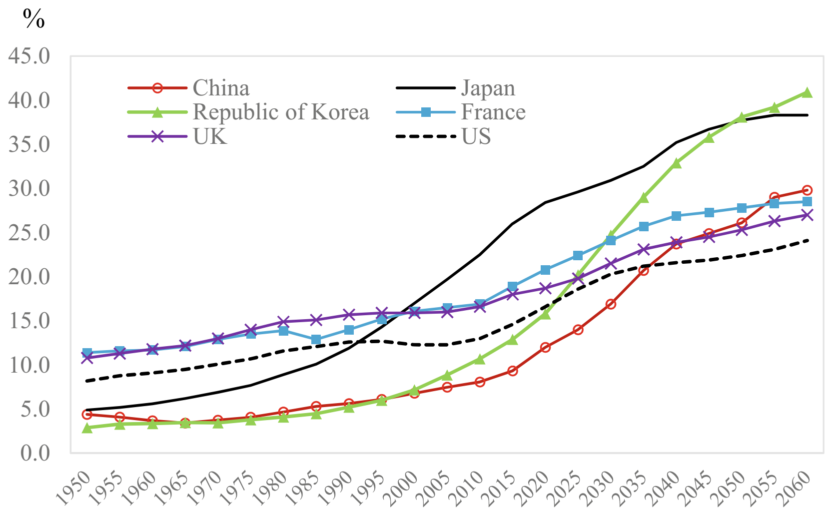

Fig. 15.1 International comparison of the proportion of the population aged 65 and above to the total population (*Source* Author's creation based on the data from World Population Prospects: The 2019 Revision published by the United Nations; Japan 1950–2015 census data, the Ministry of Internal Affairs and Communications; Japan 2020–2060 data calculated by the National Institute of Population and Social Security Research)

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From the experience of developed countries including Japan, public pensions may reduce the labor force participation of older adults. Therefore, it is argued that public pensions may negatively affect long-term economic growth (Blau & Goodstein, 2010; Borsch-Supan, 2000; Hernaes et al., 2016; Krueger & Pischke, 1992; Kudrna & Woodland, 2011; Maloney, 2000; Martin & Marcos, 2010; Oshio et al., 2009; Samwick, 1998; Vere, 2011; Shimizutani & Oshi, 2013). To evaluate the influence of public pensions on economic society, empirical study on the impact of public pensions on labor force participation has become an important research issue.

In China, the New Rural Pension Scheme (NRPS) was implemented in 2009, covering rural residents. Participation in the NRPS is voluntary; therefore, it has become a quasi-natural experiment that can be used to investigate the causal relationship between public pensions and labor force participation. Although some previous studies have estimated the impact of the NRPS on the labor force participation of older adults, most studies have used either the China Health and Retirement Longitudinal Survey (CHARLS) or other survey data for one or several provinces; accordingly, the results are inconsistent (Cheng, 2014; Liu, 2017; Liu & Zeng, 2016; Liu et al., 2016; Ning et al., 2016; Xie, 2015; Zhang, 2015; Zhang et al., 2014).

In contrast with previous studies, this study uses a longitudinal survey data from the new Chinese Health and Nutrition Survey (CHNS) to conduct an empirical study that uses a quasi-natural experiment model to investigate the impact of the NRPS on the labor force participation of older adults in China. We also conduct an analysis for Japan to compare the influence of public pensions on the labor force participation of older adults in China and Japan. These analyses provide new evidence on this issue.

The remainder of this chapter is structured as follows. Section 15.2 introduces the public pension systems in China and Japan as the institutional background. Section 15.3 summarizes the channels of impact concerning public pensions on labor force participation and reviews the previous empirical studies regarding the issue in developed and developing countries. Section 15.4 provides the framework for the empirical analysis, including the models and datasets for China and Japan. Section 15.5 presents and explains the estimated results, while Sect. 15.6 concludes the paper.

15.2 Public Pensions in China and Japan

To ensure the living subsistence of older adults in an aging society, both the Chinese and Japanese governments have established public pensions.

Japan established universal public pension insurance in the 1960s, covering all citizens. The Japanese pension system is mainly composed of the National Pension (*Kokumin Nenkin*), which covers non-working individuals; the Employees' Pension (*Kousei Nenkin*), which covers employees in companies or organizations; the mutual aid pension (*Kyosai Nenkin*), which covers civil servants; and the corporate pension *(Kigyo Nenkin*), which is mostly provided by large firms. To reduce the negative effects of public pensions on older adult employment, the Japanese government implemented a set of policies to promote the employment of older adults. For example, the Employees' Pension was reformed in 1994, and the claim age for the basic pension portion in the Employees' Pension was gradually increased from 60 to 65 years between 2001 and 2013. In 2000, the claim age of the compensation-proportional portion of the Employees' Pension was increased from 60 to 65 years between 2013 and 2025. According to the pension reform in 2004, the benefit level of the Employees' Pension will increase below the inflation rate in the future due to the macro-economic slide system, which aims to reduce pension benefits. Moreover, employment policies have also been implemented to promote the employment of older adults. For example, in 1998, the Act on the Stabilization of Employment of Older Adults was implemented, which obliged firms to set the retirement age at 60 years and prohibited employees from retiring before aged 60. The revised Act on the Stabilization of Employment of Older Adults was enforced in April 2006, which obliges employers to introduce "employment security measures" for persons aged up to 65 years old, as an extension of the mandatory retirement age system, and imposes the continuous employment system in firms. With the public pension reform and implementation of employment promotion policy, it is assumed that the employment of older adults may have been significantly improved in Japan over the past few decades.

Unlike public pensions in Japan, public pensions in China are segmented by the household registration system (*hukou*), which divides Chinese people into urban and rural *hukou* residents. Public pensions have been established based on labor insurance since the 1950s, which covers employees with an urban *hukou* in urban areas, but was reformed and changed to the Urban Employee Basic Pension Insurance (UEBPI) in

1995. The Urban Resident Basic Pension Insurance (URBPI) was implemented in 2011 and covers urban residents who are not covered by the UEBPI or the publicly funded Civil Servant Pension (CSP). However, rural residents were not covered by public pension schemes until the 2000s, and older adults in rural areas were supported by their family members (i.e., their oldest sons) and communities because traditional informal older adult care is associated with Confucianism in China. Since the late 1980s, the government began trials to establish public pension schemes such as the NRPS in some rural areas, but no nationwide public pension scheme existed for rural *hukou* residents. A significant change was observed in September 2009 when the State Council implemented the NRPS for rural residents. It is expected that the NRPS will provide minimum living standards for rural older adults and is the first step in establishing a universal public pension scheme in China.

How do public pensions affect the labor force participation of older adults in China and Japan? We conduct an empirical study of China and Japan to address this question in the following section.

15.3 Literature Review

15.3.1 Channels Exploring the Impact of Public Pensions on Labor Force Participation

How do public pensions affect labor force participation? A positive and negative effect can be considered, as follows.

First, according to neoclassical economic theory, in a perfectly competitive market, the budget constraint and preference for leisure (or work) can affect the individual labor supply. Public pensions can increase unearned income and change the budget constraint situation, which causes a decrease in labor supply. For example, based on the NRPS, when a rural older adult reaches 60 years of age, they could receive a pension benefit if they joined the NRPS. When the pension benefit is sufficient for living subsistence, the leisure preference may increase whereas the probability of working may decrease (negative effect).

Second, the pension benefit can be thought of as a kind of financial resource for an individual; for example, the benefit can be used to start a new business. It can also be used to address the liquidity constraints problem and increase the probability of rural–urban migration (Ardington et al., 2009; Posel et al., 2006). Therefore, public pensions may increase the probability of labor force participation (positive effect).

However, it is not certain how public pensions affect the labor force participation of older adults since there are positive and negative effects. Therefore, an empirical study is necessary.

15.3.2 Empirical Studies on the Impact of Pension on Labor Force Participation

Several empirical studies exist on the impact of pensions on labor force participation.[1]

For developed countries, most of the previous studies have indicated that pensions reduce the employment of older adult workers and increase the probability of retirement. For example, Krueger and Pischke (1992), Samwick (1998), Blau and Goodstein (2010), and Vere (2011) have examined the United States; Oshio et al. (2009), Seike and Ma (2010), and Shimizutani and Oshio (2013) have examined Japan[2]; Kudrna and Woodland (2011) have examined Australia; Maloney (2000) has examined New Zealand; Martin and Marcos (2010) has examined Spain; Hernaes et al. (2016) have examined Norway; and Borsch-Supan (2000) has examined Germany.

For developing countries except China, most of the empirical studies have indicated that pensions may reduce the labor force participation of older adults. For example, Posel et al. (2006) examined the effect of the South African social pension on the employment of working-age adults using the ordinary least squares (OLS) regression model and instrumental variable (IV) method. They found that rural African women were significantly more likely to become migrant workers if they were members of a household that received a pension. Ranchod (2006) estimated the effect of the means tested on the South African Old Age Pension on the labor force participation among the older adult African subpopulation in South Africa and found a significant decrease in labor force participation. De Carvalho (2008) investigated the impact of social security benefits (1991 Pension Reform) on the retirement decisions of rural workers using the difference-in-differences (DID) method. He found that receiving old-age benefits increased the probability of not working by about thirty-eight percentage points and reduced the total working hours per week by 22.5 hours. For Mexico, Juarez (2010) investigated the effect of the 2011 pension scheme on the employment of pensionable individuals, based on the DID method, and found that the program had no significant effect on the time use of pensionable individuals. Thus, both males and females aged between 18 and 59 years increased their labor supply if they lived with a pensionable male but decreased their hours worked if they lived with a pensionable female.[3] For India, Kaushal (2013) used a regression model to estimate the effect of a recent expansion in India's National Old Age Pension Scheme and found that the public pension had a modest negative effect on the employment of older adults.

Meanwhile, the results of the empirical studies for China are inconsistent. Some studies have suggested that the NRPS reduces labor force participation whereas others have found that the NRPS does not affect labor force participation. For example, Cheng (2014) conducted an empirical study using Sichuan Province survey data conducted in 2011 and an IV and probit model and found that NRPS coverage (pension enrollment) may decrease the probability of agricultural labor force participation, while 6.6% of the total labor force participation probability included agricultural and non-agricultural labor force participation. Thus, pension receipt of the NRPS decreased 13.6% of the probability of participation in agricultural work and decreased 4.4% of the probability of total labor force participation. Zhang (2015) used 2011 CHARLS data and IV and regression-discontinuity design (RDD) methods to investigate the effect of the NRPS and found that the NRPS significantly reduced the probability of labor force participation of older adults aged around 60 years but did not affect their hours worked. Liu et al. (2016) used the Ministry of Agriculture's 2011 Rural Fixed Observatory Survey data (*Nongcun Guding Guanchadian Chouyang Diaocha*) and the propensity score matching (PSM) DID method to report that although the impact of the NRPS on the probability of labor force participation was not statistically significant, the NRPS reduced the total working hours, agricultural working hours, and non-agricultural working hours. Liu and Zeng (2016) used 2013 CHARLS data and IV/probit and tobit models and found that the NRPS could increase the probability of total labor force participation in agriculture regarding employed and self-employed work but reduced the probability of becoming a non-agriculturally employed and self-employed worker. Moreover, the NRPS could increase the total working hours, agriculturally employed working hours, and self-employed working hours, but reduced the working hours for both non-agriculturally employed workers and the self-employed. Liu (2017) used 2013 CHARLS data, and OLS and probit models to estimate the effect of the NRPS. He found that the NRPS increased both labor force participation and working hours (particularly total labor participation and agricultural labor participation, total working hours, and agriculture working hours) whereas the pension receipt reduced both labor participation and working hours. Zhang et al. (2014) used 2011 CHARLS data and RDD-DID methods and found that pension receipt of the NRPS did not significantly affect retirement age and work hours. Xie (2015) used 2008 and 2012 CHARLS data and RDD-DID methods to investigate the effect of the NRPS and found that the NRPS did not significantly affect labor force participation and work hours. Ning et al. (2016) used 2011 and 2013 CHARLS data and RDD-DID methods to investigate the effect of the NRPS. Their results concur with those of Xie (2015). One reason for the variation in findings may be because the survey datasets and estimation methods are different. Thus, it is necessary to re-estimate the data using new survey data and methods. Accordingly, this study conducts a new empirical investigation of this issue using different datasets and models.

15.3.3 Contributions of the Study

Although published studies have investigated the impact of pensions on labor force participation in China, some issues remain to be considered.

First, CHARLS data and the IV, probit, PSM, and RDD models have been used in published studies for China, yet empirical studies based on quasi-natural experiments remain scarce. This study uses long-term longitudinal survey data (CHNS 2000–2011) to construct a quasi-natural experiment dataset to investigate the effect of the NRPS on labor force participation in China. The estimation using the new data and the quasi-natural experiment model can provide new evidence on the causality relationship between public pensions and labor force participation from a developing and economic transition country, China.

Second, the impact of policy may change over time. Currently, no empirical study has considered the short-term and long-term effects of public pensions. This study fills this gap in the literature.

Third, we conduct an empirical study on Japan and compare Japanese experiences from an international comparative perspective; this is the first study to compare China and Japan.

15.4 Methodology and Data

15.4.1 Model

For China, we used the DID method, which is represented by Eq. (15.1):

$$\mathrm{Y_{it}} = a + \beta_1 \mathrm{yaer}_t + \beta_2 \mathrm{treat_{it}} + \beta_3 \mathrm{treat_{it}} * \mathrm{year}_t + \beta_4 \mathrm{X_{it}} + \varepsilon_{\mathrm{it}} \qquad (15.1)$$

where Y is the independent variable of the probability of participation in work, which is a binary variable (1 = working, 0 = non-working). i is the individual, t is the year that the NRPS was implemented (2009 and 2011 in this study); treat expresses the treatment group; X denotes the individual characteristic variables (i.e., age, education, health status, etc.), family factors (i.e., number of family members, non-earning income), and the regional dummy variables; a is the constant term; and ε is the error term. $\beta_1 \sim \beta_4$ represent the estimated coefficient for each variable.

This study divides the years before the NRPS was implemented (2000, 2004, and 2006) as the pre-policy period and the years of 2009 and 2011 as the post-policy period. The details of the treatment groups are introduced in the following section.

β_3 is the estimated coefficient of the DID item. When β_3 is negative and statistically significant, it indicates that the implementation of the NRPS decreases labor participation and vice versa.

For Japan, we used a structural probit regression model to investigate employment probabilities using Eqs. (15.2)–(15.4):

$$\mathrm{Y}_i^* = a + \beta_1 \mathrm{Pension}_i + \beta_2 \mathrm{X}_i + u_i \qquad (15.2)$$

$$\mathrm{Y}_j^* = \begin{cases} 1 \text{ if } \mathrm{Y}_j^* > 0 \\ 0 \text{ if } \mathrm{Y}_j^* \leq 0 \end{cases} \qquad (15.3)$$

$$\Pr(\mathrm{Y}_i = 1) = \Pr\left(Y_i^* \geq 0\right) = \Pr(a + \beta_1 \mathrm{Pension}_i + \beta_2 \mathrm{X}_i > u_i) \qquad (15.4)$$

Since the implementation of the Old-Age Employees' Pension in Japan, there may be an endogeneity problem between pension benefits and labor force participation decisions. Since the data are from a repeated cross-sectional survey data and it is difficult to find an appropriate IV, this study referred to Okawa (1998) and calculated the total amount of pension benefits that should be received, based on the Old-Age Employees' Pension, actual amount of pension benefits, and actual wage, to address the endogeneity problem (see Appendix Tables 15.5 and 15.6).

15.4.2 Data

1. **China**

We used five waves (2000, 2004, 2006, 2009, and 2011) of data from the CHNS. The CHNS is a nationwide longitudinal survey conducted by the Carolina Population Center at the University of North Carolina and the National Institute for Nutrition and Health (formerly the National Institute of Nutrition and Food Safety) at the Chinese Center for Disease Control and Prevention. The survey took place over a 7-day period using a multistage random cluster process to draw a sample of about 7,200 households with 30,000 individuals in 15 provinces and municipal cities that varied substantially regarding their geography, economic development, public resources, and health indicators. Although the longitudinal survey began in 1989, survey data around the implementation of the policy (from 2000–2011) were used because the NRPS was implemented in 2009. This study utilized samples from 11 provinces covered in the longitudinal survey: Beijing, Liaoning, Heilongjiang, Shanghai, Jiangsu, Shandong, Hernan, Hubei, Hunan, Guangxi, and Guizhou. Because the NRPS covers rural residents, we selected the samples with rural *hukou* as the analyzed objects.

The independent variable was a binary variable (1 = working, 0 = non-working) for the labor force participation situation.

The key independent variables were constructed as follows: *year* was the dummy variable from the implementation of the NRPS (2009 and 2011), while *treat* represented the treatment group dummy variable. Based on NRPS regulations, participants older than 60 years can receive pension benefits. We constructed the treatment group to include those who did not have a pension income, were older than 60 before 2009, and had a pension income after 2009. The control group included those who did not receive pension benefits and were older than 60 years before and after 2009. The *DID* term was the interaction term of the two variables used: the policy implementation year dummy and the treatment group dummy (year $*$ treat).

For the control variables, since individual characteristics may affect labor force participation, the number of family members, health status,[4] and male dummy variables were used. It was expected that the probability of labor force participation would be greater for a larger number of family members, better health status of the group, and the male group. We used the unearned income variable as the household income factor. The eastern, central, and western regional dummy variables were used to control regional disparities.

2. **Japan**

We used six waves (1980, 1988, 1992, 1996, 2000, and 2004) of data from the Survey on Employment Conditions of Elderly Persons (SECEP). The SECEP was conducted by the Ministry of Health, Labor and Welfare of Japan. There were 33,055 samples in 1980, 26,290 in 1988, 26,001 in 1992, 21,219 in 1996, 19,595 in 2000, and 17,853 in 2004.

The dependent variable was a binary variable (1 = working in the survey year, 0 = non-working) that was similar to the analysis for China.

The key independent variable was pension benefits by pension type. Based on the questionnaire items of the survey data, the pension benefits by pension types were used in this study. The pension types were as follows: (i) Employees' Pension (*Kousei Nenkin*), which contained imputed values (see Appendix Tables 15.5 and 15.6); (ii) National Pension (*Kokumin Nenkin*); (iii) mutual aid pension insurance (*Kyosai Nenkin*), (iv) corporate pension (*Kigyo Nenkin*), and (v) other pensions.

The control variables included age, occupation at the age of 55, firm size at the age of 55, retirement experience, health, number of family members, non-earning income, and region in Japan.

15.5 Results

15.5.1 The Impact of the NRPS on Labor Force Participation in China

Table 15.1 shows the results of the impact of the NRPS on labor force participation using the DID method. After considering the influence of the policy over various periods (e.g., short term or long term after the policy was implemented), we used two datasets: (i) the samples from 2000–2009 (short term) and (ii) the samples from 2000–2011 (long term). These are summarized in Panel A (2000–2009) and Panel B (2000–2011).

Table 15.1 Results for the impact of the NRPS on the labor force participation in rural China

	(1)		*(2)*		*(3)*		*(4)*	
	Coef	*SE*	*Coef*	*SE*	*Coef*	*SE*	*Coef*	*S.E*
a. Panel A (2000–2009), samples aged 50–70								
Year	−0.176***	0.034	−0.193***	0.035	−0.197***	0.035	−0.193***	0.035
Treatment	−1.307***	0.058	−1.332***	0.063	−1.335***	0.063	−1.349***	0.063
DID	−0.351***	0.131	−0.360***	0.134	−0.358***	0.135	−0.362***	0.135
Individual variables	Yes		Yes		Yes		Yes	
Family variables	No		No		Yes		Yes	
Regional variables	No		No		No		Yes	
Constants	0.322***	0.017	2.353	1.817	2.245	1.821	2.327	1.823
Observations	8251		8251		8251		8251	
Log likelihood	−5317.674		−5017.249		−4998.474		−4983.359	
Pseudo R^2	0.0792		0.1177		0.1179		0.1206	
b. Panel B (2000–2011), samples aged 50–70								
Year	−0.190***	0.026	−0.217***	0.026	−0.216***	0.026	−0.225***	0.027
Treatment	−1.307***	0.058	−1.323***	0.062	−1.325***	0.063	−1.337***	0.063
DID	−0.382***	0.091	−0.312***	0.093	−0.322***	0.094	−0.322***	0.094
Individual variables	Yes		Yes		Yes		Yes	
Family variables	No		No		Yes		Yes	
Regional variables	No		No		No		Yes	

a. Panel A (2000–2009), samples aged 50–70

	(1)		(2)		(3)		(4)	
	Coef	*SE*	*Coef*	*SE*	*Coef*	*SE*	*Coef*	*S.E*
Constants	0.322	0.017	2.774*	1.582	2.712*	1.585	2.830*	1.587
Observations	11,264		11,264		11,264		11,264	
Log likelihood	−7185.418		−6791.219		−6761.481		−6741.822	
Pseudo R^2	0.093		0.131		0.131		0.134	

Note
1. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
2. Individual factors (age, education, gender, and health status), family factors (number of family members, unearned income), and regional factors (eastern and central region dummy variables) were also estimated; the results are not listed in the table
Source Authors' creation based on the data from CHNS of 2000–2011

First, the results in Panels A and B show that the coefficients of the DID term are negative and statistically significant. This indicates that the NRPS negatively affects labor force participation. This suggests that pensions may decrease the probability of participating in work and may increase leisure time, which may increase the welfare of rural older adults. However, the public pension may decrease the labor force participation of older adults who are aged around 60 years, which may cause a labor force shortage in the agricultural industry. Balancing the welfare of older adults with the labor force shortage has become a challenge for the Chinese government.

Second, when comparing the coefficient values between Panels A and B, the absolute value is greater for Panel A (from 0.351 to 0.362) than for Panel B (from 0.316 to 0.328). This shows that the negative effect of the NRPS on labor force participation may become smaller in the long term. Thus, an estimation using the new longer survey data to investigate the NRPS effect should be conducted in the future.

Finally, the coefficient values of the DID term in the models are similar in Model 1 (basic model that only uses three variables: after the 2009 dummy, treatment group dummy, and DID term), Model 2 (adds the individual characteristic variables to Model 1), Model 3 (adds the family and income variables to Model 2), and Model 4 (adds the region dummy variables to Model 3). Even though the individual characteristics, family structure factors, and regional factors may affect the labor participation the influence of these factors is small, and when these factors are controlled, the negative effect of the NRPS remains.

Considering that the estimated results may vary according to the treatment and construction of control groups, this study used various treatment and control groups to investigate the policy effect. The results are summarized in Table 15.2. The results indicate that although the coefficients of DID items are not statistically significant, these values are negative. This again confirms that the NRPS may negatively affect labor participation. The results in Table 15.2 are similar to those in Table 15.1. This confirms that the NRPS negatively affects the labor force participation of older adults in rural China.

Table 15.2 Robustness checks: Results using various treatment groups for China

	(1)		*(2)*		*(3)*		*(4)*	
	Control: Aged 55–59		*Control: Aged 50–59*		*Control: Aged 50–59*		*Control: pension participant*	
	Treatment: Aged 60–64		*Treatment: Aged 60–64*		*Treatment: Aged 60–70*		*Treatment: non-participant*	
	Aged 55–64		*Aged 50–64*		*Aged 50–70*		*Aged 50–70*	
	Coef	*SE*	*Coef*	*SE*	*Coef*	*SE*	*Coef*	*SE*
Year	−0.196***	0.048	−0.200***	0.048	−0.261***	0.033	−0.222***	0.033
Treatment	0.008	0.090	0.038	0.082	−0.027	0.057	−1.290***	0.057
DID	−0.048	0.073	−0.067	0.062	−0.021	0.051	−0.355***	0.125
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5036		7257		10,735		10,220	
Log likelihood	−3359.814		−4788.098		−6967.258		−5894.488	
Pseudo R^2	0.037		0.047		0.061		0.168	

Note
1. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$
2. Control variables included age, age squared, education, health, gender, number of family members, unearned income, and region; these results are not listed in the table

Source Authors' creation based on the data from CHNS of 2000–2011

15.5.2 *The Impact of Pensions on Labor Force Participation in Japan*

The results for the probability of the labor force participation are shown in Table 15.3 for Panel A (1980s), Panel B (1990s), and Panel C (2000s). Regarding the significance level of each factor, the amount of pension benefits, age, occupation at the age of 55, company size at the age of 55, health status, unearned income, number of co-residing family members, retirement experience, and region all significantly affect the probability of the labor participation.

We also calculated the marginal effects of the amount of Employees' Pension (*Housei Nenkin*) benefits: the results are summarized in Table 15.4. The main findings are as follows. For those aged 60–69, if the Employees' Pension benefits increase by JPY 10,000 per month, the employment probability will decrease by 3.86 percentage points (1980), 0.87 percentage points (1988), 0.06 percentage points (1992), 3.99 percentage points (1996), 0.52 percentage points (2000), and 1.63 percentage points (2004) each year. Regarding the change in the impact of the Employees' Pension on the employment of older adults, the estimated value in 1996 (−3.99 percentage points) is almost the same as that in 1988 (3.86 percentage points). Although the Employees' Pension system was frequently reformed between the 1980s and the late 1990s, it can be seen that employee pension still has a negative effect on the employment of older adults. Moreover, the negative effect does not diminish over time. However, when compared with 1980 and 1996, the impact of the Employees' pension tends to be slightly smaller in the 2000s (estimated values are −0.52 percentage points in 2000 and −1.63 percentage points in 2004).

15.6 Conclusions

The Chinese government implemented the NRPS in 2009 to expand public pension coverage in rural China. This study investigates if the NRPS affects the labor force participation of rural older adults in China. Based on the natural experiment models (DID method) and using five waves (2000, 2004, 2006, 2009, and 2011) of CHNS longitudinal survey data, this study employed an empirical investigation to provide useful evidence related to this issue. We also investigated the impact of pensions on the employment of males aged 60–69 using six waves (1980, 1988,

Table 15.3 Results for the impect of pensions on the labor participation in Japan

	Coef	*z-value*	*Coef*	*z-value*
a. Panel A, 1980s				
	1980		1988	
Employees' Pension	−0.111***	−17.15	−0.022***	−9.71
National Pension	0.220***	5.14	−0.016	−0.78
Mutual aid pension	−0.062***	−10.76	−0.022***	−6.75
Corporate pension	−0.064***	−4.32	0.006	0.77
Other pensions	−0.080***	−5.02	−0.024**	−2.42
Individual variables	Yes		Yes	
Family variables	Yes		Yes	
Firm variables	Yes		Yes	
Regional variables	Yes		Yes	
Constants	0.876***	6.52	0.608***	5.60
Observation	5440		4995	
Pseudo R^2	0.243		0.182	
Log likelihood	−2675.650		−2788.130	
b. Panel B, 1990s				
	1992		1996	
Employees' Pension	−0.002**	−2.52	−0.103***	−33.25
National Pension	0.008	0.59	−0.062***	−7.08
Mutual aid pension	−0.011***	−3.50	−0.038***	−12.50
Corporate pension	−0.025***	−3.21	−0.020***	−3.08
Other pensions	−0.029***	−2.57	−0.007	−0.51
Individual variables	Yes		Yes	
Family variables	Yes		Yes	
Firm variables	Yes		Yes	
Regional variables	Yes		Yes	
Constants	−1.118***	−10.88	0.692***	6.20
Observation	5570		4727	
Pseudo R^2	0.325		0.361	
Log likelihood	−2505.020		−2656.300	
c. Panel C, 2000s				
	2000		2004	
Employees' Pension	−0.013***	−9.10	−0.041***	−11.26
National Pension	−0.038	−1.24	–	-
Mutual aid pension	0.002	0.64	–	-
Corporate pension	0.005		–	-
Other pensions	−0.050***	−2.54	−0.023**	−2.42

(continued)

Table 15.3 (continued)

	Coef	*z-value*	*Coef*	*z-value*
Individual variables	Yes		Yes	
Family variables	Yes		Yes	
Firm variables	Yes		Yes	
Regional variables	Yes		Yes	
Constants	−0.463***	−3.65	−0.210*	−1.74
Observation	3431		3978	
Pseudo R^2	0.129		0.140	
Log likelihood	−2064.940		−2364.130	

Note
1. ***p < 0.01, **p < 0.05, *p < 0.10.
2. The Employees' Pension benefits are imputed values based on Okawa's (1998) method
3. In the 2004 questionnaire item, there were only two pension types: the Employees' Pension and other pensions. Therefore, only the Employees' Pension and other pensions were estimated for 2004
Source Authors' creation based on the data from SECEP of 1988–2004

Table 15.4 The marginal effects of Employees' Pension benefit amount on the labor participation in Japan

	Aged 60–69 (%)	*Aged 60–64 (%)*	*Aged 65–69 (%)*
1980	−3.86	−4.14	−2.88
1988	−0.87	−0.77	−0.94
1992	−0.06	−0.01	−1.08
1996	−3.99	−2.59	−5.93
2000	−0.52	−0.10	−1.20
2004	−1.63	−1.75	−1.38

Note The dependent variable and control variables are similar to those in Table 15.1
Source Authors' creation based on the data from SECEP of 1988–2004

1992, 1996, 2000, and 2004) of data from the SECEP conducted by the Ministry of Health, Labor and Welfare of Japan.

Some major conclusions can be drawn. First, for China, the NRPS decreases the probability of the labor force participation of older adults. These results are consistent with those of previous studies (Cheng, 2014; Ning et al., 2016). Compared with the policy effect in the short term (from 2000 to 2009), the negative effect becomes smaller over the long term (from 2000 to 2011).

Second, for Japan, the higher the pension benefit, the lower the employment probability from 1980 to 2004. However, the negative effect has become smaller in recent decades.

By comparing the results with Japan, the following policy implications can be considered for China. First, the results indicate that the NRPS may decrease the labor force participation of older adults in rural China, which is similar to the negative effect of the employee pension in Japan. The NRPS, as a public pension system, can improve the welfare of rural older adults; it is also expected to reduce the social security gap between rural and urban residents and reduce poverty among older adults. However, it should be noted that the public pension system might negatively affect labor force participation. As the aging population in China progresses, it can be assumed that the labor force shortage problem will become more serious in the future. Therefore, when the government promotes reform and constructs the public pension system, both the welfare effect and the negative effect of public pensions on the labor market should be considered carefully.

Second, in Japan, although the national universal pension system provides a safety net for older adults, the Japanese government has faced problems such as a heavy fiscal burden since the 1980s (Kaneko, 2018; Oshio, 2018; Seike & Yamada, 2004). The Chinese government should address and prevent fiscal problems to construct a sustainable public pension system in China.

Finally, in contrast with Japan, China's public pension systems have been established and implemented based on the *hukou* system; therefore, a large pension inequality exists between rural and urban Chinese residents (Ma, 2018; Ma & Oshio, 2020). Even though this empirical study's results indicate that the NRPS may decrease the labor force participation of older adults in rural China, the government should not reduce the pension benefits for rural residents in the future because, from the living subsistence perspective of older adults, the pension benefit of the NRPS is the lowest among the various public pension types. As mentioned in Sect. 15.2, the public pension system in China is a segmented system that includes the UEBPI, CSP, URBPI, and NRPS (Cai & Cheng, 2014; Ma, 2018, 2020). Urban employees are the main eligible group for the UEBPI and CSP, non-working urban residents are the main eligible group for the URBPI, and rural residents are the main eligible group for the NRPS. Thus, pension benefits and pension insurance premiums differ according to these pension systems. The pension benefits are greater for the CSP and UEBPI than for the NRPS. Since August 2012, the URBPI and NRPS have been integrated as the Urban and Rural Resident Social Pension Insurance, but the pension benefits are lower for rural residents than for urban residents. Thus, integrating these public pensions is important for the Chinese government to reduce social security inequality between urban and rural residents.

Appendix

Introduction of the NRPS in China

The main contents of the NRPS are as follows. First, residents who are aged 16 and over, not in school, not covered by public pension schemes for urban *hukou* residents (i.e., UEBPI, CSP, and URBPI), and who have rural registration can choose to participate in the NRPS, which is voluntary. Upon deciding to participate, they must register with their village administration, which is the lowest level of the government's hierarchy in China.

Second, the NRPS's funds come from three sources: individual contributions, collective and local governments, and the central government. The individual contributions range from RMB 100 to RMB 500 per year. Each county can determine the exact contribution range applied in its jurisdiction. In some regions, collective communities contribute to funds. Local governments provide a subsidy of at least RMB 30 per year for every insured person. If the insured person contributes more, they will receive a higher benefit in the future. The local government administers the NRPS funds.

Third, rural older adult residents are entitled to receive a pension if they are aged 60 or above at the time that the NRPS is implemented. Those aged below 60 years of age must have contributed to it for at least 15 years.

Fourth, the insured person is entitled to receive benefits from two parts: (1) basic pension benefits of at least 55 RMB a month from pooling pension insurance funds and (2) individual account funds. Because there is no means test, the pension insurance participants do not need to exit from the labor market when they receive pension benefits. Individual accounts can be inherited by the insured person's family members if the insured persons die early. The central government supports the total basic guaranteed benefit (at least 55 RMB per month per insured person) for participants in the central and western regions, and 50% of the basic guaranteed benefit for participants in the eastern region. In addition, the benefit will be adjusted according to inflation, but the adjustment mechanism has not yet been determined (Cai et al., 2012).

The Chinese government enforced the implementation of the NRPS after 2009. Based on data from the Ministry of Human Resources and Social Security, the total number of participants increased from 103.0 million in 2010 to 483.7 million in 2012, which was an increase from 74.1 million in 2010 and 349.9 million in 2012, while beneficiaries increased from 28.9 million in 2010 to 133.8 million in 2012. After August 2012, the New Rural Pension Scheme and Urban Resident Pension Scheme were integrated as Urban and Rural Residents' Social Pension Insurance.

Calculation for the Full Amount of Employees' Pension Benefits for Japan

See Table 15.5 and Table 15.6.

Table 15.5 Calculation method for the survey data of 1980 and 1988 in Japan

Condition	*Amount of pension benefit after reduction based on OAEP*	*Unit: JPY monthly* *Calculation for full amount of pension benefit*
$W \leq 9.5$	empP = 0.8fullP	fullP = empP/0.8
$9.5 \leq W \leq 11.4$	empP = 0.7fullP	fullP = empP/0.7
$11.4 \leq W \leq 13.8$	empP = 0.6fullP	fullP = empP/0.6
$13.8 \leq W \leq 16.5$	empP = 0.5fullP	fullP = empP/0.5
$16.5 \leq W \leq 18.5$	empP = 0.4fullP	fullP = empP/0.4
$18.5 \leq W \leq 21.0$	empP = 0.4fullP	fullP = empP/0.3
$21.0 \leq W \leq 25.0$	empP = 0.2fullP	fullP = empP/0.2
$25.0 \leq W$	empP = 0	Average value of full employee pension benefit by occupation types at the age of 55

Note OAEP: Old-Age Employees' Pension; W: standard wage monthly; empP: actual amount of pension benefit after the reduction based on the OAEP; fullP: full amount of Employees' Pension, which is the amount that an employee should receive before the reduction based on the OAEP
Source Authors' creation

Table 15.6 Calculation method for the survey data of 1992, 1996, 2000, and 2004 in Japan

		Unit: JPY monthly
Condition	Amount of pension benefit after reduction based on OAEP	Calculation for full amount of pension benefit
$W + 0.8\text{fullP} \leq 22$	$\text{empP} = 0.8\text{fullP}$	$\text{fullP} = \text{empP}/0.8$
$22 \leq w + 0.8\text{fullP}$ $W < 34$ $0.8\text{fullP} < 22$	$\text{empP} = 0.8\text{fullP} - 0.5(W + 0.8\text{fullP} - 22)$	$\text{fullP} = 0.25(5\,W - 10\text{empP} - 110)$
$22 \leq w + 0.8\text{fullP}$ $W \geq 34$ $0.8\text{fullP} < 22$	$\text{empP} = 0.8\text{fullP} - 0.5(34 + 0.8\text{fullP} - 22) - (W - 34)$	$\text{fullP} = 0.25(10\,W + 10\text{empP} - 280)$
$22 \leq w + 0.8\text{fullP}$ $W < 34$ $0.8\text{fullpP} \geq 22$	$\text{empP} = 0.8\text{fullP} - 0.5\,W$	$\text{fullP} = 0.125(5w + 10\text{empP})$
$22 \leq w + 0.8\text{fullP}$ $W \geq 34$ $0.8\text{fullP} \geq 22$	$\text{empP} = 0.8\text{fullP} - 0.5 * 34 \text{-} (W - 34)$	$\text{fullP} = 0.125(10\,W + 10\text{empP} - 170)$
	$\text{empP} = 0$	Average value of full employee pension benefit by occupation types at the age of 55

Note OAEP: Old-Age Employee Pension; W: standard wage monthly; empP: actual amount of pension benefit after reduction based on the OAEP; fullP: full amount of Employees' Pension, which is the amount that an employee should receive before the reduction based on the OAEP
Source Authors' creation

Notes

1. For details of the literature review on the issue of the impact of public pensions on the labor supply of intra-household prime-age adults, please refer to Ma (2020).
2. For details of the literature review on the impact of public pensions on the labor supply of older adults in Japan, please refer to Seike and Ma (2010).
3. Juarez (2010) explained the reason for the results as the income in the hands of older adult females was shared more with younger family members than the income in the hands of older adult males.
4. Because the missing values for subjective health status were greater, the mental health score was used in this study. The health status was poor when the mental health score was higher. This study used subjective health status, and the results were similar to those that were obtained using the mental health score. To maintain the observations in the econometric analysis, the results used the mental health score presented in this study.

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CHAPTER 16

Bequest Motives and Saving Rate of Elderly Households

Cheng Tang and Cheng Zhang

16.1 Introduction

Since the end of the twentieth century, the number and proportion of elderly people in China has continued to grow, which has affected its economic development. According to the World Population Prospects Report (2019),[1] China's aging rate—the proportion of the population aged over 65—continues to increase and will soon exceed that of Japan, which has the highest aging rate in the world. Based on the Fund Flow Table of the National Bureau of Statistics,[2] as China's aging population rapidly increases, the rate of household saving has gradually declined from 42.1% in 2010 to 36.2% in 2017. Even so, China's household saving rate

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_16

is still relatively high (Ma & Yi, 2010). This trend is consistent with the life cycle theory: family members save assets during work, while retirement reduces the assets for consumption. Thus, the saving rate has an inverted U-shaped relationship with age (Modigliani & Brumberg, 1954). However, some studies have argued that in China, the household saving rate is high, both when householders are relatively young and when they retire, whereas it is low during middle age. The relationship between age and the saving rate is approximately U-shaped (Chamon & Prasad, 2010; Rosenzweig & Zhang, 2014). This phenomenon contradicts the life cycle theory. So why does the saving rate of Chinese elderly households remain high? How does aging affect China's household saving rate? Studies have provided explanations such as life expectancy extension (Zhang & Wang, 2019), population aging (Chen et al., 2014), and population structure (Ni et al., 2014). However, few studies have analyzed the saving behavior of elderly households based on microdata from the perspective of bequest motives.

Japan is similar to China in terms of economic growth, demographic changes, and traditional cultural foundations. It has one of the highest household saving rates in the world. According to the survey data of China and Japan (Fig. 16.1), China's household saving rate exceeds that of Japan from age 55 and both show an upward trend after age 65. By comparison, the saving rate of Chinese elderly households is higher than that of employed Japanese. Why is the saving rate of "aging before getting rich" in Chinese elderly households even higher than that of the wealthiest counterpart in Japan? In addition, does bequest motive also significantly affect the saving rate of Chinese elderly households?

Several studies have explained the reasons for high household saving rate in China from various aspects. A significant finding was the life cycle theory (Modigliani & Cao, 2004), which showed the savings rate is affected by the proportion of the working-age population in the total population. From the perspective of preventive saving motivation (Choi et al., 2017; Ma & Zhou, 2014), household saving rate increases with expenditure on housing (He et al., 2018; Li & Huang, 2015), education, and health care (Chamon & Prasad, 2010; Wang & Wu, 2019). Regarding residents' income distribution, excessive gap in household income may lead to a decline in the level of consumption, which, in turn, increases the household saving rate (Gan et al., 2018). The level of financial development and cultural factors (Xu et al., 2017; Ye et al., 2012)

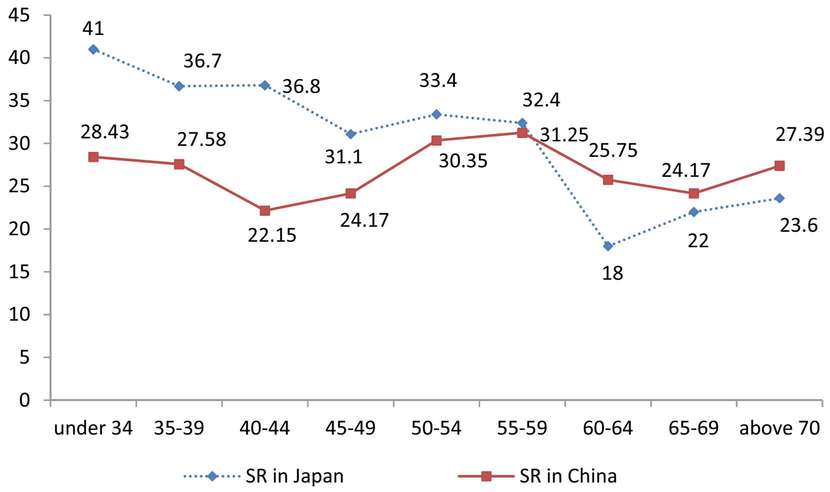

Fig. 16.1 Saving rate of Japan and China by age (*Note* SR = Saving Rate. *Source* From https://population.un.org/wpp)

also affect the household saving rate. Some have asserted family demographic structure or famine experience affects high saving rate (Cheng & Zhang, 2011; Wei & Zhang, 2011). Several studies have proposed the factors driving the pattern, but with no conclusive answers. However, few studies have focused on the puzzle at the micro level from the perspective of bequest motives.

Cai and Zhang (2020) examined the reasons for the high savings of Chinese elderly households from the perspective of bequest motives, precautionary motive, and time preference based on the survey data of Beijing, Shanghai, and other urban areas from 2009 to 2010 (effective sample number of 328 people). They believed that bequest-motivated families have higher financial and fixed assets than non-bequest-motivated families.

This study is perhaps the first to examine the impact of bequest motives on elderly household savings rate from a micro perspective, and contributes to the literature from the following two aspects: First, based on the 2015, 2017, and 2019 Chinese household financial survey data, we explain, from the perspective of bequest motive, why the elderly household savings rate remains high during the aging process. The results indicate that bequest motives significantly increase the elderly household savings rate, and hence provide empirical evidence for understanding the mystery of China's high household savings rate. Second, this study reveals the heterogeneous effects of bequest motives on elderly household saving rate of different groups (urban–rural differences, different wealth levels, children's education, and work difference), which contains a comparative study with the effect of bequest motives on elderly household savings rate in Japan, enriching the literature and having implications for policymakers.

The China Household Financial Survey (CHFS) data were employed from family's microscopic perspective, which provides unique explanation for China's high saving rate. We not only compare the data between China and Japan but also discuss the impact of bequest motives on the saving rate of households from different groups, including urban and rural differences, different wealth levels, and children's different education levels and work types based on whether they work within the government system.

The remainder of this chapter is organized as follows: Sect. 16.2 reviews the literature. Section 16.3 constructs econometric models, describes variables, and analyzes data. Section 16.4 analyzes the empirical results. Section 16.5 presents the heterogeneity analysis. Section 16.6 tests the robustness. Section 16.7 concludes and proposes some policy implications.

16.2 Literature Review

According to the standard life cycle theory, families increase savings during work and show smooth consumption after retirement; thus, the saving rate declines (Ando & Modigliani, 1963). However, studies have found that the wealth gradually declines after retirement, so the saving rate does not drop significantly (Alessie et al., 1999; De Nardi et al., 2015). Studies have explained this phenomenon mainly from three aspects: uncertain life expectancy (Cocco & Gomes, 2012; De Nardi et al., 2009; Post & Hanewald, 2013; Yaari, 1965); voluntary bequest motivation (De Nardi & Yang, 2014; Kopczuk & Lupton, 2007; Laitner, 2002), and preventive saving motivation (De Nardi et al., 2010; Dobrescu, 2015). Several similar studies have associated the bequest motives with the rate of saving. The bequest motives are classified into three categories: egoist, altruism, and legacy (Horioka, 2014; Kopczuk & Lupton, 2007). First, egoist motive assumes that people are selfish, leaving no inheritance to children or only leaving it when the old understand the uncertainty of death and to children who responsibly respect and care about them (Hurd, 1989; Nardi & Yang, 2014). Second, altruistic motive is that people have intergenerational altruism (family relationships) toward their children. According to this theory, regardless of whether the children can inherit the family business or take care of the elderly, parents will leave an inheritance to their children (Laitner, 2002). Third, the main point of legacy motivation is that parents want to continue the family business or property and take actions to minimize the possibility of them being destroyed. According to this theory, the inheritance will only be left to the children who can manage the family property (Alessie et al., 2014; Norton & Van Houtven, 2006).

Studies have focused on the savings rate of Japanese elderly households. According to the life cycle theory, in Japan, the income level declines relatively slowly after the elderly retire or stop working (Horioka, 2010; Horioka & Niimi, 2017; Murata, 2019). Precautionary saving motives and bequest motives are the key reasons for this slow downward trend. Whereas some scholars believed that the precautionary motive plays an important role (Niimi & Horioka, 2018), others have found that it could not fully explain the slow decline (Murata, 2019). Some studies have suggested that family wealth declines more gently within bequest-motived families (Horioka, 2002; Horioka et al., 1996). However, no consistent conclusions have been reached regarding the effect of precautionary saving motives and bequest motives on the savings rate of elderly households. Individual property can be used for not only an inheritance to children, but also medical, nursing, or other expenses (Dynan et al., 2002).

Only a few studies have examined the phenomenon of high savings of China's elderly households from the following aspects. First, the old-age pension reform has led to the uncertainty of households' income, thus increasing the saving rate of elderly households (Chen, 2016). Second, the wealth effect brought by pension income promotes the saving rate (Liu & Chen, 2010). Third, the individual's cognitive consumption capability affects the household spending power, which, in turn, affects the saving rate (Li & Zhang, 2018). An empirical research on Chinese bequest motives mainly emphasizes two aspects. The first is the impact on household wealth and asset portfolio. For example, Chen and Huang (2013) used the number of children and the number of core family members as proxy variables to examine the influence of bequest motives on the household wealth effect. Kuang et al. (2018) measured bequest motives by the number of houses owned by the family. It indicated that bequest motives boost housing prices. Yang and Gan (2020) used the CHFS data to understand the influence on urban household investment portfolios and wealth gaps. Yin (2012) focused on the impact of bequest motives on wealth accumulation in elderly households by adopting micro-data from the Life Preference and Satisfaction Survey. The second aspect is associated with the support of children. From the data of farmers in Anhui Province, Jiang et al. (2015) studied the relationship between the support provided by children and their parents' bequest motives. Yin (2010) analyzed the relationship between bequest motives and children's coresident and found that regardless of whether it is urban or rural, the type of bequest motives in China is egoism.

Studies have mainly focused on the perspectives of social security and pension insurance. They rarely highlight the saving behavior of the elderly households from bequest motives, especially by in-depth analysis based on the national representative data. Only Almås et al. (2020), referring to the urban and rural survey data of two provinces in China, suggested that the level of children's assistance to parents significantly affects how much inheritance is left to them. For example, housing is an essential part of the elderly households' inheritance and is a significant reason for saving. Using China's urban survey data, Cai and Zhang (2020) also claimed that bequest motives significantly increase household financial assets and fixed assets.

This study extends the literature from a microscopic perspective to examine the puzzle of the high saving rate of elderly households. We first collected the CHFS 2015, 2017, and 2019 data, including urban households and a sample of rural households. Then we analyzed the impact of bequest motives on the saving rate of elderly households from three aspects: urban and rural areas, wealth accumulation, and differences in children's lives.

16.3 Model and Variables

16.3.1 Model

To investigate the impact of bequest motive on household savings, this study establishes the following econometric equation:

$$\mathrm{Saving_i} = \mathrm{a_0} + \alpha_1 * \mathrm{Bequest\_motive_i} + \alpha_2 \mathrm{X_i} + \mu_\mathrm{i} \tag{16.1}$$

where $Saving_i$ denotes the household i's saving rate. $Bequest\_motive_i$ is the bequest motive of household i's. X_i refers to the control variables, including demographic, family, and provincial. μ_i is the residual error.

16.3.2 Data Source and Variables

Data are obtained from the CHFS project conducted by the Southwest University of Finance and economics in 2015, 2017, and 2019, which investigated 29 provinces, cities, and autonomous regions, except Xinjiang, Tibet, Hong Kong, Macao, and Taiwan. The data contain the following demographic characteristics: households, family wealth, income, expenditure, insurance, and employment information. The number of children, the types of insurance, and the housing information are recorded in detail, which provides reliable data for the study. The CHFS data are sampled scientifically and randomly, and the survey data are representative of high quality (Gan et al., 2012). The main variables are described as follows.

- Saving rate

To increase the robustness and reliability of the empirical results, we present two definitions of saving rate (dependent variables) based on the literature (Yin & Zhang, 2019). The formula of the first definition: the total household income in the current year minus the household expenditure, and divided by the household income. Household expenditure[3] includes consumption of nondurable goods such as food, daily necessities, communication expenses, cultural entertainment, and transportation expenses, as well as education and medical expenses; household income contains property income, annual earning, transfer income, and operating revenue. The expression of saving rate 1 is as follows:

$$\text{Saving 1} = \frac{(\text{household income} - \text{household expenditure})}{(\text{household income})} \tag{16.2}$$

As education and medical expenditures are contingent and sudden, they have a strong rigidity for a family's expenditure. Considering robustness, we then defined the second household saving rate following the study results of Ma and Zhou (2014). The total household income minus the household's regular consumption and divided by the household income. A family's regular consumption excludes the medical expenditure and education expenditure. The expression of the saving rate 2 is as follows:

$$\text{Saving 2} = \frac{\begin{array}{c}[\text{household income} - (\text{household consumption} \\ (-\text{medical expenses} + \text{educational expenditure}))]\end{array}}{\text{household income}} \tag{16.3}$$

In empirical analysis, the main regression results are saving rate 1 and saving rate 2.

- Bequest motive

Combined with the CHFS questionnaire survey data, we present three definitions to measure the bequest motive of elderly households. The first definition is to measure whether the householder or spouse has life insurance (Tin, 2010). The households whose householder or spouse with life insurance are assigned a value of 1, while a value of 0 is assigned to those without any life insurance (i.e., with bequest motive = 1; 0 otherwise). The second definition, using the method followed by Chen and Huang (2013), measures the bequest motive by the number of children in the family. As regards this method, we took the percentage of boys in a family as the measurement. The third definition tests whether the family has more than one house (Kuang et al., 2018). If the family has multiple houses, the bequest motive is assigned a value of 1; otherwise, it is 0.

- Control variables

This study selected the following control variables, including householder's demographic characteristic variables, family characteristic variables, and provincial characteristic variables. Demographic variables of householders include age, education level, whether a CPC Party member, employed or unemployed, marital status, and registered rural residents. Family characteristic variables contain members' participation in endowment insurance, size, business operation, and total assets. Regional variables include provincial control variables.

This study emphasizes the influence of bequest motive on the saving rate of elderly households. In data processing, our sample includes a householder aged 60 or above and the family has at least one child. To avoid the effect of outliers, we exclude samples whose total household income is less than or equal to 0, set the upper limit of household saving rate to 100%, and the lower limit to −100%. Finally, the total number of respondents is 12475.

Table 16.1 shows that the saving rate of China's elderly households is still high, with the average value of saving rate 1 at 18.28% and saving rate 2 at 37.26%. The average bequest motive of elderly households was 0.0394, 0.6595, and 0.2098, respectively, by three definitions. The average age of the householder is 67.09 years, but the average years of education are only 5.6 years, which means the education level of the elderly in China is relatively low. The proportion of employed householder is 27.88%, indicating that some elderly groups continue to choose to work after retirement. The percentage of married householders was 82.54%, while that of rural families was 40.45%. The control variables of family characteristics show that 12.40% of the families run business. The average number of family members is between 4 and 5 (4.75), whereas the number of children in a family is between 1 and 2 (1.53). The rate of elderly households joining in endowment insurance is high (83.26%). The percentages of children with formal work and those with higher education level are low at 14.37 and 20.42%, respectively.

Furthermore, this study explores the general situation of the household saving rate of different bequest motives. Table 16.2 shows that both SR1 and SR2 show that the saving rate of high-bequest motive is higher than that of low-bequest motive. Taking saving rate 2 and bequest motive 2 as examples, the saving rate of high-bequest motive families was 40.66%, which was higher than that of low-bequest motive families (32.92%), with a difference of 7.74%.

Table 16.1 Descriptive statistics of variables for China

Variable	N	*Mean*	*S.D*	*Min*	*Max*
Dependent Variable					
SR1	12,475	0.1828	0.6278	−1	1
SR2	12,475	0.3726	0.6164	−1	1
Independent Variable					
BM1	12,475	0.0394	0.1945	0	1
BM2	12,475	0.6595	0.4204	0	1
BM3	12,475	0.2098	0.4072	0	1
Control Variable					
Householder's age	12,475	67.0934	6.0966	60	99
Householder's education level	12,475	5.5979	3.8772	0	19
Family business	12,475	0.1240	0.3296	0	1
Householder (Party Member)	12,475	0.1226	0.3280	0	1
Householder (employed)	12,475	0.2788	0.4484	0	1
Householder (married)	12,475	0.8254	0.3796	0	1
Family size	12,475	4.7525	1.7054	2	19
Children (employed)	12,475	0.1437	0.3508	0	1
Number of children	12,475	1.5295	0.8592	1	10
Children's education level	12,475	0.2042	0.4031	0	1
Householder (registered rural residents)	12,475	0.4045	0.4908	0	1
Householder (endowment insurance participation)	12,475	0.8426	0.3796	0	1
Family assets (in 10,000 Yuan)	12,475	97.69	178.82	0	2830

Note The data come from the 2015, 2017, and 2019 China Household Finance Survey data. *N*: number of observations; S.D.: standard deviation
Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

Table 16.2 Household saving rate in China

	High-BM			*Low-BM*		
	BM1	*BM2*	*BM 3*	*BM 1*	*BM 2*	*BM 3*
SR1	0.3084	0.2268	0.3138	0.1777	0.1262	0.1480
SR2	0.4549	0.4066	0.4624	0.3695	0.3292	0.3488

Note SR = Saving Rate; BM = Bequest Motive
Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

16.4 Estimation Results

16.4.1 Benchmark Regression

First, this study analyzes the impact of bequest motive on the savings behavior of Chinese elderly households. The estimation results illustrate a strong positive relationship between bequest motives and elderly household saving rate (Table 16.3).

In Table 16.3, Columns (1) and (2), by the first definition, measure whether the householder or spouse has life insurance. The estimation results in column (1) show that the estimated coefficient of bequest motive of the elderly household saving rate 1 (SR1) is 0.0675, which is significant at 1%. We redefine the household saving rate 2 (SR2) to prevent the impact of accidental expenditure on education and health care. The results of column (2) reveal significant and positive coefficient (0.0423) but have relative weak explanatory power (at 10% significant level). Second, columns (3) and (4) are the regression results of the definition accessed by the proportion of boys in the family. The estimated coefficients are 0.0959 and 0.0686, respectively, which demonstrate a strong link between bequest motives and saving rate (significant level = 1%). Third, we used the family ownership of more than one house as a factor to measure bequest motives. The results also indicate that bequest motives have a strong positive effect on the elderly household saving rate, with the estimated coefficients of column 5 at 0.1157 and column 6 at 0.0775.

As regards control variables, the significance of the estimation results from column (1) to column (6) is consistent. To avoid repetition, we focus on the estimation results of column (1). The householder's age effect on the family saving rate presents a U-shape relationship, which follows the conclusion by Chamon and Prasad (2010). The higher the level of education (years of education), the stronger the precautionary saving motive, thereby increasing the household saving rate (Zhang & Zhang, 2016). Other stimulations include employed householder, married householder, and family size. Alternatively, the household management of industry and commerce significantly inhibited the household savings rate as the household needs more cash investment to run a business and industry. Similarly, compared with urban areas, the income level of rural households is lower, which restrains the growth of elderly household's saving rate. Interestingly, the participation in endowment insurance did not significantly shrink the household saving rate but,

Table 16.3 The impact of bequest motives on the saving rate of Chinese older households

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	SR1	SR2	SR1	SR2	SR1	SR2
BM1	0.0675***	0.0423*				
	(0.0236)	(0.0228)				
BM2			0.0959***	0.0686***		
			(0.0130)	(0.0128)		
BM3					0.1157***	0.0775***
					(0.0127)	(0.0121)
Household's age	−0.0298**	−0.0064	−0.0325**	−0.0083	−0.0309**	−0.0071
	(0.0148)	(0.0144)	(0.0148)	(0.0144)	(0.0147)	(0.0143)
Age squared /100	0.0219**	0.0072	0.0238**	0.0085	0.0027**	0.0078
	(0.0104)	(0.0101)	(0.0104)	(0.0101)	(0.0103)	(0.0100)
Householder's education level	0.0146***	0.0103***	0.0152***	0.0107***	0.0136***	0.0096***
	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)	(0.0019)
Family business	−0.0332*	−0.0533***	−0.0361**	−0.0554***	−0.0421**	−0.0593***
	(0.0171)	(0.0167)	(0.0170)	(0.0167)	(0.0170)	(0.0167)
Householder (Party ember)	0.0549***	0.0313**	0.0546***	0.0311**	0.0511***	0.0288*
	(0.0156)	(0.0150)	(0.0156)	(0.0150)	(0.0156)	(0.0150)
Householder's occupation	0.0304**	0.0040	0.0284*	0.0026	0.0323**	0.0053
	(0.0149)	(0.0145)	(0.0149)	(0.0145)	(0.0149)	(0.0145)
Householder (married)	0.0450***	0.0532***	0.0456***	0.0536***	0.0434***	0.0521***
	(0.0157)	(0.0155)	(0.0157)	(0.0155)	(0.0157)	(0.0155)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Endowment insurance joined	0.1055***	0.1038***	0.1072***	0.1049***	0.1020***	0.1014***
	(0.0173)	(0.0171)	(0.0173)	(0.1071)	(0.0172)	(0.0170)
Family size	0.0280***	0.0282***	0.0277***	0.0280***	0.0250***	0.0262***
	(0.0039)	(0.0039)	(0.0039)	(0.0038)	(0.0039)	(0.0039)
Householder (registered rural residents)	−0.0862***	−0.0436***	−0.0907***	−0.0468***	−0.0854***	−0.0430***
	(0.0130)	(0.0126)	(0.0129)	(0.0126)	(0.0129)	(0.0126)
Provincial control	Yes	Yes	Yes	Yes	Yes	Yes
Time control	Yes	Yes	Yes	Yes	Yes	Yes
N	12,453	12,453	12,453	12,453	12,453	12,453
R^2	0.081	0.102	0.085	0.104	0.086	0.105

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard error is in (). BM = bequest motive, SR = saving rate

Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

instead, increased it, because residents still lack a sense of security in participating in the endowment insurance as the current pension system fails to provide good protection, and the pension insurance of social pooling mode accounts for a large degree of household consumption (Zhao et al., 2017).

Besides, we analyze the impact of bequest motives on the saving rate of Japanese elderly households. Table 16.4 shows the estimation results by the two definitions of bequest motives.

The data are from the Household Finance Survey of the Japan Postal Savings Consortium in 2013, 2015, and 2018.[4] The questions are directly linked to bequest motives. For instance, question 35 asked the family, "Under what circumstances will the inheritance be left to the children?" Respondents had the following options: "1. I would leave the inheritance under no circumstances; 2. I would leave the inheritance only when children take about of me. 3. I would leave the inheritance when a child can inherit the family business; 4. I will not actively leave an inheritance; 5. Others; 6. I do not want to leave an inheritance" (p. 17). The definitions of bequest motives are based on these questions, while bequest motive 1 is defined as dummy variables. If the householder answers 1, then the value of bequest motive is 1; otherwise, it is 0; the value of heritage motivation 2 is assigned accordingly. If respondents choose answer 1, the bequest

Table 16. 4 The impact of bequest motives on the saving rate of Japanese older households

	(1)	*(2)*	*(3)*	*(4)*
	SR1	SR2	SR1	SR2
BM1	0.0482**	0.0456*		
	(0.0227)	(0.0275)		
BM2			0.0299***	0.0237*
			(0.0115)	(0.0138)
Householder's character control	Yes	Yes	Yes	Yes
Family's character control	Yes	Yes	Yes	Yes
Time control	Yes	Yes	Yes	Yes
N	1464	1370	1408	1325
R^2	0.048	0.036	0.051	0.037

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate

Source Authors' creation based on the data from the Household Finance Survey of the Japan Postal Savings Consortium in 2013, 2015, and 2018 motive is assigned a value of 3. The bequest motive is assigned a value of 2 when respondents choose answers 2 and 3, while the other situations are assigned a value of 1. The estimated results in Table 16.4 show that the estimated coefficients by the two definitions of bequest motives are both significantly positive within the statistical level of 10%, indicating that the bequest motives positively affect the saving rate of Japanese elderly households. Specifically, the empirical findings of microdata from both China and Japan clarify that the bequest motives have a positive effect on the saving rate of elderly households.

16.4.2 Instrumental Variable Estimation

The endogenous bias in the benchmark results is due to two reasons: The first is the reverse causality, which means the family saving rate may, in turn, affect the individual's bequest motives: the higher the household saving rate, the stronger the individual's motivation to leave a legacy for their children. Second, there may be missing variables that affect both bequest motives and household saving rate. To solve the problems, we selected the average bequest motive of the elderly households in the same community as the tool variable of the family bequest motives and estimated the model by two-stage least squares method.

Table 16.5 is the estimation results of instrumental variable method. Columns (1) (2), Columns (3) (4) and Columns (5) (6) are estimated results of the three definitions of bequest motives. The endogenous test of Durbin–Wu–Hausan bequest motive is reported at the bottom. To avoid duplication, we took the estimation results of column (1) and column (2) as examples for analysis. The p values of DWH test are 0.0627 and 0.1642 respectively and the results of columns (1) and (2) both show that the model does not have endogenous problems and significant at the 10% level. The regression results of first stage reveal that the influence of community average bequest motive on bequest motives was significant with a coefficient at the 1% level, and the F value of the first stage was greater than 16.38, which is the critical value (Hausman et al., 2005). Therefore, it is appropriate to use the community mean value as the instrumental variable of individual bequest motives, and there is no weak instrument selection problem. Results show that the estimated coefficients of bequest motives are significantly positive at the statistical level of 1 and 5%, and the coefficients are 0.1549 and 0.1047 respectively. From Column (3) to Column (6), only the estimation result of column (4) is

Table 16.5 The impact of bequest motives on the saving rate of Chinese older households (instrumental variable method)

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	SR1	SR2	SR1	SR2	SR1	SR2
BM1	0.1549*** (0.0532)	0.1047** (0.0509)				
BM2			0.0578** (0.0275)	0.0084 (0.0267)		
BM3					0.1667*** (0.0250)	0.1339*** (0.0240)
Householder's character control	Yes	Yes	Yes	Yes	Yes	Yes
Family character control	Yes	Yes	Yes	Yes	Yes	Yes
Time control	Yes	Yes	Yes	Yes	Yes	Yes
N	12,453	12,453	12,453	12,453	12,453	12,453
R^2	0.0806	0.1021	0.0841	0.1027	0.0852	0.1034
F Value of first stage	17.07	17.07	174.99	174.99	152.17	152.17
Instrumental variable -value	25.90	25.90	73.49	73.49	72.01	72.01
DWH test Chi^2 (P-value)	3.465 (0.0627)	1.936 (0.1642)	2.461 (0.1167)	6.608 (0.0102)	5.503 (0.0190)	7.3625 (0.0067)

Note *, **, and ***are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate
Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

not significant, while the rest columns are significant within the 5% level. The above regression results further identified the positive and significant relation between individual bequest motives and the saving rate of elderly household.

16.4.3 Propensity Score Matching Estimation Result

Personal choices and preferences are determinants of individual's bequest motives, so there may be sample selection problems in benchmark model estimation. Thus, we chose the propensity score matching (PSM) to modify the benchmark model. The kernel matching (1:2) is chosen to

Table 16.6 Matching estimation result for China

Independent variable	*Dependent variable*	*Experimental group*	*Control group*	*ATT*	*Standard error*	*T-value*
BM1	SR1	0.3119	0.1776	0.1343***	0.0289	4.64
	SR2	0.4566	0.3954	0.0612**	0.0241	2.55
BM2	SR1	0.2185	0.1589	0.0596***	0.0126	4.74
	SR2	0.3959	0.3566	0.0393***	0.0124	3.17
BM3	SR1	0.3136	0.1954	0.1183***	0.0133	8.86
	SR2	0.4619	0.3822	0.0796***	0.0129	6.16

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively, heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate
Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

reestimate and the estimation results (Table 16.6). To ensure the reasonableness of the matching results, we tested whether the control variables are balanced before and after matching, and whether the mean values are still significantly different between the experimental group and the control group. The results show that the control variables passed the balance test, indicating that the model in this paper is suitable for estimation using this method. The PSM estimation results in Table 16.6 show that whether saving rate 1 or saving rate 2 is used as the explained variable, the ATT values by different bequest motive definitions are statistically significant at the 10% level. The estimation results of PSM further confirm that bequest motives can significantly increase the saving rate of elderly households.

16.5 Further Analysis

16.5.1 *The Influence of Bequest Motives on the Saving Rate of Urban and Rural Elderly Households*

Is there any significant difference in the impact of bequest motives on the household saving rate of different elderly groups? The following section analyzes this issue from three aspects: urban and rural areas, different levels of wealth accumulation, and children's living conditions.

With the development of social support for the aged, although there are diverse ways of caring about the old, child support is still the ideal method (Cong & Silverstein, 2012). In rural areas of China, the tradition of "to raise children to care for you when you get old" is prevalent. For example, Jiang et al. (2015) showed that children play a leading role in providing for the aged in rural families. The rural children's support mode can easily help build intergenerational bonds and enhance the emotional exchanges among family members, which leads the elderly feeling motivated to leave a legacy for their children, thereby increasing the family's saving rate. For urban elderly households, however, the social pension mode is diverse, so the senior citizen's lives are splendid and full of variety. To a certain extent, this can replace their children in providing for the elderly and can weaken the elderly persons' emotional dependence on their children.

Table 16.7 demonstrates that the saving rate of rural elderly households is more affected by the bequest motives than that of urban areas. Columns (1) and (2) are the estimated results by the two definitions of saving rate. The regression coefficients of bequest motives and rural cross terms are 0.1450 and 0.1844, respectively, which are both significant at the 1% level. One explanation is that, compared with those in the urban areas, rural elderly households mainly rely on child support, and they have a strong motive to save for their children; another reason is that rural areas have lower income levels, and the elderly may worry about their children's future to save.

Table 16.7 The influence of bequest motives on the saving rate of urban and rural elderly households in China

	(1)	*(2)*
	SR1	SR2
BM	0.0184	0.0321
BM in rural area	0.1450***	0.1844***
	(0.0288)	(0.0290)
Rural area	−0.1461***	−0.2170***
	(0.0243)	(0.0242)
Householder's character control	Yes	Yes
Family's character control	Yes	Yes
Provincial control	Yes	Yes
Time control	Yes	Yes
N	12,453	12,453
R^2	0.106	0.088

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate

16.5.2 Influence of Bequest Motives on the Saving Rate of Elderly Households with Different Wealth Levels

Are there significant differences in the household saving rate for the elderly with different wealth levels? In this study, we define families with wealth levels higher than 75 percentile as high-wealth families, low-wealth families are defined by those with a level of wealth lower than 25 percentile, and middle percentile part is the middle-wealth families. We use high-wealth families as the reference group to estimate the influence of bequest motives on the saving rate of families of different wealth levels (Table 16.8). Results show that compared with high-wealth families, the bequest motives significantly promote the saving rate of low-wealth and middle-wealth families, both at the 1% significant level. Specifically, the estimated coefficients of the cross-term between bequest motives and low-wealth families are 0.1220 and 0.0764, respectively, while that of the middle-wealth families are 0.0698 and 0.0625, respectively. Therefore, low-wealth and middle-wealth households show the characteristics of "old before getting rich," and they would save to accumulate wealth.

16.5.3 The Influence of Bequest Motives on the Saving Rate of Elderly Households with Different Children's Living Conditions

For families with different children's living conditions, is there any difference in the impact of the bequest motives on the savings rate? Studies have found that parents have intergenerational altruistic motives (kinship and blood relationship) for their children. Altruistic motives indicate that parents will leave an inheritance to their children under any conditions (Laitner, 2002). Their bequest motives will be further strengthened, especially when the elderly anticipate the declining trend of their children's living standards, thereby increasing the savings rate (Hamaaki et al., 2019). This study further uses empirical analysis to test. Although the CHFS data do not directly involve the future living conditions of the children's family, we can use the children's type of work and education level to indirectly measure it. Children's work is classified as work within the government system and outside of the government systems. If the children's organization does not belong to government agencies, public institutions, or state-controlled enterprises, it will be assigned a value of 1; otherwise, it will be 0. Likewise, if the education level is low at the

Table 16.8 The impact of bequest motives on the saving rate of Chinese older households (from wealth accumulation perspective)

	(1)	*(2)*
	SR1	SR2
BM	0.0305	0.0188
	(0.0199)	(0.0192)
BM*Low-income household	0.1220***	0.0764**
	(0.0353)	(0.0351)
BM*middle-income household	0.0698***	0.0625**
	(0.0270)	(0.0264)
Low-income household	−0.2878***	−0.1649***
	(0.0298)	(0.0297)
Middle-income household	−0.1464***	−0.1030***
	(0.0225)	(0.0220)
Householder's character control	Yes	Yes
Family's character control	Yes	Yes
Provincial control	Yes	Yes
Time control	Yes	Yes
N	12,453	12,453
R^2	0.095	0.108

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate
Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

junior college level or below, the value is 1; otherwise, it is 0. Traditionally, parents believe that children working outside of the government system lack social security and stability. Under this condition, the bequest motives will improve the savings rate. Similarly, the education level affects employment level, income level, and the future living conditions. Parents' concern about children's future leads to increase in the savings of those elderly households whose children have low education level. Next, we use CHFS microdata for analysis.

Columns (1) and (2) of Table 16.9 examine the influence from the perspective of children with different types of work. The cross-term coefficients of bequest motives and children's work outside of the government system are 0.0765 and 0.0509, respectively, which are both significant at the 1% statistical level. The results show that bequest motives significantly increase the saving rate of elderly households with children working outside of the government system. Similarly, Columns (3) and (4) are from different education levels, and the estimated coefficients of the cross-term between bequest motives and children's low educational level are 0.0969 and 0.0775, respectively (significant at the 1% level). The results also show that the bequest motives significantly increase the saving rate of elderly households with lower education level of their children.

These results show that the bequest motives' positive effect on the savings rate of elderly households is reflected in rural areas because of the parents' concerns about their children's future living standards. Altruistic bequest motives can explain this phenomenon, especially with elderly households whose children work outside of the government system and children with low education levels.

16.6 Robustness Check

16.6.1 The Sample Robustness Test

We performed a robustness test with respect to sample and estimation method to check the results. We used the 2015 Shanxi survey questionnaire data, which directly measured the bequest motives, to reverify the regression results. In the questionnaire, we defined bequest motives as a dummy variable. As for the question, "What is the purpose of saving?" The answer "to leave an inheritance for your children or to marry your children" is assigned a value of 1; otherwise, it is 0.

Based on the Shanxi survey data, it was found that the estimated coefficient of bequest motives is significant at the 1% level. The regression results in Table 16.10 show that bequest motives significantly increase the household saving rate, which proves that the robustness of the benchmark results in this study.

16.6.2 The Robustness Test of the Estimation Method

In the benchmark regression results, this study sets the upper and lower limits of the saving rate value to 1 and −1. Although only a small part of the extreme sample values are merged into the upper and lower limits, to prevent the estimation results from being biased, this study further uses the Tobit model to estimate.

Table 16.11 demonstrates the estimated results of the Tobit model. Except for column (2), the regression coefficients of bequest motive of saving rate 1 and saving rate 2 are all positive at the statistical significance

Table 16.9 Influence of bequest motives on household savings rate of Chinese older households (children's work and education level)

	(1)	*(2)*	*(3)*	*(4)*
	SR1	SR2	SR1	SR2
BM	0.0192	0.0172	0.0268	0.0131
	(0.0235)	(0.0228)	(0.0202)	(0.0194)
BM* Children working outside of the government system	0.0765***	0.0509*		
	(0.0276)	(0.0269)		
Children working outside of the government system	−0.2513***	−0.1744***		
	(0.0222)	(0.0219)		
BM* Children's low level of education			0.0969***	0.0775***
			(0.0256)	(0.0248)
Children's low level of education			−0.2294***	−0.1736***
			(0.0207)	(0.0201)
Householder's character control	Yes	Yes	Yes	Yes
Family's character control	Yes	Yes	Yes	Yes
Provincial control	Yes	Yes	Yes	Yes
Time control	Yes	Yes	Yes	Yes
N	12,453	12,453	12,453	12,453
R^2	0.093	0.107	0.092	0.107

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate

Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

Table 16.10 The impact of bequest motives on the saving rate of Chinese older households

Based on Shanxi survey data analysis		
	(1)	*(2)*
	SR1	SR2
BM	0.1834***	0.2117***
	(0.0370)	(0.0426)
Householder's character control	Yes	Yes
Family's character control	Yes	Yes
N	671	671
R^2	0.106	0.105

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate

Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

level of 1%. This confirms that the bequest motives strongly and positively promote the saving rate of elderly households, which further illustrates the reliability of the study results.

16.7 Conclusions

This study explores the determinants of the high saving rate of elderly households from the perspective of bequest motives using the CHFS data and Japan's postal savings data. To overcome the bias caused by the endogenous problem on the estimation results, we selected the mean value of the individual bequest motive of the same community as the instrumental variable of the family bequest motive and the PSM method to reestimate the benchmark model.

The following are the empirical results: In the case of controlling demographic, family, and provincial characteristics, the individual bequest motives significantly increase the saving rate of elderly households. The estimated result is unchanged and reliable after considering endogeneity and the robustness of the results. First, the bequest motives affect the saving rate of rural elderly households greater than their urban counterparts. One reason is that the rural elderly people mainly depend on their children's support and have a strong bequest motive to save for their children. Another reason is that the rural economy is underdeveloped and households have low-income levels, and the old generation saves for

Table 16.11 The impact of bequest motives on the saving rate of Chinese older households (Tobit)

Tobit Estimator	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
	SR1	SR2	SR1	SR2	SR1	SR2
BM1	0.0402*** (0.0200)	0.0232 (0.0194)				
BM2			0.0732*** (0.0096)	0.0485*** (0.0092)		
BM3					0.0886*** (0.0097)	0.0563*** (0.0094)
Householder/ Family character control	Yes	Yes	Yes	Yes	Yes	Yes
Provincial control	Yes	Yes	Yes	Yes	Yes	Yes
Time control	Yes	Yes	Yes	Yes	Yes	Yes
N	12,453	12,453	12,453	12,453	12,453	12,453
Pseudo R^2	0.055	0.089	0.058	0.091	0.060	0.091

Note *, **, and *** are significant at the levels of 10, 5, and 1%, respectively; heteroskedasticity robust standard errors are in (). BM = bequest motive, SR = saving rate

Source Authors' creation based on the data from CHFS 2015, 2017 and 2019

their children's better future economic life. The second result, similarly, is associated with wealth levels, which reveal that low- and middle-wealth families with bequest motives would have high saving rate for their children. This can be explained by the characteristics of "getting old before getting rich," so these families have a stronger bequest motive to save to accumulate wealth. Third, the strong positive effect of bequest motives on saving rate is reflected on households whose children work outside of the government system and whose children have low education level, as the old parents worry about their children's future living standards.

Currently, why does the saving rate of the elderly population remain high? On the one hand, the proportion of the elderly population in China continues to increase, and the problems caused by aging tend to be prominent. On the other hand, the high savings of elderly households have caused insufficient consumption demand among residents, which restricts China's current economic transformation and development. According to the research results, the following are the main policy implications. For elderly households in rural areas, relevant departments should improve their social security levels and promote socialization of the elderly, so that the elderly can feel at ease in their old age, weaken their bequest motive, and thus stimulate consumption. In addition, considering the strong altruistic bequest motives, it is essential to maintain economic growth, broaden employment channels, and strengthen employment security, thereby alleviating the concerns of the elderly about their children's future and reducing the family saving rate. Further study would learn from the experience of Japan and properly levy inheritance taxes to relieve the positive effect of bequest motive on the savings of elderly households.

Notes

1. According to data released by the National Bureau of Statistics (http://www.stats.gov.cn/english/PressRelease/202002/t20200228_1728917.html), from 2000 to 2019, China's population of elderly people aged 65 and above increased from 88 to 176 million people, the proportion of the elderly in the total population rose from 9.9 to 12.6%.
2. Accessed from http://data.stats.gov.cn/english/.
3. According to the CHFS CAPI Questionnaire (2017) Part 4 pp. 325, household consumption mainly includes the following items: food expenses including tobacco and alcoholic beverage expenses; daily living expenses,

water, electricity, fuel, heating, property management expenses; daily necessities expenses, laundry supplies, washing tools, handmade supplies, toilet paper, and bedding textiles; communication expenses, telephone expenses, mobile phone expenses, cable TV expenses, and Internet expenses; cultural and entertainment expenses, books and newspaper expenses, movie expenses, bars, Internet cafes, pets, playgrounds, art equipment, sporting goods, travel and fitness expenses; beauty expenses, including cosmetic surgery, purchase of skin care products, cosmetics, beauty treatments; local transportation expenses, subway fees, bus fares, taxi and online taxi fares, various expenses for self-driving cars (gas, parking, maintenance fees), and tolls, but do not include self-driving tours for tourism purposes; purchase of clothing expenses; housing maintenance expenses (excluding expenses for improving housing performance and structure, and expanding housing area); education expenses and medical expenses.

4. The Japan Postal Savings Foundation conducted a nationwide survey on the savings behavior of 5,000 households with more than two people in 2013, 2015, and 2018. The recovery rate was stabilized at approximately 40% each time, and the two-stage stratified random sampling method was adopted.

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CHAPTER 17

Income Inequality and Subjective Well-Being

Xinxin Ma and Sho Komatsu

17.1 Introduction

The Chinese economy experienced dramatic growth during the market-oriented reform period. During the nineties and early half of the 2000s, the annual average GDP growth rate was approximately 10%. With economic growth, the income level has become higher than that in the planned economy period, while income inequality has widened (Sicular et al., 2020).[1]

Regarding the relationship between economic growth and income inequality, according to the Kuznets hypothesis (Kuznets, 1955), the income gap widens in the early stages of economic development but narrows with economic growth. As income inequality grows and more

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X. Ma and C. Tang (eds.), *Growth Mechanisms and Sustainable Development of the Chinese Economy*,
https://doi.org/10.1007/978-981-19-3858-0_17

people become dissatisfied with inequality, the sustainable development of an economic society will not be realized, and economic growth will be negatively impacted. Conversely, the existence of income inequality also increases the motivation for an individual's work efforts or entrepreneurship to obtain higher income. Whether to prioritize economic growth policies or inequality reduction policies to improve the welfare of people has become an important issue for the Chinese government. To provide more academic evidence for policymaking, it is necessary to conduct an empirical study on how income levels and income inequality affect subjective well-being (SWB). In happiness economics, SWB is an indicator reflecting the theoretical concept of individual utility (Ma & Piao, 2019a, 2019b). SWB is most commonly measured by asking people to evaluate their life (Kahneman et al., 2006). This study focuses on the issue for China. We also compared the income effects between China and Japan.

Regarding the association between income, income inequality and SWB, two hypotheses have been proposed: the absolute income hypothesis and the relative income hypothesis (Leibenstein, 1950). The absolute income hypothesis holds that SWB is greater for the high-income group than for the low-income group. The relative income hypothesis emphasizes that the gap from the reference group may negatively affect SWB: the probability of SWB is lower for those whose income level is lower than the reference group income. Empirical studies for China and Japan have tested the two hypotheses, but the results differ between China and Japan. The empirical results are not consistent for China, while two hypotheses are supported in Japan (Higuchi & Hagiwara, 2011; Higuchi & He, 2011; Ma & Piao 2019a, 2019b; Tsutsui, 2010). However, some issues should be discussed as follows.

Contrary to previous studies, the study contributions to the literature by two points as follows: First, most previous studies only focus on one country, and the international comparative study on the issue is scarce. This study investigates the association between income factors and SWB in China and attempts to compare China with Japan. Second, most previous studies on China, except those of Zhang and Churchill (2020), used one-point cross-sectional data or repeated cross-sectional data, which might maintain individual heterogeneity problem in the results. Moreover, SWB may be affected by prior situations, but there is no empirical study to address this problem.

This study uses Chinese and Japanese longitudinal data and a fixed-effects (FE) model to address these problems. To the best of our knowledge, the dynamic FE model was first used for the China issue. The results provide richer evidence for this issue.

The remainder of this chapter is structured as follows: Sect. 17.2 introduces the channels through which the income factors may influence SWB and summarizes the previous empirical studies for developed and developing countries on the issue. Section 17.3 provides the framework for the empirical analysis, including the models and datasets for China and Japan. Section 17.4 presents the estimated results and explains the results. Section 17.5 concludes.

17.2 Literature Review

17.2.1 The Channels of Effects of Absolute and Relative Incomes on SWB

Regarding the association between income factors and SWB, the absolute income and relative income hypotheses have been proposed.

According to the utility theory of neoclassical economics, for the channels of absolute income effects on SWB, the individual utility depends on income and time constraints. It can be assumed that when the time constraint is constant, the higher the income level, the higher the goods consumption, and the higher the utility.

Regarding the channels of relative income effects on SWB, the following three hypotheses are proposed.

a. The *interdependence preference hypothesis* (Leibenstein, 1950) states that because consumer satisfaction is not only related to the goods function itself, but also to a non-goods function need (e.g., the rise of social position by holding high quality or high-price goods), the owned goods gap between an individual and the reference group with similar characteristics (e.g., age, education) may influence SWB.
b. The *relative-deprivation hypothesis* (Boskin & Sheshinski, 1978; Easterlin, 1974) emphasizes that when the gap between an individual and their reference group is greater, for example, the income of the individual is lower than their reference group, the individual will feel inferior, which may cause lower SWB.

c. The *tunnel effect hypothesis* (Hirschman & Rothschild, 1973) points out that high income may be thought to be the future income goal for middle- and low-income groups; the higher the income inequality (higher relative income), the higher the expectation for future income, which may increase the SWB.

According to the interdependence preference hypothesis and relative-deprivation hypothesis, income inequality or relative income may negatively affect SWB, while according to the tunnel effect hypothesis, the effect of relative income may be positive. Therefore, the direction of the effect of relative income (positive or negative effect) is not clear; it should be revealed based on empirical studies.

17.2.2 The Results of Empirical Studies on Absolute and Relative Incomes for China and Japan

We summarize the empirical results for China and Japan as follows.[2] For China, the results of the absolute income hypothesis are not clear. For example, Appleton and Song (2008), Smyth et al. (2010), Jiang et al. (2011), Wang and VanderWeele (2011), and Ma (2016) pointed out that the absolute income hypothesis is supported. However, Zhao and Liu (2013) revealed that although absolute income has a significant positive effect on SWB, when controlling for relative income, absolute income no longer has a significant effect on SWB. Ren and Fu (2011) and Wang et al. (2019) reported similar results. Likewise, Run (2012) found that absolute income does not have a significant effect on SWB when controlling for changes in income and self-identified stratum. Yan et al. (2019) conducted an empirical study on SWB using data from the Chinese General Social Survey (CGSS) and revealed that absolute income does not have a significant effect on SWB. Furthermore, Zhang and Cai (2011) and Zhu and Leng (2018) found an inverted U-shaped relationship between absolute income and SWB. The relative income hypothesis results are not consistent. For example, Knight and Gunatilaka (2010a), Luo (2006, 2009), Brockmann et al. (2009), Jiang et al. (2011), Ma (2016), Huang (2019), and Zhang and Churchill (2020) found that the higher the income inequality, the lower the SWB—supporting the relative income hypothesis. Yan et al. (2019) conducted an empirical study on SWB using data from the CGSS and revealed that relative income has a significant positive effect on SWB. However, Jiang et al. (2011)

and Knight and Gunatilaka (2010b) indicated that the higher the relative income, the higher the SWB. Wang et al. (2015) pointed out that relative income and SWB have an inverted U-shaped relationship. Luo (2006, 2009) conducted an empirical study on happiness using data from the Chinese Household Income Project Survey and pointed out that when controlling for absolute income, relative income does not have a significant effect on SWB. Furthermore, Smyth and Qian (2008) stated that the influence of relative income on SWB differs between high-income and low-income groups.

Irokawa (1999) conducted an empirical study using data from the Japanese Panel Survey of Consumers (JPSC) from 1995 to 1997 and found that the total income of wives and husbands in Japan positively affects life satisfaction; therefore, the absolute income hypothesis is supported. Urakawa and Matsuura (2007a, b) analyzed the influence of relative income on happiness using data from the JPSC from 1994 to 2001. They reported that the relative income hypothesis is supported. Sakamoto (2008) analyzed the effect of the wife's work status and intra-household resource allocation (time and consumption) on happiness using data from the JPSC from 1994 to 2004, and found that the household income positively affects happiness—supporting the absolute income hypothesis. Higuchi and He (2011) tested the relative income hypothesis using data from the JPSC from 1993 to 2009. They indicated that, in Japan, the relative income hypothesis is supported. Higuchi and Hagiwara (2011) found that the wife's income and the husband's income affect happiness. Ma and Piao (2019ab) used JPSC data from 2004 to 2014 and reported that both the absolute income hypothesis and the relative income hypothesis are supported among married Japanese women.

17.3 Methodology and Data

17.3.1 Model

In previous studies, the determinants of SWB were investigated by constructing the dependent variable as an ordered category dummy variable, binary dummy variable, and scale variable. The ordinary least squares (OLS), ordered logit regression, and probit models are typically used. The estimated results based on these methods are usually consistent (Ferrer-i-Carbonell, 2005). When the dependent variable is a scale variable, the results of the OLS are more easily understood. This study uses a scale variable of the SWB score (very satisfied = 5, satisfied = 4, normal = 3, not satisfied = 2, very unsatisfied = 1) as the dependent variable. The models are expressed as Eq. (17.1) to compare the results using different variables.

$$\mathrm{SWB}_i = a + \beta_1 \,\mathrm{Income}_i + \beta_2 \,\mathrm{Gap}_i + \beta_\mathrm{X} X_\mathrm{i} + u_\mathrm{i} \tag{17.1}$$

where i denotes an individual, SWB is an individual's SWB (here, life satisfaction) score from 1 to 5, and *Income* is an indicator of absolute income. *Gap* is an indicator of the relative income. X is another factor that may affect the SWB. a is a constant, u is an error item, β is the estimated coefficient. When β_1 is a positive value and is statistically significant, the absolute income hypothesis is supported; when β_2 is a negative value and is statistically significant, the relative income hypothesis is supported.

However, there may be two econometric problems in Eq. (17.1). First, the heterogeneity problem should be considered in Eq. (17.1): We use the FE model or random-effects (RE) model to address the problem—expressed by Eq. (17.2).

$$\mathrm{SWB}_{it} = a + \beta_1 \,\mathrm{Income}_{it} + \beta_2 \,\mathrm{Gap}_{it} + \beta_X X_{it} + v_i + \varepsilon_{it} \tag{17.2}$$

In Eq. (17.2) ε is the true error. v is an term related to individual-specific and time-invariant factors. In the FE or RE models, v_i will drop out; thus, the heterogeneity problem can be addressed. The F-test, the Breusch and Pagan Lagrangian multiplier test, and the Hausman specification test were employed to compare the appropriation of the OLS, FE, and RE models.

Second, there may be an initial dependency problem: the SWB in the prior year affected the SWB in the survey year. To address this, this study uses a dynamic panel analysis model recommended and applied by Wooldridge (2002, 2005) and Contoyannis and Rice (2004). Equation (17.3) expresses the dynamic model. SWB_{t-1}indicates SWB in period t−1.

$$\begin{aligned}\mathrm{SWB}_{it} = a + \mathrm{SWB}_{it-1} + \beta_1 \,\mathrm{Income}_{it} + \beta_2 \,\mathrm{Gap}_{it} \\ + \beta_X X_{it} + v_i + \varepsilon_{it}\end{aligned} \tag{17.3}$$

Regarding the group heterogeneities, we also performed the analyses by group (educational background, gender, urban/rural *hukou*, and easter/central/western region) using sub-samples. Finally, we conduct robustness checks.

17.3.2 Data

For China, we used three waves (2014, 2016, and 2018) data from the China Family Panel Studies (CFPS). The CFPS is a nationally representative annual longitudinal survey of Chinese communities, families, and individuals launched in 2010 by the Institute of Social Science Survey of Peking University, China. The sample for the 2010 CFPS baseline survey through a multi-stage probability was drawn with implicit stratification. It is multi-stage to reduce the operational cost of the survey and to allow for studies of social contexts. Each subsample in the CFPS study is drawn through three stages: county (or equivalent), village (or equivalent), and household. In the 2010 baseline survey, the CFPS successfully interviewed 15,000 families and 30,000 individuals within these families, with an approximate response rate of 79%. The CFPS covered 25 provinces in the 2010 survey and 31 provinces and municipalities in China in the latest survey. We can get rich information, such as individual attributes and SWB from CFPS. We used the latest three waves of the CFPS to obtain information on the issue. The samples pf CFPS are 37,147 (2014), 36,892 (2016), and 37,354 (2018). The analysis target was limited to 16 years old and over, missing values were excluded, and the total number of samples used in the panel data analysis was 32,969.

For Japan, we use data from the JPSC. The JPSC was first conducted in 1993 by the Institute for Research on Household Economics in Japan. The samples were obtained by randomly selecting young women aged 24–34 years old as Cohort A. Cohort B was added in 1997 for women aged 24–27 years. In 2003, Cohort C was added to women aged 24–29 years. In 2008, Cohort D was added to women aged 24–28 years. The JPSC was conducted annually since 1993. The JPSC from 1993 to 2015 was used in this study. The total panel data sample of JPSC from 1993 to 2015 was 36,695 individuals.

Although the questionnaire items of the CFPS and the JPSC are different, the survey data for China and Japan can provide rich samples and information about SWB, income, individual characteristics (e.g., education, age, employment status), and family structure (e.g., number of family members). This information enables the investigation of the absolute income and relative income influence on the Chinese SWB and compares the income effects on SWB between Chinese and Japanese married women. Observations with missing values for each variable were deleted.

17.3.3 Variable Setting

SWB was used as the dependent variable. It is a scale variable calculated as "very satisfied = 5, satisfied = 4, normal = 3, not satisfied = 2, very unsatisfied = 1" for China; "very happy = 5, happy = 4, normal = 3, unhappy = 2, and very unhappy = 1" for Japan.

The independent variables were: First, the key independent variables were absolute income and relative income indices. The income level was adjusted to address inflation influence. For China, the income for 2014, 2016, and 2018 was adjusted by the Chinese consumer price index (CPI) for urban and rural regions—published by the National Bureau of Statistics (NBS) in China. The CPI in 2014 provided a standard. For Japan, income from 1995 to 2013 was adjusted by the Japanese CPI from 1995 to 2013, published by the Ministry of Internal Affairs and Communications, Japan. The CPI in 1995 provided a standard.

Two types of variables were used as indices of absolute income to test the absolute income hypothesis: (i) The individual annual income level was used based on the questionnaire items on individual income. Regarding the nonlinear association between income level and SWB, we used income and income squared terms in the analysis for China. (ii) Income category dummy variables (the first to the fifth quintile income) were also constructed. We used this indicator to compare the absolute income effect on SWB between China and Japan.

We conducted two types of variables as indices of relative income to test the relative income hypothesis. (i) The subjective relative income variable was used in the analysis for China. Based on the questionnaire item in CFPS of "What is your relative income level in your local area?", the dummy variables were constructed based on the answers: "1 = very low, 2 = low, 3 = normal, 4 = high, and 5 = very high". (ii) Referring to Ma (2016), the income of the reference group is an imputed value calculated from income functions.[3] We used this indicator in the analysis of Japan.

Second, the other variables (controlled variables) were constructed: For China, we used (1) age and age squared term; (2) sex (male dummy); (3) education attainment (years of schooling); (4) self-rated health status dummy variables (excellent, very good, good, fair, and poor); (5) marital status (married dummy); (6) party membership, (7) ethnic (Han ethnic dummy); (8) employment status (working dummy); (9) the number of family members; (10) public pension enrollment; (11) public medical insurance enrollment; (12) the region dummy variables including the eastern, central, and western region dummy variables; (13) year variables including 2014, 2016, and 2018 dummy variables for China. For Japan, we used (1) age and age squared term, (2) education attainment dummy, (3) child status (number of children, children's age), (4) employment status (regular work, non-regular work), (5) spouse's participation in housework, and (6) year dummy variables from 1994 to 2015.

Based on the Chinese and Japanese survey data, age is limited to those older than 16 years for China and older than 24 years for Japan. We used samples aged 24 and above to compare Chinese and Japanese married women. Samples with missing values were excluded from analyses.

17.4 Results

17.4.1 Results Using Cross-Sectional Data for China

The results obtained using the cross-sectional data analysis method are listed in Table 17.1. Depending on the variables used, the estimation models are divided into Model 1 (using income factors, regions, and years as independent variables), Model 2 (adding individual factors to Model 1), Model 3 (adding family factors to Model 2), and Model 4 (adding employment factors to Model 3).

First, regarding absolute income, the coefficients of income and income squared terms are statistically significant in all models. Absolute income and SWB have an inverted U-shaped relationship. In the low-income group, SWB will improve as income levels rise, while in the high-income group, when the income level exceeds a certain level, subjective welfare will decrease as the income level rises. The absolute income hypothesis was supported by the low-income group. These results are consistent with those of Appleton and Song (2008), Smyth et al. (2010), Jiang et al. (2011), Wang and VanderWeele (2011), and Ma (2016).

Second, regarding relative income, the results in Models 1–4 indicate that, compared to the very low-income group, SWB is higher for the low-, normal-, high-, and very high-income groups. The coefficient is the largest in the very high-income group. The relative income inequality

Table 17.1 Absolute income, relative income, and SWB in China (cross-sectional data)

	(1) *Coef.*	*SE*	*(2)* *Coef.*	*SE*	*(3)* *Coef.*	*SE*	*(4)* *Coef.*	*SE*
Income	0.033***	0.009	0.018*	0.010	0.018*	0.010	0.020**	0.010
Income_sq	−0.004***	0.001	−0.002*	0.001	−0.002*	0.001	−0.002**	0.001
Relative income (Ref. Very low)								
Low	0.124***	0.023	0.057**	0.024	0.057**	0.024	0.055**	0.0234
Normal	0.508***	0.021	0.302***	0.022	0.300***	0.022	0.299***	0.0224
High	0.792***	0.024	0.413***	0.026	0.411***	0.026	0.409***	0.026
Very high	1.194***	0.026	0.642***	0.030	0.640***	0.030	0.639***	0.030
Individual variables	No		Yes		Yes		Yes	
Family variables	No		No		Yes		Yes	
Employment variables	No		No		No		Yes	
Region	Yes		Yes		Yes		Yes	
Year	Yes		Yes		Yes		Yes	
Observations	32,969		29,900		29,746		29,746	
R^2	0.13		0.197		0.197		0.197	

Note
1. $^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$
2. Individual factors (age, age squared term, years of schooling, male, party membership, married, urban, pension enrollment, medical insurance enrollment), family factors (number of family members), employment factors (working dummy), region (eastern, central, and western), and year variables were calculated, but the results are not listed in the table.
Source Authors' creation based on the data from CFPS of 2014, 2016 and 2018

hypothesis was supported. These results are like those of Luo (2006, 2009), Brockmann et al. (2009), and Ma (2016).

Finally, regarding the influence of no-income factors on SWB, to compare the results in Models 2 to 4, we found that the magnitudes of the coefficients of absolute income and relative income are almost similar, which suggests that although the individual, family, and employment factors affect SWB, these impacts are smaller than those of income factors. This also indicated that the multicollinearity problem between these variables was small. Therefore, in the following analysis, we use all variables, including individual, family, and employment status factors in Model 4.

17.4.2 Results Using Longitudinal Data for China

The results using the longitudinal data are summarized in Table 17.2. We used three models: Model 1 (fixed-effects model: FE), Model 2 (random-effects model: RE), and Model 3: dynamic model. The results of the *F*-test, Breusch-Pagan Lagrange multiplier test, and Hausman specification test indicated that the FE model (Model 1), and dynamic model (Model 3) are more appropriate. In the following, we discuss the hypothesis testing results based on Models 1 and 3.

First, the results in both Models 1 and 3 indicated that the coefficients of income and income squared terms were not statistically significant; therefore, the absolute income hypothesis was not supported. The results are consistent with the studies of Luo (2006, 2009), in which cross-sectional data (CHIP) were used. In general, from a nationwide perspective, the influence of income level on Chinese SWB has not been significant in the last decades, even after addressing the heterogeneity and initial dependent problems.

Regarding the effects of relative income on Chinese SWB, all results of Models 1—3 indicated that compared to the very low-income group, the SWB is higher for low-, medium-, high-, and very high-income groups. The coefficient of the very high-income group was the largest. These results support the relative income hypothesis.

17.4.3 Results by Heterogenous Group for China

Regarding the heterogeneities between various groups, we employed the estimations using sub-samples and the dynamic model. These results are

Table 17.2 Absolute income, relative income, and SWB in China (longitudinal data)

	(1) FE		*(2) RE*		*(3) Dynamic model*	
	Coef	SE	Coef	SE	Coef	SE
SWBt_1					−0.476***	0.017
Income	−0.002	0.015	0.007	0.010	0.031	0.027
Income_sq	0.001	0.002	-4.83E−04	0.001	−0.002	0.003
Relative income (Ref. Very low)						
Low	0.067**	0.031	0.060**	0.024	0.006	0.052
Normal	0.196***	0.032	0.287***	0.023	0.130**	0.055
High	0.265***	0.039	0.393***	0.027	0.139**	0.067
Very high	0.465***	0.047	0.625***	0.030	0.283***	0.086
Control variables	Yes		Yes		Yes	
Observations	29,192		29,192		17,588	
Groups	17,078		17,078		14,977	
R-sq. within	0.126		0.119		0.418	
Between	0.114		0.227		0.002	

	(1) FE	*(2) RE*	*(3) Dynamic model*
Overall	0.119	0.199	0.008
F-test that all u_i = 0	1.40 ($p > F$ = 0.000)		
Breusch and Pagan Lagrangian multiplier test for random effects		531.49 (p > chibar^2= 0.000)	
Hausman specification test	260.19 (p > chi^2 = 0.000)		

Note
1. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
2. FE: fixed-effects model; RE: random-effects model
3. Individual factors (age, age squared term, years of schooling, male, party membership, married, urban, pension enrollment, medical insurance enrollment), family factors (number of family members), employment factors (working dummy), region (eastern, central, and western), and year variables were calculated, but the results are not listed in the table

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summarized in Table 17.3 (by education background), Table 17.4 (by gender), Table 17.5 (by urban and rural hukou residents), and Table 17.6 (by eastern, central, and western regions). The main findings are: .

First, regarding educational background (see Table 17.3), we employed the estimations by three groups:(i) low-education (elementary school and below), middle-level education (junior high school and senior high school), and high-education (college and above). The coefficients of income and income squared terms were not statistically significant among the three groups; the absolute income hypothesis was not supported in either the low-, medium-, or high-level education groups. However, the coefficients of relative income are positive, and the statistical significance level is at 5% for both the medium- and low-level education groups. Comparing the magnitudes of the coefficient of relative income, it is

Table 17.3 Absolute income, relative income, and SWB in China by education

	(1) High		*(2) Medium*		*(3) Low*	
	Coef	SE	Coef	SE	Coef	SE
SWBt_1	−0.500***	0.046	−0.503***	0.023	−0.470***	0.033
Income	0.041	0.049	0.047	0.035	−0.051	0.072
Income_sq	−0.004	0.005	−0.004	0.003	0.007	0.007
Relative income (Ref. Very low)						
Low	−0.110	0.156	0.042	0.066	−0.004	0.108
Normal	0.0624	0.161	0.150**	0.073	0.092	0.112
High	−0.009	0.193	0.149	0.094	0.168	0.129
Very high	0.006	0.343	0.230*	0.132	0.321**	0.142
Control variable	Yes		Yes		Yes	
Observations	2,514		8,242		7,349	
Groups	2,139		6,878		6,691	
Hausman test	329.58 (p > chi^2 = 0.000)		962.08 (p > chi^2 = 0.000)		401.51 (p > chi^2 = 0.000)	

Note
1. ***p < 0.01, **p < 0.05, *p < 0.10
2. The dynamic model is used
3. High: college and above; Medium: junior high and senior high school; Low: primary school and below
4. Individual factors (age, age squared term, male, party membership, married, urban, pension enrollment, medical insurance enrollment), family factors (number of family members), employment factors (working dummy), region (eastern, central, and western), and year variables were calculated, but the results are not listed in the table.

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Table 17.4 Absolute income, relative income, and SWB in China by gender

	(1) Males		*(2) Females*	
	Coef	SE	Coef	SE
SWBt_1	−0.470***	0.025	−0.488***	0.022
Income	0.010	0.039	0.044	0.034
Income_sq	−1.20E-04	0.004	−0.004	0.004
Relative income (Ref. Very low)				
Low	0.150**	0.074	-0.108	0.071
Normal	0.230***	0.080	0.043	0.075
High	0.167	0.102	0.112	0.089
Very high	0.326***	0.120	0.271**	0.119
Control variable	Yes		Yes	
Observations	8,804		8,784	
Groups	7,498		7,482	
Hausman test	878.45 (p > chi^2 = 0.000)		834.26 (p > chi^2 = 0.000)	

Note
1. ***p < 0.01, **p < 0.05, *p < 0.10
2. The dynamic model is used.
3. Individual attribute factors (age, age squared term, years of schooling, party membership, married, urban, public pension enrollment, and public medical insurance enrollment), family factors (number of family members), employment factors (working dummy), region (eastern, central, and western), and year variables were calculated, but the results are not listed in the table

Source Authors' creation based on the data from CFPS of 2014, 2016, and 2018

Table 17.5 Absolute income, relative income, and SWB in China by urban and rural *hukou* residents

	(1) Urban		*(2) Rural*	
	Coef	SE	Coef	SE
SWBt_1	−0.466***	0.020	−0.459***	0.025
Income	0.105**	0.050	−0.003	0.032
Income_sq	−0.012**	0.005	0.002	0.003
Relative income (Ref. Very low)				
Low	−0.017	0.100	−0.027	0.060
Normal	0.001	0.113	0.149**	0.063
High	0.028	0.128	0.154**	0.078
Very high	−0.129	0.182	0.368***	0.095
Control variable	Yes		Yes	
Observations	3,791		13,797	
Groups	3,208		11,875	
Hausman test	496.07 (p > chi^2 = 0.000)		1202.39 (p > chi^2 = 0.000)	

Note
1. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
2. The dynamic model is used
3. Individual attribute factors (age, age squared term, years of schooling, male, party membership, marital status, public pension enrollment, public medical insurance enrollment), family factors (number of family members), employment factors (working dummy), region (eastern, central, and western), and year variables were calculated, but the results are not listed in the table

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Table 17.6 Absolute income, relative income, and SWB in China by region

	(1) East		*(2) Central*		*(3) West*	
	Coef	SE	Coef	SE	Coef	SE
SWBt_1	−0.459***	0.025	−0.516***	0.033	−0.471***	0.033
Income	0.069*	0.035	−0.004	0.053	−0.006	0.066
Income_sq	−0.005	0.003	1.62E-04	0.005	0.003	0.007
Relative income (Ref. Very low)						
Low	−0.083	0.076	−0.008	0.100	0.141	0.101
Normal	0.107	0.083	0.054	0.112	0.245**	0.100
High	0.143	0.097	−0.006	0.138	0.238*	0.125
Very high	0.263**	0.120	0.259	0.171	0.421**	0.181
Control variable	Yes		Yes		Yes	

(continued)

Table 17.6 (continued)

	(1) East	*(2) Central*	*(3) West*
Observations	7,407	5,164	4,979
Groups	6,200	4,391	4,388
Hausman test	824.39 (p > chi^2 = 0.000)	549.52 (p > chi^2 = 0.000)	361.0 (p > chi^2 = 0.000)

Note
1. ***p < 0.01, **p < 0.05, *p < 0.10
2. The dynamic model is used
3. Individual attribute factors (age, age squared term, years of schooling, male, party membership, married, urban, public pension enrollment, and public medical insurance enrollment), family factors (number of family members), employment factors (working dummy), and year variables were calculated, but the results are not listed in the table

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the largest in the low-education group (0.321). The relative income hypothesis was supported significantly in the low-education group.

Second, regarding the disparities by gender (see Table 17.4), the income and income squared terms are not statistically significant in both men and women, and the absolute income hypothesis is not supported for both men and women. However, the coefficients of relative income are positive, and the statistical significance levels are high at 1% (men) and 5% (women). Comparing the magnitude of the coefficient of indicators of relative income, they are larger for men than for women. The results revealed that both men and women support the relative income hypothesis, and the relative income effect on SWB is greater for men. The reasons considered are: men are more competitive than women (Kalinowski 2019); therefore, the effect of relative income is significant for men.

Third, the hypotheses testing results differ between urban and rural *hukou* residents (see Table 17.5).

Specifically, the coefficients of income and income squared terms are statistically significant for urban residents, and the absolute income and SWB have an inverted U-shaped relationship. However, the coefficients of income and income squared terms are not significant for rural residents. It is shown that the absolute income hypothesis is supported by urban residents but rejected by rural residents.

Regarding the relative income effect, the relative income hypothesis is supported by rural residents but rejected by urban residents. It is shown that the impact of relative income on SWB is greater for rural residents.

This result can be explained by the relative-deprivation hypothesis. The Chinese society is divided by the household registration (*hukou*) system (Ma, 2018ab). Compared to urban residents, rural residents not only have lower income levels, but also have significant differences in social security, education systems, urban housing purchase systems, and employment (Lyu et al., 2020; Ma, 2022; Wei & Gong 2019; Yuan et al., 2020). In the Chinese urban labor market, there remains the problem of discrimination against rural migrant workers (Lee, 2012; Ma, 2018b; Zhang et al., 2016). Consequently, rural residents might feel alienated or inferior, and the negative effect of relative income on SWB is more significant for rural residents than for urban residents.

Finally, regarding the regional disparities (see Table 17.6), (1) the absolute income hypothesis is not supported by residents in both the central and western regions, but for the eastern region, the coefficient of income is a positive value (0.069) and statistically significant at the 10% level, and the absolute income hypothesis is supported in the eastern region. GDP per capita is higher in the eastern region than in the other regions. The results indicate that rising income levels may improve Chinese SWB in well-developed regions. (2) Comparing the magnitude of the coefficients of relative income, it is greater for residents in the western region—indicating that the influence of income inequality on SWB is greater for residents in less-developed regions.

17.4.4 *Results of Robustness Checks for China*

To check for robustness, the continuous variable of income level was changed to a set of dummy variables ranging from the first to the third quintile, and re-estimation was performed. The results are summarized in Table 17.7. The results of the *F*-test, Breusch-Pagan Lagrange multiplier test, and Hausman specification test indicated that the FE model (Model 1), and dynamic model (Model 3) are more appropriate. Below, we discuss the hypothesis testing results based on Models 1 and 3.

Regarding income level, the coefficient in Model 1 is not statistically significant as in Table 17.2. The coefficient of income third quintile is a positive value (0.115) and statistically significant at the 1% level in Model 3, the absolute hypothesis is partly supported. Regarding the relative income effects, the relative income hypothesis was supported in both Models 1 and 3. These results are like those in Table 17.2. In summary, the conclusions are mostly confirmed. The results indicate that the effect of income factors on Chinese SWB is greater for relative income than for absolute income. The results are significant for policy implications for the Chinese government. This is discussed in the following section.

17.4.5 *Studies Comparing China and Japan*

Some pointed out that employment status differs between Chinese and Japanese women (Ma, 2011). Compared with Japanese women, the labor participation rate is higher, and the gender gap in the labor market is smaller for Chinese women than for Japanese women (see Chapter 14 in this book). Moreover, gender role consciousness and economic development levels also differ between these two countries. Gender role division is greater in Japanese society, and the economic development level is higher

Table 17.7 Absolute income, relative income, and SWB in China (longitudinal data)

	(1) FE		*(2) RE*		*(3) Dynamic model*	
	Coef	*SE*	*Coef*	*SE*	*Coef*	*SE*
SWBt_1					−0.476***	0.017
Income category (Ref. First quintile)						
Second quintile	0.016	0.026	0.002	0.017	0.078	0.049
Third quintile	0.039	0.024	0.018	0.014	0.115***	0.044
Relative income (Ref. Very low)						
Low	0.067**	0.031	0.059**	0.024	0.006	0.052
Normal	0.196***	0.031	0.286***	0.023	0.130**	0.055
High	0.265***	0.039	0.391***	0.027	0.136**	0.067
Very high	0.465***	−0.047	0.624***	0.03	0.284***	0.086
Control variables	Yes		Yes		Yes	
Observations	29,192		29,192		17,588	
Groups	17,078		17,078		14,977	
R-sq. within	0.126		0.119		0.418	
between	0.113		0.227		0.002	
overall	0.118		0.199		0.007	
F-test that all u_i = 0	1.40 ($p > F = 0.000$)					
Breusch and Pagan Lagrangian multiplier test for random-effects model			531.36 ($p >$ chibar^2 $= 0.000$)			
Hausman specification test	261.3 ($p >$ chi^2 $= 0.000$)					

Note
1. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
2. FE: fixed-effects model; RE: random-effects model
3. Individual attribute factors (age, age squared term, years of schooling, male, party membership, married, urban, public pension enrollment, and public medical insurance enrollment), family factors (number of family members), employment factors (working dummy), region (eastern, central, and western), and year variables were calculated, but the results are not listed in the table
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in Japan than in China. Therefore, it is assumed that the effects of absolute income and relative income on SWB may differ between these two countries.

We performed a comparative study on Chinese and Japanese married women aged 24 years and above. The results are summarized in Table 17.8 (China) and Table 17.9 (Japan). We used the OLS, FE, and RE models. The results of the *F*-test, Breusch-Pagan Lagrange multiplier test, and Hausman specification test indicated that the FE model (Model 2) was more appropriate for both China and Japan. In the following, we discuss the hypothesis testing results based on Model 2. The main findings are summarized as follows..

Regarding the effects of absolute income, for both Chinese and Japanese married women, the coefficients of the high-income group dummy (income fourth quintile for Chinese, income fourth and fifth quintiles for Japanese) are positive and statistically significant at the 1% and 5% levels. Both Chinese and Japanese married women supported the absolute income hypothesis, after addressing the heterogeneity problem.

However, the results for the relative income hypothesis differ between the Chinese and Japanese. For China, the coefficients of relative income are positive and statistically significant, but not significant in the Japanese group. The results indicated that the relative hypothesis is supported in the Chinese married women but not supported in the Japanese married women. The results suggest that, compared to Japanese married women, the effect of relative income is greater for Chinese married women. This might be because income inequality is smaller in Japan than in China. For example, the Gini coefficient of disposable income is 0.376 (2014) and 0.372 (2017) in Japan (MHLW 2020), 0.469 (2012), 0.465(2016), and 0.468 (2018) in China (NBS, 2018).

17.5 Conclusions

With economic development progress, the Chinese economy has grown rapidly, and individuals' income levels have risen. However, the income inequality gap has widened compared to that in the early stages of economic development. How do income levels and income inequality affect Chinese SWB? Using the data from the CFPS of 2014, 2016, and 2018 to address both individual heterogeneity and initial dependence problems that were not considered in previous studies, this study

Table 17.8 Absolute income, relative income, and SWB of Chinese married women

	(1) Pooling		*(2) FE*		*(3) RE*	
	Coef	*SE*	*Coef*	*SE*	*Coef*	*SE*
Household income (Ref. First quintile)						
Second quintile	−0.014	0.025	0.071*	0.039	−0.010	0.025
Third quintile	−0.002	0.023	0.080*	0.040	0.001	0.023
Relative income (Ref. Very low)						
Low	0.012	0.034	0.053	0.045	0.0145	0.034
Normal	0.231***	0.032	0.153***	0.045	0.220***	0.032
High	0.367***	0.038	0.268***	0.058	0.355***	0.038
Very high	0.636***	0.043	0.527***	0.070	0.627***	0.042
Control variables	Yes		Yes		Yes	
Observations	12,845		12,845		12,845	
Groups			7,667		7,667	
R-sq. within			0.118		0.109	
Between			0.001		0.205	
Overall			0.006		0.178	
F-test that all u_i = 0			1.32 (p > F = 0.000)			
Breusch and Pagan Lagrangian multiplier test					180.87 (p > chibar2 = 0.000)	
Hausman specification test			105.95 (p > ch ^{2} = 0.000)			

Note
1. ***p < 0.01, **p < 0.05, *p < 0.10
2. Pooling: OLS; FE: fixed-effects model; RE: random-effects model
3. Individual attribute factors (age, age squared term, years of schooling, party member, urban, public pension enrollment, and public medical insurance enrollment), family factors (number of family members), employment factors (working dummy), region (eastern, central, and western), and year variables have been calculated, but the results are not listed in the table
4. Samples Are Chinese Married Women Aged 24 and Above

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conducted an empirical investigation to test the absolute income and relative income hypotheses. The main conclusions are:

First, for China, (1) using cross-sectional data, both the absolute and relative income hypotheses were supported—like those in most previous studies. (2) The absolute income hypothesis was not supported based on

Table 17.9 Absolute income, relative income, and SWB of Japanese married women

	(1) OLS		*(2) FE*		*(3) RE*	
	Coef	*SE*	*Coef*	*SE*	*Coef*	*SE*
Household income (Ref. First quintile income)						
Second quintile income	0.040**	0.019	0.013	0.022	0.032	0.020
Third quintile income	0.017	0.021	0.022	0.026	0.021	0.022
Fourth quintile income	0.073***	0.024	0.074**	0.032	0.083***	0.026
Fifth quintile income	0.105***	0.032	0.113***	0.042	0.115***	0.034
Household income gap (Ref. I1 < I0)						
I1 > I0	−0.016	0.020	−0.008	0.026	−0.012	0.021
Control variable	Yes		Yes		Yes	
Observations	10,853		10,853		10,853	
Groups	1684		1684		1684	
R-sq. within			0.08		0.06	
Between			0.49		0.72	
Overall			0.32		0.45	

	(1) OLS		*(2) FE*		*(3) RE*	
	Coef	*SE*	*Coef*	*SE*	*Coef*	*SE*
F-test that all u_i = 0			3.01 ($p >\ F = 0.0000$)			
Breusch and Pagan Lagrangian multiplier test					147.41 ($p >$ chibar^2 = 0.0000)	
Hausman specification test			3199.66 ($p >$ chi^2 = 0.0000)			

Note
1. ***$p < 0.01$, **$p < 0.05$, *$p < 0.10$
2. Pooling: OLS; FE: fixed-effects model; RE: random-effects model
3. Individual attribute factors (wife's age and age squared term, wife's educational attainment, husband's education attainment, number of years in marriage), family factors (number of children, age of youngest child, hours of husband participation in child care or homework, co-residence with parents, housing status), employment factors (wife's employment status, husband's employment status), region (cities and countries scale dummy), and year variables have been calculated, but the results are not listed in the table
4. Household Income Reference Standard Calculated Based on Household Income Function. I1: Actual Household Income

Source Authors' creation based on Ma and Piao (2019a). Calculated based on the data from JSPS of 1995–2013 the FE and dynamic FE models, while the relative income hypothesis was strongly supported. (3) The relative income hypothesis was supported among all groups (low-, medium- and high-education group, men and women group, urban and rural resident group, eastern, central, and western region group). However, the effects of relative income on SWB differ by group. It is greater for the low-educated, men, rural residents, and residents in less-developed regions.

Second, comparing the results between China and Japan, both Chinese and Japanese married women supported the absolute income hypothesis. However, the testing results on the relative income hypothesis differ between China and Japan: the hypothesis is significantly supported for China, while it is not supported for Japan.

The study implications are: First, the results differ by using cross-sectional data and by using longitudinal data, particularly for the testing results of the absolute income hypothesis. We show that the endogeneity issues may be maintained when individual heterogeneity and initial dependence problems are not addressed.

Second, the relative income hypothesis was supported significantly more for China than for Japan. This may be because income inequality is greater in China than in Japan. To improve the Chinese SWB, policies that promote economic growth and policies that reduce income inequality should be emphasized in the future. Policies to reduce poverty, regional disparities, and irrational income inequality (e.g., high wage income resulting from a state-owned sector or monopoly industry sector, corruption, etc.) should be enforced by the Chinese government.[4]

Third, the effect of relative income on SWB is greater for the disadvantaged group (e.g., less-educated, rural, and less-developed residents) in China. This can be explained by the relative-deprivation hypothesis. Disadvantaged individuals are more sensitive to income inequality because they are alienated from society. Therefore, the Chinese government should change the policy of economic development from "prior rich" (*Xianfu Lun*) to "common prosperity" (*Gongtong Fuyu*) to build a sustainable development society where people can enjoy the outcomes of economic growth equally.

Finally, the limitations of this study must be noted. Although we used longitudinal data to address individual heterogeneity and initial dependence problems that were not considered in previous studies, the endogeneity problem may also be maintained in the results. To address this endogeneity problem, further research is required. Furthermore, according to the survey data, it is not possible to distinguish between pre-tax and post-tax income. An analysis that considers the effects of taxes and social security (e.g., income tax, social insurance premium payment, pension benefits, etc.) should be conducted in the future.

Notes

1. According to data from the World Bank and National Bureau of Statistics of China, the Gini coefficient in China has increased from 0.230 in 1990 to 0.485 in 2005, 0.477 in 2010, 0.462 in 2015, and 0.469 in 2019.
2. See Dolan et al. (2008) and Nagamaba et al. (2018) for a detailed survey on the association between income factors and SWB in developed and developing countries.
3. For income function, the dependent variable is individual income, independent variables are individual education attainment, years of experience, gender, married, employment status, and region. For the detailed results, please refer to Ma and Piao (2019a, 2009b).
4. For the wage gap issue between the public and private sectors in China, please refer to Chapter 11 in this book.

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