Toshiharu Ishikawa   *Editor*

Firms' Location Selections and Regional Policy in the Global Economy

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Preface

The rapid economic expansion since the 1980s has brought about harsh price competition following cost-cutting competition among manufacturing firms. In order to cope with the cost-cutting competition, many firms fragment their production processes into small blocs and assign them internationally to appropriate locations. This competition has changed the organization and the spatial structure of the production activity: Products manufactured in the existing agglomerations are greatly advanced and production volume of new industrial clusters in the emerging regions is greatly increased; production processes and the related management activities have been integrated into the international networks on the basis of various kinds of infrastructures. Corresponding to these changes of manufacturing firms' activities, national governments have pursued policies to lead the economic transformation and capture the potential benefits. Local governments also launch various strategies to vitalize regional economies.

The global changes in the production system of firms and the impacts of the governments' policies on the national and regional industrial organization are worth being examined using industrial location analysis. This book was dedicated to exploring these topics with the support of the Japanese Ministry of Education (Supported Program for the Strategic Research Foundation at Private Universities, 2013–2017). At the celebration of the 50th founding anniversary of the Institute of Economic Research, Chuo University, in 2014, a conference with the theme "Globalization and Location Choices of Firms" was held. This book has been compiled on the basis of the results and findings presented at the conference. The book comprises four parts. Part I discusses the theoretical basis of the location choices and examines actual spatial production systems in the recent real world. Part II expands the scope of location analysis to cover the effects of new factors that play important locational roles in the global economy. Because the location factors in the global economy are closely related to the policies that are manipulated by governments, Parts III and IV examine policies and strategies of selected countries and cities that are planned for vitalizing regional economies. The contents of each of the parts are as follows.

The early section of Part I focuses on the dynamics between agglomeration economies and production processes. Chapter 1 analyzes the influence of firms' activities on agglomeration economies and the transformation of the firms' production processes. Chapter 2 explains how firms change the scale of production in an agglomeration to enjoy external and internal economies as much as possible. This section also explains that survival competition among firms due to maturity of goods generates a harsh situation where firms are forced to fragment their production processes.

The latter section provides analyses of the spatial distribution of fragmented production processes considering recent locational situations. Chapter 3 analyzes the supply chain of production processes by a simulation method considering the locational influence of the earthquake in Japan and floods in Thailand. Chapter 4 examines the diffusion of Japanese manufacturing production processes from Japan to countries of East Asia.

Part II first deals with locational aspects of economic factors that were not recognized as important location factors before economic globalization. Chapter 5 utilizes a stimulation model to explain the function of the transfer price of the intermediate goods and analyzes effects of the corporation tax rates on the location selections of firms. This chapter also explains theoretically why firms planning a new factory pay attention to social and economic performances and characteristics of regions. Chapter 6 further deepens the analysis on how the transfer pricing system affects the selection of factory location by examining the relationship between transfer pricing and foreign direct investments (FDI). Chapter 7 inquires about the corporation tax system of several countries and compares business location costs of the countries. Chapter 8 discusses the different features of the industrial structure in ASEAN countries and suggests that these features influence a firm's country selection for its factory.

As described in Part II, when firms' activities expand internationally and their factories are scattered across countries, the firms consider that the corporation tax rates, the interest rates, and the industrial organization of countries are the primary factors in choosing a particular country, and the function of the transfer price of the intermediate goods produced in different countries comes to play an important role in a firm's financial management. The influences of these factors on the firms are manipulated by the governments of countries. A country's policies could directly affect the determination of a factory's location; in other words, the country's policy could either attract or drive away the factories. It is said that the corporation tax rates, the interest rates, the regulation of the transfer price, and the subsidies are significantly influential in the policies of a country in the global economy. Then, as a particular country has been selected for firm's factory, the firm's location selection issue moves down to the local level, and the firm pays attention to social characteristics and economic performances of cities within the selected country. These are also linked to policies of the region and country. The policies of countries and regions are important factors that influence the firm's location decision within the selected country.

Because economic policies exert locational influences nowadays, national and regional governments reconsider the economic policies from the viewpoint of the firms' locations. With this in the background, the discussion in Parts III and IV shift to the policies of the selected countries and cities. These two parts deal with the policies and strategies of countries and cities. Part III deals with the regional policies of countries and Part IV considers the cities' revitalization strategies. The contents of the chapters in the parts are as follows.

Part III analyzes the regional development policies of countries that are in different economic and social conditions such Nordic countries and the Philippines. The discussion is based on the country's economic policies, history, and geography that influence the location of economic activity. Part IV narrows down the analysis to a city's economic vitalization strategies. First, using econometric and statistical techniques, examples are given of the relationships between economic productivity and the city's economic and social characteristics. Then, vitalization strategies of the following individual cities are looked into: Umea in Sweden, Schweinfurt in Germany, Chongqing in China, and Davao in the Philippines. Finally, based on data from Japan and Sweden, a proposal is presented for the strategy of economic vitalization of individual cities from the viewpoint of the city system.

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Part I
Restructuring Agglomeration to Spatial Production Network

Chapter 1
Firm Location and Agglomeration Economies

Daisuke Nakamura

Abstract This chapter examines agglomeration economies and how they affect the location of firms. First, the relevant literature on agglomeration economies is introduced. Second, we investigate each component of these economies in terms of scale, scope, and complexity (spatially constrained internal and external economies). Internal economies are internal to the firm and external to the industry, while external economies are external to the firm and internal to the industry, with some exceptions. We also discuss negative elements, such as urbanization diseconomies. Third, the roles played by agglomeration economies in sustainable regional development are explored. We reveal that the enhancement of economic infrastructure elements is immediately beneficial to producers. A simple model framework is introduced to analyse how location advantages are related to agglomeration economies by comparing two physically separate locations. The impact on regional development of changes in agglomeration economies is then divided into two parts: economic elements and social infrastructure elements. Economic infrastructure elements that are relevant to industrial location are conventionally understood to be the trade-off between agglomeration economies and transportation costs. Other dimensions include social infrastructure elements, which are immediately beneficial to households and may affect the level of regional attractiveness for local residents. The policy implications for sustainable regional development need a well-balanced combination of both types of elements. Finally, we address further avenues of research on agglomeration economies, such as the importance of internal economies through the application of production and cost functions.

Keywords Agglomeration economies • Firm location • Firm's location selections

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1   Introduction

This chapter explores agglomeration economies and how they work in terms of firm location. Agglomeration economies are treated as essential elements when examining spatial economy in social sciences, although their roles change over time. Some of these terms have already been examined in conventional economics, i.e., Marshall (1892) described them as the concentration of specialized industries in particular localities. In location theory, Weber (1928 [1909], pp. 124–172) formally investigated the economies of agglomerations as a trade-off to transportation costs. Ohlin (1967, pp. 127–145) incorporated them into trade theory. Hoover (1937) called them localization economies. Other types of agglomeration include urbanization economies, which are not only external to the firm but also may be external to the industry. Isard (1956) presented a comparison between localization and urbanization economies.

Vertical integration represents the availability of cost savings by integrating several processing stages on the upstream and downstream linkages of the firm; these are empirically investigated by Hummels et al. (1995). A generalized framework of agglomeration economies was introduced to spatial economics as the core elements of new economic geography by Fujita et al. (1999) and Fujita and Thisse (2002). As was noted by Parr (2002a), there was much confusion and misuse of agglomeration economics terminology. In addition to these two types of classification, Parr (2002b) defined activity-complex economies. There are internal dimensions as well as external economies.

Moreover, the notion of fragmentation of production was applied by Jones and Kierzkowski (2005). Brakman et al. (2009) produced a representative textbook of geographical economics as an evolved new economic geography, and the relationship between agglomeration economies and regional development are discussed by Fratesi and Senn (2009). Silva and Hewings (2010) expanded the notion of fragmentation of production to the relationship between location decision making and the internal organization of firms, with consideration given to efficiency of communication.

2   Agglomeration Economies in Internal Terms

This section examines spatially constrained internal economies, which are internal to the firm but external to the industry. According to categorization by Parr (2002b), internal economies have two dimensions: spatially unconstrained and spatially constrained. As examined in the conventional non-spatial economic model, spatially unconstrained economies can be analysed without considering the location of other processing stages within the firm. Conversely, spatially constrained economics need to take into account the spatial proximity to other processing stages within

the firm. Here, we examine how these economies affect the location of the production plant and the operation of processing.

The presence of internal economies can indirectly affect decisions relating to the location of the firm when economic activity relies on spatial proximity. In other words, if spatial proximity generates internal economies of agglomeration, physically separated plants may gather in a specific site, and this integration process will reduce the number of the firms' assembly plants. In contrast, if these effects are beneficial but do not outweigh other disadvantageous cost factors, such as higher transportation costs, the operation of the firm may be dispersed and the number of plants within the firm will be increased via disintegration processes. More formally, the following details can be provided in terms of scale, scope, and complexity.

As can be seen in this section, for the effects of internal economies and firm operation, all three horizontal, lateral, and vertical integrations directly affect the structure of processing costs and production function. Since the combination of processing costs and production function specifies the optimal production scale of the firm, changes in the structure of these integrations provide the extent of change in the production scale. Moreover, if these economies require spatial proximity, the relationships between firm operation, location, and agglomeration economies that are internal to the firm can be more deeply investigated.

2.1 Horizontal Integration (Spatially Constrained Internal Economies of Scale)

One of the advantages of internal economies of scale is mass production. This can be observed with the reduction in average cost as the quantity of output increases (Fig. 1.1). The figure illustrates a typical downward sloping average cost curve, where the horizontal axis represents the quantity of output and the vertical axis shows the cost level. For instance, an increase in the quantity of products from q_1 to q_2 reduces the average cost from AC_1 to AC_2.

Other advantages of internal economies of scale can be seen in the long run. It is generally possible to change the facility in the long run, and this specific movement is shown in the figure by changes in the average cost curve from AC to AC_L. In this situation, average cost further decreases from AC_2 to AC_3 even though the quantity of output is fixed at q_2. These may work as long as the average cost curve is downward sloping. If such opportunity is solely available via spatial vicinity, it is called spatially constrained internal economies of scale. Horizontal integration may also indirectly affect vertical integration as is examined later in this paper.

Fig. 1.1 Structure of the average cost curve
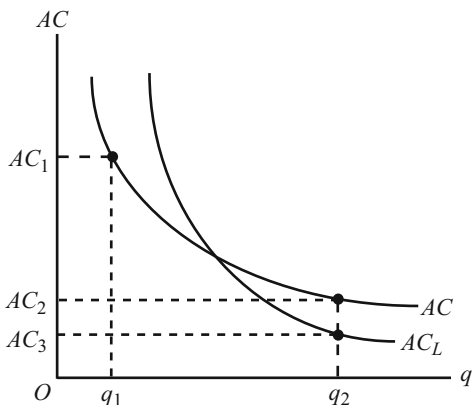
2.2 Lateral Integration (Spatially Constrained Internal Economies of Scope)

Internal economies of scope are observed when a firm produces a variety of products that may be assembled by sharing several processing stages. Let us imagine a vehicle tire company that, in addition to vehicle tires, also produces rubber tubes for gardening, tennis balls, and golf clubs. The reason for increasing their variety is that they can directly or indirectly apply their input, technology, and other facilities of vehicle tire production.

$$\sum_{i=1}^{n} (c_i q_i + F_i) > \sum_{i=1}^{n} (c_i q_i + b F_i) \tag{1.1}$$

where c $(c > 0)$ = unit cost for processing to produce the product i, q_i $(q_i > 0)$ = quantity of product i, $F_i (F_i > 0)$ = fixed cost to produce i, and b $(b < 1)$ = index on sharable rate of fixed processing facilities.

If these are exclusively achieved by being sited near each other, they are called spatially constrained internal economies of scope. Hence, lateral integration is observed when varieties of production achieve more efficient operation than the processing of a single product. This can be also brought about through the concentration of the available technologies in production function as well as via sharing of common facilities at a fixed cost within the firm. These can be observed in both spatially unconstrained and constrained circumstances. If the production facility is immobile or inseparable, this type of integration is referred to as part of the agglomeration economy that is internal to the firm.

Fig. 1.2 Vertical integration. (**a**) A situation in which four different processing stages (*a1*, *a2*, *a3*, and *a4*) are conducted separately. (**b**) represents an integrated processing stage

(a) (b)
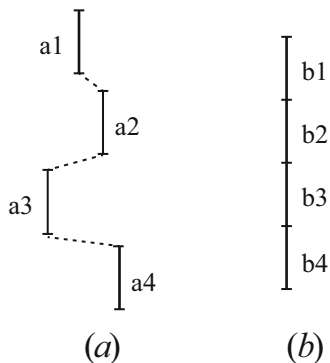
2.3 Vertical Integration (Spatially Constrained Internal Economies of Complexity)

Internal economies of complexity work when several different stages of production within a single firm incur costs that are lower than those of production among separate firms. In other words, vertical integration represents the possibility to save costs by integrating several processing stages in the upstream and downstream linkages of the firm. Stigler (1951) formally investigated the notion of vertical integration. They are investigated further with an empirical approach by Hummels et al. (1995) and with the concept of fragmentation of production by Jones and Kierzkowski (2005).

Figure 1.2 illustrates two different patterns of managerial operation of a firm. Part (a) shows a situation in which four different processing stages (a1, a2, a3, and a4) are conducted separately and there are no succinct processing patterns. In contrast, part (b) represents an integrated processing stage (b1 through b4). If the total cost of the production in (a) is much higher than in (b), vertical integration may be chosen by this firm.

If integration is achieved with spatial proximity, for instance, this may be referred to as part of an agglomeration economy. In a spatially constrained term, vertical integration is encouraged when spatial proximity saves on reheating or liquidity costs between stages during some kinds of manufacturing processes such as iron–steel works and petrochemical plants.

3 Agglomeration Economies in External Terms

This section examines spatially constrained external economies. Meade (1952) and Scitovsky (1954) detailed externality in terms of pecuniary and technological externalities. External economies have two dimensions: spatially unconstrained and spatially constrained. Spatially constrained external economies are subsets of agglomeration economies that are external to the firm and over which the firm has no control.

In terms of scale, scope, and complexity, incentive exists to locate firms at a particular site to achieve cost savings as spatially constrained external economies. These external economies cannot be directly measured in terms of cost aspects as is the case with internal economies. However, the aggregate effects of external economies, particularly spatially constrained economies, play an important role in investigating firms' decision making to locate within a particular economic space.

Spatially constrained external economies have incentives to locate firms at particular sites to achieve cost savings as localization, urbanization, and activity-complex economies. As can be seen in this section, these external economies cannot be directly measured in terms of cost aspects as is the case with internal economies. However, the aggregate effects of external economies, particularly spatially constrained economies, play an important role in investigating firms' decision making in terms of locating within a particular economic space.

3.1 Localization Economies

Spatially constrained economies of scale are referred to as localization economies. These are observed when there are possibilities for firms to obtain labor cost savings, joint action for input extraction, and specialized services. Marshall (1892) designated these as the examination of the localization of industry, suggesting physical conditions such as climate, soil, and availability of mines or quarries. Those conditions are both concerned with the importance of specialized skilled labor.

Marshall also provides other advantages such as accessibility of a pool of labor, achieving lower costs for assembly, transportation, and fuel, as well as advantages such as the sharing of new ideas and information, subsidiary trade, less expensive machinery, specialized services, and cooperative joint action regarding the supply of inputs for marketing, and research and development. These ideas have not been included in either the production function in conventional economic theory or in location analysis in existing central-place theory.

Localization economies were formally introduced to location analysis by Weber (1909 [1928]) in his location triangle model. Weber treated localization economies as a trade-off to transportation costs. Further details are analysed in Sect. 4.

3.2 Urbanization Economies

Urbanization economies are typically found in metropolitan areas as a result of the various cost-saving benefits to be had in such areas. These economies can have positive or negative factors for firms. Parr (2002b) addressed advantageous factors such as administrative accessibility, well organized infrastructure, varieties of labor

supply, and advanced transportation and communication systems involve different and unrelated industries in a large urban area.

Those services are enhanced by the existence of various businesses and municipal and commercial services. However, disadvantages also exist, such as higher land prices, congestion, and pollution. If positive factors exceed these negative factors, it is likely that the plant will be located in the metropolitan area, but the opposite is also true. If there is no dependency on spatial proximity, these are referred to as spatially unconstrained external economies of scope. This can be seen where there are particular advantages in terms of well organized infrastructure, municipal services, and convenient transportation within a specific island, nation, or region.

3.3 Activity-Complex Economies

Parr (2002b) further introduced additional elements called activity-complex economies as spatially constrained external economies of complexity, and two types of form were indicated, as illustrated in Fig. 1.3: (a) involving firms engaging in different processing stages that generate sequential linkages among interrelated firms, and (b) involving firms supplying different inputs to a given firm for final assembly, which creates convergent linkages.

Activity-complex economies rely on trade between different firms in a production chain. These upstream and downstream linkages are encouraged when lower transaction and transportation costs are available between succinct stages with other firms. In this case, firms that are relatively able to move their plant location are required to locate at a specific economic site where there is sufficient access to relevant neighboring firms or industry.

The advantage of spatial proximity in terms of activity-complex economies is the possibility for cost savings in energy and in transportation costs for assembly and distribution between production stages. In addition, spatial proximity also encourages better communication systems and increases the availability of inputs and outputs between relevant stages, for example, the concentration of the aerospace industry in Toulouse, with concentrations of the parts supply chain for automobile assembly campus in Chicago.

There, the availability of lower transaction and transportation costs between succinct stages with other firms is important. Advantages include savings in energy and in transportation costs for assembly and distribution between production stages.

Fig. 1.3 Sequential and
convergent linkages
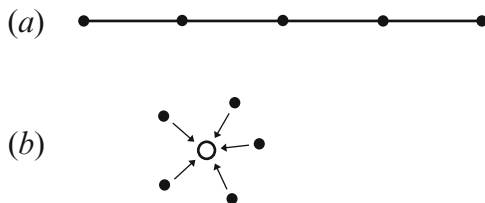
4   Agglomeration Economies and Regional Development

Thus far, agglomeration economies have been linked with firms and industrial
organizations. In this section, we expand this to explore the impact of these
economies on regional development. Two types of infrastructure elements are
compared and contrasted and followed with further arguments for sustainable
regional economic growth.

4.1   Economic Infrastructure Elements

Enhancement of economic infrastructure elements can be immediately beneficial to
producers. Here, the way in which location advantages are related to agglomeration
economies is shown by comparing two physically separate locations. The following
conditions are assumed for reasons of simplicity. First, two locations are located
separately: A and B. In both locations, there are producers who manufacture a
particular product. Figure 1.4 exemplifies this scenario with average cost curves. As
illustrated in the figure, the producer at location B is a more efficient producer than
the one at location A. The advantage lies in not only achieving lower average
processing costs $(\min AC_A > \min AC_B)$ but also in producing a larger quantity of
output at the cost-minimized production point $\left(q_A^* < q_B^*\right)$.

The difference between two producers can be regarded as a location advantage
of spatial proximity to input sites or to upstream linkages of production. In addition
to the internal dimension, it is also possible to consider this from the standpoint of
spatially constrained external economies that the location B is an industrial complex
district and the producer has several cost-saving opportunities of activity-complex
economies. However, if consumers of this product are not uniformly distributed in
the economic plane, and spatial concentration of those consumers can be observed
immediately close to location A, the cost-disadvantageous producer A may have
higher profit due to higher revenue than that of producer B. Thus, the optimal firm
location can be affected by several variables involving the economies of
agglomeration.

While agglomeration economies are divided into six parts, some of these
economies work together or have trade-off relationships between them. In terms
of scale, horizontal integration within a firm closely relates to labor utilization

Fig. 1.4 Cost curves for a production at location A (*left-hand side*) and at location B (*right-hand side*)
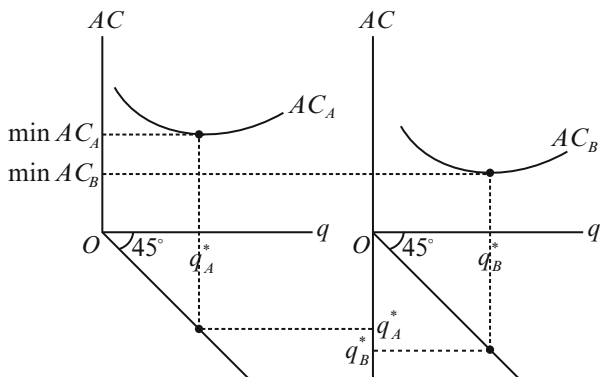
among industries as localization economies. With respect to scope, both lateral integration within the firm and urbanization economies rely on given potential residual economies in order to share facilities and devices. In terms of complexity, while internal economies of vertical integration are observed within a firm as managerial integration for transaction and communication cost savings, activity-complex economies are observed as cooperation or partnerships between different firms. This can be related to the extent of transaction costs between firms, information availability and the reaction functions of other relevant firms.

If cost savings in a particular location are connected with the extraction of inputs, either the assembly transportation rate or the factor price must be lower than in the other locations. However, if there is no difference between the input conditions for two locations, these cost differences must be explained by the spatial differentiation, namely, the conditions of agglomeration economies and accessibility of the output market. Between different types of external economies, there may be a case where two or three types of economies are available at the same time. For instance, if localization or activity-complex economies are achieved nearby or within the centre of a market area, those firms have available some qualities of urbanization economies. However, they may also have opposite forces, namely, urbanization diseconomies.

In this way, these economies of scale, scope, and complexity may coexist and work together beyond the categorization of the six types of agglomeration economies.

4.2 Social Infrastructure Elements

Social infrastructure elements are directly relevant to households, and these may affect the level of regional attractiveness to local residents. Glaeser et al. (2001)

discussed consumer cities, where the attractiveness of regions is closely related to the residential amenity with a background of empirical evidence. There, the most important four elements are specified as follows: the presence of a rich variety of services and consumer goods; aesthetics and physical setting; good public services; and speed, including communication and transportation speed. Unless a region has a satisfactory level of attractiveness, regions may experience a decline in population and may have difficulty surviving in the long run.

Nakamura (2013) addressed the importance of social infrastructure elements as components of regional attractiveness as follows. First, the provision of advanced educational, medical, cultural, and other social services, enhanced by a good intraregional transportation network for commuting. Second, these are divided into two groups: normal and luxury. The former are essential for making a living and include supermarkets, pharmacies, and petrol stations, while the latter are services that can be supplied from other upper hierarchically ordered regions. Nakamura (2014) also specifies social infrastructure elements in terms of benefits to households such as schools, colleges, and universities of high academic standing, well-equipped hospitals, and cultural and entertainment activities.

Although these social infrastructure elements are better maximized in each region, it should be noted that the majority of such services incur not only establishment but also maintenance costs. Hence, the specification of the optimal level of coordination of social infrastructure elements may be crucially important for the long-term perspective.

4.3   Sustainable Regional Development

Sustainable regional development requires both economic and social infrastructure elements so that centripetal forces for local firms and households work sufficiently well in the long run. Nakamura (2013) insisted on well-balanced development of economic and social infrastructure elements for sustainable regional growth as follows: (1) enhancement of infrastructure elements advances the external economies of firms; (2) enhancement of social infrastructure elements may improve attractiveness to households; (3) enhancement of attractiveness to households can increase the productivity of local firms as long as they are assumed to labors of these firms; (4) the increased profit of local firms contributes to the maintenance of stable tax revenue to local government, which may be partly apportioned to development of economic and social infrastructure. In addition, these improve when transportation and communication networks are also advanced.

Moreover, Nakamura (2014) discussed the roles played by agglomeration economies on sustainable regional economies as follows. First, one of the potentials of a local economic force depends on the accessibility to inputs which needs a physical number of local population. Second, stable accessibility of inputs maintains the attractiveness of a region to households as well as providing sufficient job opportunities for that region. More job opportunities can be provided when

agglomeration economies are more available. Thus, neither economic infrastructure nor social infrastructure element can be neglected.

For European regions, sustainable regional development was investigated in detail by Leeuwen (2010), who explored the multifaceted relationships between town-hinterland and rural economies at different spatial levels and for different economic agents.

5 Concluding Comments

The difference between spatially unconstrained and constrained economies is that, for one, the location of other processing stages does not matter and, for the other, the spatial proximity to other processing stages must be considered. While agglomeration economies still play important roles, it can be also said that greater technology in transportation and communication networks lowers the need for agglomeration economies. However, nothing is better than a face-to-face conversation. This analysis reveals that the optimal location for a firm differs with the type of industry and their level of dependency on different roles of agglomeration economies. Exceptions may also be accepted by further considerations of additional elements such as the extent of market competition for products, significant ratios between assembly and distribution transportation costs, irregular distribution of inputs, and the availability of operational services for particular production. Although not explicitly described in this paper, the optimal location model has little significance to agglomeration economies that are internal to the firm. In other words, agglomeration economies have some effects on the location decision of the firm solely external dimensions. However, the internal economies may also play a role if the analysis includes production and cost functions. In addition, we argue that the location of consumers does matter for producers to optimize their location decision making. As a result, it is also necessary to treat consumer behavior as an endogenous variable for regional policy analysis, although that is beyond the scope of this examination.

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Chapter 2
Fragmentation of Production Process Due to Growth and Survival Competition

Toshiharu Ishikawa

Abstract There are kinds of competition styles among manufacturing firms: growth and survival competition. Both competition styles change the number of the firms in an industry and compel them to alter their production process. This section, first, explains what make these competition styles, then, shows the mechanisms by which the competitions change the number of firms located at an agglomeration and divides their production processes. These explanations make a foundation to start the analysis of location of fragmented production processes in the globalized economy.

Keywords Internal economies • External economies • Production process • Survival competition • Fragmentation

1 Introduction

Production activities of manufacturing firms have been transformed by the economic globalization, which has accelerated since the 1990s: firms' production processes are divided into small blocs, and the fragmented blocs are scattered across countries. It would be safe to say that the fragmentation of production processes is generated by a harsh competition among firms. There seem to be the kinds of competition styles generate situations that force manufacturing firms to divide production processes: one is growth competition, i.e. to compete to achieve more production volume and obtain more profit; another is survival competition, i.e. to compete to survive in an industry by selling products at a lower price. The purpose of this chapter is to explain the mechanisms by which competition among manufacturing firms is generated and how it makes manufacturing firms divide production processes.

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2   Advancement of Firm's Production Process by Growth Competition

From a historical viewpoint, the time when manufacturing firms enormously increase production quantity overlaps with the period when industrial agglomerations grow. In this time, firms tend to form agglomerations in order to produce as much goods as possible and to fulfill a huge demand for them. In this situation, competition among firms within agglomerations can be expressed as growth competition, since firms compete not for survival in the market but to attain greater sales volume. It is considered, therefore, in progress of growth competition that firms tend to change their existing production modes to achieve greater production volume by utilizing internal and external economies within agglomerations. This section examines a firm's production quantity and the number of the firms within an agglomeration in the period in which firms pursue agglomeration economies as much as possible.

2.1   Production Mode for Enjoyment of Agglomeration Economies

2.1.1   Assumptions

A firm that produces goods in an agglomeration enjoys the internal economy that is varied by its production quantity. This internal economy, A_I, is expressed by a function of the production quantity, Q, as Eq. 2.1,

$$A_I = -aQ^2 + bQ - C \tag{2.1}$$

where a, b, and C are parameters. And the firm enjoys localization economies, A_E, that arise from the accumulation of firms. The localization economies are dependent on the total quantity of production at the place of agglomeration. These economies relate to firm's production quantity and the number of firms, N, as shown by Eq. 2.2,

$$A_E = -\alpha \left(\sum\nolimits_{i=1}^{N} Q_i \right)^2 + \beta \left(\sum\nolimits_{i=1}^{N} Q_i \right) - D \tag{2.2}$$

where α, β, and D are parameters.

Firms located within an agglomeration enjoy two kinds of economies, illustrated in Fig. 2.1a. It is assumed in Fig. 2.1a that even if the number of the firms is one, the firm enjoys a part of localization economies since the production quantity at this place is increased by the firm's production. If agglomeration economies are minus, it implies that the manufacturing efficiency of a firm worsens.

a

A_E, A_I A_E

b

A_T
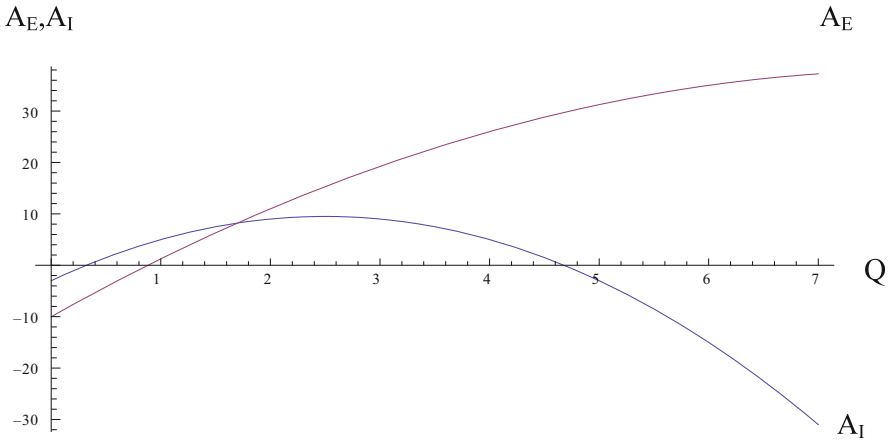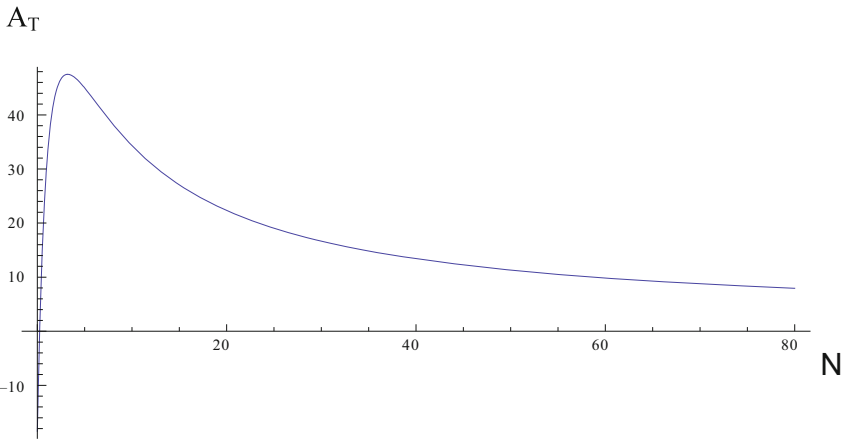
Fig. 2.1 (**a**) Relationships between agglomeration economies and production quantity. (**b**) The number of firms and agglomeration economies

2.1.2 Derivation of Firm's Production Quantity and the Number of Firms

The total amount of agglomeration economies, A_T, is shown by Eq. 2.3,

$$A_T = -aQ_i^2 + bQ_i - C + \left(-\alpha \left(\sum_{i=1}^{N} Q_i \right)^2 + \beta \left(\sum_{i=1}^{N} Q_i \right) - D \right) \qquad (2.3)$$

The optimal production quantity, Q^*, of a firm that makes the total agglomeration economy maximum is obtained by Eq. 2.4,

$$Q^* = (b + \beta N)/(2(a + \alpha N^2)) \tag{2.4}$$

The optimal production quantity of a firm decreases as the number of firms increases. The amount of total economies a firm can enjoy is expressed by Eq. 2.5,

$$A_t = \left(-a*\left((\beta N + b)/(2(a + \alpha N^2))\right)\right)^2 + b\left((\beta N + b)/(2(a + \alpha N^2))\right) - \\
C + \left(-\alpha\left(N*\left((\beta N + b)/(2(a + \alpha N^2))\right)\right)\right)^2 + \beta\left(N*\left((\beta N + b)/(2(a + \alpha N^2))\right) - D\right) \tag{2.5}$$

As the number of firms increases, total production quantity in the agglomeration increases as shown by Eq. 2.6,

$$TQ = \left((b + \beta N)/(2(a + \alpha N^2))\right)N \tag{2.6}$$

The optimal number of the firms, N^*, and the production quantity of a firm, Q^*, are derived by a function of parameters as in Eqs. 2.7 and 2.8, respectively.

$$N^* = a\beta/\alpha b \tag{2.7}$$

$$Q^* = (b + \beta)/(2a(1 + \beta/b)) \tag{2.8}$$

Total agglomeration economy is a function of the number of firms. Figure 2.1b shows the relationship between total agglomeration economy and the number of the firms, assuming $a = 2, b = 10, \alpha = 0.75, \beta = 12, C = 3$, and $D = 10$. The optimal number of the firms is determined as 3.2, and the production quantity of a firm is derived as 8. The total agglomeration economy a firm enjoys is found to be 47.5.

In rare cases, the number of firms within an agglomeration coincides with the optimal number that maximizes the agglomeration economies, because the number of the firms located within an agglomeration depends on other agglomerations. More commonly, more firms locate at the place that can produce higher agglomeration economies. Hence, production of a firm at a well-conditioned place becomes less than the optimal quantity, and the number of the firms in the well-conditioned agglomeration is larger than the optimum.

2.2 Increase of Firms by the Interlock of Internal and External Economy

Internal and external economies are interconnected, and they influence the production activity of firms. The influence is considered as follows. First, by participating

in an agglomeration, it becomes possible for a firm to entrust some parts supporting product production to other firms, and the firm can enjoy more internal economics. Second, through commission of some production parts to other firms, technical cooperation is promoted, and the external economy increases to the firm. These effects are illustrated by the shift of the lines as in Fig. 2.2a, b. Figure 2.2a shows that internal economy increases via maturation of the relation between inter and external economy even if production of a firm is at the same level. Figure 2.2b shows that due to the maturation of the relation between two kinds of economies, external economies rise. The higher curve in Fig. 2.2c shows the relationship between these two economies and the number of firms when the relation between the two kinds of economies progresses. Figure 2.2c illustrates that when the relation of the two economies matures, the number of firms in an agglomeration that provides the firms with the maximum agglomeration economies increases.

3 Changes in the Production Activities of a Firm via Survival Competition

3.1 Mechanisms of Emergence of Survival Competition

In developed countries, firms' recognition that they have to change production modes arises from two aspects: one is cost competition following global price competition; the other is the maturity of the products the industry provides in the market. The recognition leads to change in existing agglomerations. The mechanisms in which these competitions are generated and existing agglomerations are changed are briefly explained as follows. By agglomeration economy, firm's production costs fall, in turn it reduces the prices of goods and increases the sales quantity of goods. In addition, the substantial social infrastructure established in agglomerations decreases the expenditures of the physical distribution of the goods produced therein. These changes lead firms' activities to expand to include many countries. As a result, strong price competition that leads to cost competition among firms occurs worldwide. This competition urges firms to alter production modes in their factories to reduce costs. Finally, production structures of the existing agglomerations alter.

While, as the products of firms matures, the rate of increase in amount demanded for the product begins to show a fall tendency. Since this tendency arises under the situation where the production capacity of firms has been adequately increased, it leads to a reduction in the number of firms. This reduction tendency generates harsh survival competition among firms in the industry. This survival competition presses firms to alter production modes.
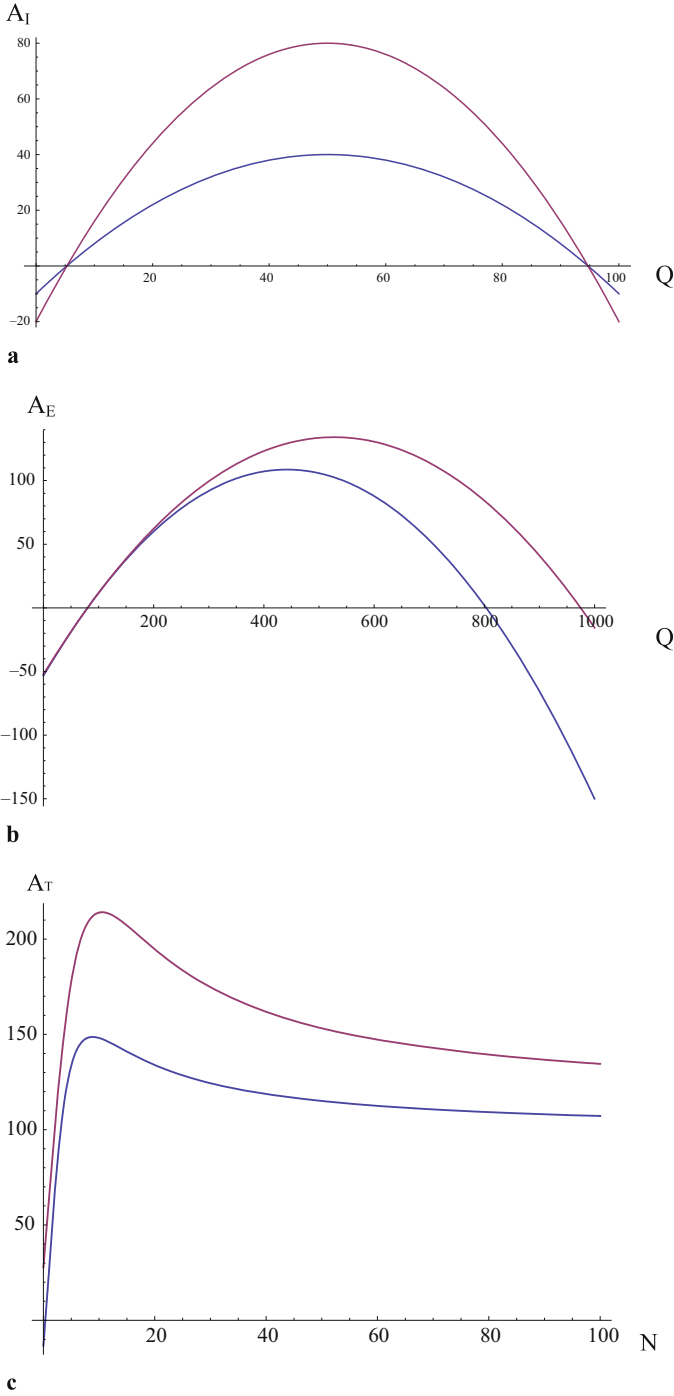
Fig. 2.2 Increase of (**a**) internal economy due to maturation, (**b**) external economy due to maturation of economies, (**c**) agglomeration economy by maturation

In the following subsection, the mechanism by which the maturity of goods gives rise to survival competition is examined. Further, the change in production modes due to survival competition is analyzed.

3.2 Survival Competition Generated by the Maturity of Consumer Goods

Let us consider the possibility that the number of firms decreases by increasing consumer incomes as consumer goods mature.

3.2.1 Assumptions for the Demand Side of Goods

The assumptions are as follows. Consumers are equally distributed over the plane market by the density 1. One kind of goods, Q, is sold by many firms. The goods sold by individual firms are differentiated mutually. All the goods are sold by firms located at the center of a plane market. Consumers bear the transportation cost of the goods. Since only fixed numbers of consumers go to a store at a certain fixed period, it is considered that the transportation cost T of goods is the fixed costs for the consumer.

Each consumer has the utility function U, shown by Eq. 2.9[1]

$$U = \left(\sum_{i=1}^{n} q^{\sigma} \right)^{1/\sigma} \tag{2.9}$$

where q is the quantity demanded by a consumer goods and n is the number of differentiated consumer goods. σ is a parameter and is $0 < \sigma < 1$. Consumer income is y, and a constant sum from y is applied to the transportation cost of goods purchase. The amount of budget to the goods is shown by $C = y\text{-}T\text{-}O$, where O is the budget applied to other goods and services. Consumer's budget constraint is revealed by Eq. 2.10.

$$C = \sum_{i=1}^{n} p_i q_i \tag{2.10}$$

A Lagrange equation L for deriving the optimal quantity of the goods that maximizes a consumer's utility is shown by Eq. 2.11

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[1] The utility function is analyzed in detail by Dixit and Stiglitz (1977).

$$L = U + \lambda\left(C - \sum_{i=1}^{n} p_i q_i\right) \tag{2.11}$$

The quantity demand for each good is derived by solving the following simultaneous equations.

$$\partial L / \partial q_i = 0 \tag{2.12a}$$
$$\partial L / \partial q_j = 0 \tag{2.12b}$$
$$\partial L / \partial \lambda = 0 \tag{2.12c}$$

The amount demanded of the goods q_i can be expressed as Eq. 2.13

$$q_i = q_j \left(p_i / p_j\right)^{(1/\sigma - 1)} \tag{2.13}$$

Demand elasticity of a price to the goods q_i, ε is shown by Eq. 2.14,

$$\varepsilon = 1/(\sigma - 1) \tag{2.14}$$

The aggregate demand function, D, in the plane market area is shown by Eq. 2.15.

$$D = \left(q_j \left(p_i / p_j\right)^{(1/\sigma - 1)}\right) * \left(\pi H^2\right) \tag{2.15}$$

where H is the radius of the circular market area, which is given by Eq. 2.16,

$$H = (zM / p^{\varphi}) \tag{2.16}$$

where z and φ are parameters, p is the price index of the goods, M is a parameter concerning the total purchase of goods, a function of the transportation costs per mile, t, and a consumer's income, y, which is shown by Eq. 2.17,

$$M = f(t, y) \tag{2.17}$$

The effects on the parameter M of the transportation costs per mile and a consumer's income are shown by Eqs. 2.18a and 2.18b, respectively.

$$\partial M / \partial t < 0 \tag{2.18a}$$
$$\partial M / \partial t > 0 \tag{2.18b}$$

(πH^2) in Eq. 2.16 shows the size of the market and indicates the number of consumers, m. Eqs. 2.16 and 2.18b show that a decreasing price, p, and an increasing income expand market size and increase the number of consumers. Consequently, these changes increase the total demand for goods.

Using Eq. 2.15, the demand elasticity, E, of the price to the aggregate amount demanded of the goods is derived as Eq. 2.19.

$$E = 1/(\sigma - 1) - 2\varphi \qquad (2.19)$$

The Eq. 2.19 can be rewritten by Eq. 2.20,

$$E = \varepsilon - 2\varphi \qquad (2.20)$$

Equation 2.20 indicates that elasticity of E is larger than that of ε.

3.2.2 Assumptions for the Supply Side of Goods

Many firms produce differentiated similar goods in a plane market. A firm is under monopolistic competition. Thus, a firm's profits become zero, although it can determine the quantity of production, q_i, to maximize profit. Total demand for consumer goods is expressed by Q. Profits, Y_i, of the firm that produces the goods, q_i, are given by Eq. 2.21,

$$Y_i = (p_i - w)q_i - F \qquad (2.21)$$

where w and F are marginal and fixed costs, respectively.

Under monopolistic competition, the price is given by Eq. 2.22

$$p_i = (\varepsilon/(\varepsilon + 1))w \qquad (2.22)$$

Using the elasticity of a price, ε, the price is rewritten by Eq. 2.23,

$$p_i = (1/\sigma)w \qquad (2.23)$$

Under monopolistic competition, a firm's profit becomes zero, $Y_i = 0$. The production quantity of a firm is derived from this condition as Eq. 2.24,

$$q_i = F\sigma/(w(1 - \sigma)) \qquad (2.24)$$

Equations 2.23 and 2.24 show that a decreasing value of σ increases the price and decreases the firm's production quantity of goods

3.3 Decrease in the Number of Firms via Survival Competition

3.3.1 Effects of the Change of Consumers' Taste on the Number of Firms

In equilibrium, total demand and aggregate supply of consumer goods, Q, should be equalized. When each consumer good $qi(i = 1, 2 \ldots n)$ produced by each firm is altogether shown by q, and the price $pi(i = 1, 2 \ldots n)$ is altogether displayed with the price index, p, Eq. 2.25 will be established in the goods market,

$$nq = D \qquad (2.25)$$

where n is the number of firms and D is the aggregate demand for goods. In this subsection, D is revealed as $D = f(p, Y)$ for simplicity of analysis. Although the total income, Y, of consumers in the market area is dependent on individual's income, y, and the number of consumers, m, the total income is dealt with as an independent variable. The effects of transportation costs per mile on total demand are included in the effect of change of the total income.

From Eq. 2.25, the number of firms is shown by Eq. 2.26,

$$n = D/q \qquad (2.26)$$

Then, the number of firms is shown by Eq. 2.27,

$$n = Dw(1 - \sigma)/F\sigma \qquad (2.27)$$

The effect of the parameter σ on the number of firms is indicated by checking the sign of Eq. 2.28,

$$\partial n/\partial \sigma = (-Dw - w(1 - \sigma)ED)/F\sigma^2 \qquad (2.28)$$

E is $dD/dp \cdot p/D$, thus, the sign of $\partial n/\partial \sigma$ is determined by Eq. 2.29,

$$-1 - (1 - \sigma)E \qquad (2.29)$$

Equation 2.29 is reduced to Eq. 2.30.

$$\varepsilon - E \qquad (2.30)$$

From Eq. 2.30, it is shown that $\partial n/\partial \sigma > 0$, keeping other things equal, a decrease in the parameter σ lowers the number of firms.

3.3.2 Effects of Increasing Total Income on the Number of Firms

Let us analyze the influence of total income, Y, in the area concerned with the number of firms. The influence is shown by Eq. 2.31,

$$
\begin{aligned}
\partial n/\partial Y = (w(1-\sigma)/F\sigma) \cdot dD/dY \cdot Y/D \cdot D/Y - \\
(wD/F\sigma^2) \cdot d\sigma/dY - (wD(1-\sigma)/F\sigma^2) \cdot E \cdot d\sigma/dY
\end{aligned}
\tag{2.31}
$$

This equation is rewritten as follows:

$$
\partial n/\partial Y = \left(Dw/YF\sigma^2\right)\left((1-\sigma)\sigma\Phi - \sigma\right)(1 + (1-\sigma)E)\left(d\sigma/dY\right)(Y/\sigma) \tag{2.32a}
$$

where, $\Phi = dD/dY \cdot Y/D$, since it is usually assumed as $\Phi > 0$. Then Eq. 2.32a can be shown as Eq. 2.32b,

$$
\partial n/\partial Y = \left(wD\sigma/YF\sigma^2\right) \cdot ((1-\sigma)\Phi - (1 + (1-\sigma)E)\Theta) \tag{2.32b}
$$

where, $\Theta = d\sigma/dY \cdot Y/\sigma$. Θ is demand elasticity of σ, which is assumed to be $\Theta < 0$.

Considering the consumer's love of diversity, the sign of $\partial n/\partial Y$ is dependent on Eq. 2.32c

$$
(1-\sigma)\Phi - \left(1 + ((1-\sigma)E)\Theta\right) \tag{2.32c}
$$

Since Eq. 2.32c is reduced to Eq. 2.32d, the sign of Eq. 2.32a is determined by Eq. 2.32d,

$$
\Phi + (\varepsilon - E)\Theta \tag{2.32d}
$$

The sign of $\partial n/\partial Y$ depends on the values of elasticity, ε, E, Φ, and Θ. These values have the following sign and relationship,

$$
\begin{aligned}
(dD/dY \cdot Y/D) = \Phi > 0 \\
(d\sigma/dY \cdot Y/\sigma) = \Theta < 0 \\
(\varepsilon - E) > 0
\end{aligned}
$$

Assuming that $(\varepsilon\text{-}E)$ is 1.2 and Θ is -1, the relationship between $\partial n/\partial Y$ and the elasticity Φ is illustrated in Fig. 2.3 elasticity.

It is known from Fig. 2.3 that, when the elasticity of $dD/dY \cdot Y/D$ is high, the number of firms is increased by the increase in total income. Conversely, when elasticity is low, the number of firms is decreased by the increase in total income.

It is considered from the above considerations that when demand for the goods concerned is sufficiently fulfilled in a market, the possibility of a reduction in the number of the firms arises due to the increase in total income. The tendency to decrease the number of firms generates strong survival competition among firms.

$\partial n /\partial Y$

Survival competition leads firms to alter their production modes; firms have a
motivation to fragment their production processes into small blocs to reduce
production costs.

4 Division of a Production Process by Survival Competition

Survival competition leads firms to divide a production process into several blocs to
decrease production costs, and this is a starting point for the diffusion of some blocs
spatially to seek reductions in production costs. These changes of production
activity occur an instability of existing agglomeration. This section, using the
cost function, analyzes fragmentation of production.

Assuming a firm is under monopolistic competition, division of production
processes is analyzed using the simple cost function.

The cost function of production is given by the following equation.[2]

$$TC = (w/N^s)\ x + F + (p_n\ N) \tag{2.33}$$

where TC is total costs, w is marginal costs, and F is fixed costs. N and x note the
number of processes and production quantity, respectively. p_n is marginal costs of
the process when the number of processes is increased by one. S is a parameter.

From Eq. 2.33, the optimal number of processes N^* is derived as

$$N^* = (s\ w\ x/p_n)^{(1/(s+1))} \tag{2.34}$$

Thus, the cost function is rewritten by Eq. 2.35,

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[2] This equation is the same type as shown by Burda and Dluhosch (2002).

$$TC = \left(s \, w \, x \, p_n^s\right)^{(1/(s+1))} - F \tag{2.35}$$

When the price of goods is noted as P, firm's profits are shown by Eq. 2.36,

$$Y = Px - \left(s \, w \, p_n^s \, x\right)^{(1/(s+1))} - F \tag{2.36}$$

In the equilibrium, the two equations are established,

$$\partial Y/\partial x = 0 \tag{2.37}$$
$$Y = 0 \tag{2.38}$$

From the above equations, the optimal production quantity, x^*, and price, P^*, are derived as Eqs. 2.39 and 2.40,

$$x^* = (s/p_n)(1/w)(F\sigma/(1-(s+1)))^{(s+1)} \tag{2.39}$$
$$P^* = (w/\sigma)(s \, p_n(1-\sigma(s+1))/(F\sigma))^s \tag{2.40}$$

And the optimal number of processes, N^*, is given by Eq. 2.41

$$N^* = s\sigma F/(p_n(1-\sigma(s+1))) \tag{2.41}$$

It is known from Eq. 2.41 that if a firm has a certain production quantity, it divides the production process into blocs to reduce production costs, and the optimal number of processes increases as the fixed costs become high.

It is worth noticing that sufficient quantity of production is required for dividing a production process. Assigning the following numerical values to each parameter, $s = 0.95, F = 30, p_n = 5, w = 1.5$, the production quantity that is required to divide the production process can be derived. Figure 2.4 shows this quantity.

In Fig. 2.4, line 0-TCu shows how production costs change when a production process is not divided; line 0-TCf shows production costs where a production process is divided. If the production exceeds 13.82, a process is divided. When the quantity reaches 13.82, a production process will be divided into two according to Eq. 2.34.

As shown by Eq. 2.39, production quantity depends on the parameter σ. It is interesting to know the relationships between σ, production quantity, and the number of processes. When σ is 0.15, quantity x is 5.1, thus the processes are not divided. If σ is 0.25, x becomes 25.8, and the process is divided to 2.78 blocs. If σ is 0.4, x becomes 335.3, and the number of processes is 10.4. Since the production quantity is dependent on the parameter of σ, which determines the price elasticity of demand, it could be said that the number of production processes is influenced by consumers' taste for the goods.[3]

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[3] Shi and Yang (1995) analyze how the division of production processes proceeds. Ishikawa (2010) analyzes the relationships between the retail structure and division of the production process.
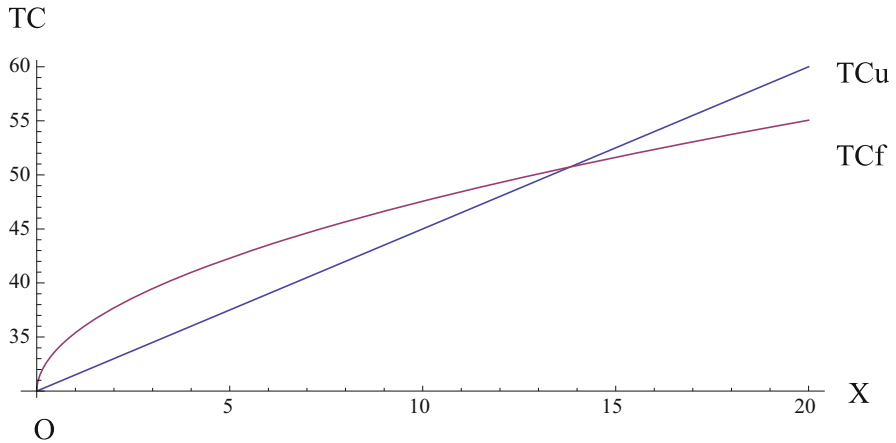
Fig. 2.4 Production quantity required for division of the process

5 Concluding Remarks

These days, many manufacturing firms fragment production process and scatter the fragmented production blocs in different countries. This chapter showed why firms divide production process: growth competition and survival competition. In particular, survival competition generates a harsh situation for firms. This chapter explains a mechanism by which survival competition is brought about in an industry and then the number of firms is forced to decrease within that industry. The trend for a decrease in the number of firms gives rise to cost-cutting competition among firms, which leads to the division of production processes. The examination of why firms divide production process into some blocs and the mechanism of the division of production process seems to be a starting point for the analyses of the location of the fragmented production blocs.

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Chapter 3
Supply Chain, Transportation, and Spatial Risk

Tatsuaki Kuroda

Abstract In 2011, Japanese firms suffered severe losses as a result of the Great East Japan Earthquake and the Thailand floods. Firms incurred continual damage because they depended on spatially dispersed supply chains. The fragmentation of foreign and domestic trade proceeds as a dispersion force. As a result, secondary or tertiary subcontractors sometimes provide distinctive parts independently. However, such a structure has in fact caused contiguous damage to these firms. To capture the characteristics of supply chains over space and the cascade of spatial risks, we set up a two-level structure of circles in which firms can be categorized. The top circle is occupied by intermediate goods producers who provide differentiated inputs for the final goods producers in the second circle. We assume that scale economy works with respect to the variety of intermediate goods. Thus, final goods producers purchase inputs from intermediate goods producers in different locations, paying transport costs in the process. We then evaluate the two-level structure in terms of location-specific hazards such as earthquakes. A more dispersed supply chain corresponds to a greater likelihood that final goods producers would suffer losses from the spatial risk. Simulation results reveal that the expected damage may be less for intermediate goods producers with more dispersed locations. Conversely, final goods producers may be better served by being spatially concentrated.

Keywords Fragmentation • Supply chain • Location risk • Economic resilience • Hazards • Disasters

1 Introduction

The patterns of trade and the configuration of existing supply chains are changing drastically with the progress of globalization. Final goods producers are essentially attracted to outsourcing because of the prevailing scale economy based on modularity, particularly in modern machinery industries (Baldwin and Clark 2000). On one hand, the fragmentation of foreign and domestic trade proceeds as a dispersion

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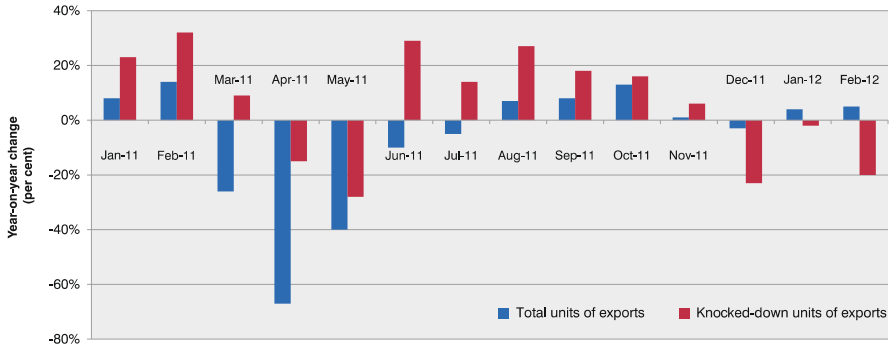
Fig. 3.1 Monthly growth rates of Japan automobile exports around the Japan Earthquake 2011 and the Thailand Flood (*Source*: Japan Automobile Manufacturers Association 2012. Note: A knocked-down unit refers to a semi-finished vehicle with a unit value <60 % of the unit value of a finished vehicle. From ESCAP (2013, p. 160))

or disintegration force (Feenstra 1998). This fragmentation means that firms seek global comparative advantages in terms of individual parts or modules. As a result, secondary or tertiary subcontractors sometimes provide distinctive or unrivaled parts independently.

On the other hand, in Japan for example, a number of firms have dispersed their plants to rural regions to avoid potential risks brought about by strong earthquakes anticipated around Tokyo or Nagoya (i.e., most developed metropolitan areas). However, such a strategy might actually cause contiguous damage to these firms. In fact, in 2011, Japanese firms suffered great losses not only from the Great East Japan Earthquake[1] but also from the Thailand floods, which caused considerably more damage than the anticipated earthquakes around the metropolitan areas in which the majority of the plants of these firms had originally been located. The firms continually incurred damage because they depended on spatially dispersed supply chains. In Japan's automobile industry, for example, the production of automobiles was greatly damaged by both the Great East Japan Earthquake and the Thailand floods (Fig. 3.1). The total probability of risks becomes higher because each dispersed plant location faces a relatively positive probability of spatial risks such as earthquakes, floods, or political conflicts. If we connect the components of the supply chain, risks and even financial crises can easily be diffused. For example, Toyota Motor Corporation halted automobile production in all of its domestic plants from 14 to 26 March 2011 because of the disruption in the company's supply chain, thereby generating an output loss of 140,000 cars. Furthermore, the Thailand floods cost them 260,000 cars (Toyota Motor Corporation 2012).

Renesas Electronics Corporation is another example of a firm whose supply chain was disrupted by the earthquake. As a result of the collapse of certain plants of this semiconductor company, which also produces microcontrollers and

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[1] Natural disasters cause human losses as well as economic damage. The Great East Japan Earthquake on 11 March 2011 caused 21,613 fatalities and missing people (The Fire and Disaster Management Agency, Japan, 2014).

microprocessors, many automobile companies (including General Motors in the USA) were forced to cease production for a particular period. This incident was called 'Renesas Shock', where certain subcontractors were noted as having monopolistic powers, based on increasing returns to scale in recent supply chains as described above.[2] With regard to economic damage, Tokui et al. (2012) estimated that the damage of the earthquake amounted to 1.35 % of the Japanese gross domestic product (GDP). They also estimated that nearly 90 % of the output loss in Japan from the earthquake was due to the indirect effects of supply chain disruption.

Although the present chapter focuses on the economic consequences of these disasters, recovery from such damage is an important aspect to consider.[3] The concept of 'resilience' is often used to evaluate the possible ways of recovery from such disasters. 'Resilience' comes from the Latin word '*resilíre*,' which means 'to leap back,' although the term also has many other definitions in literature (e.g., Omer 2013; Modica and Reggiani 2014). Rose (2007) classified economic resilience into two concepts, namely, static and dynamic, with respect to time dimension. Static resilience pertains to maximizing the available resources at a given point in time, whereas dynamic resilience focuses on the speed of recovery or reconstruction. Hallegatte (2014) recently proposed similar groupings, specifically instantaneous resilience and dynamic resilience. These groupings are further categorized into macroeconomic and microeconomic resilience; the latter was further used to describe the distribution of losses across different areas of the society, such as households. In view of the groupings proposed by Hallegatte, this chapter analyzes the static/instantaneous resilience of an economy, with emphasis on the conflict of interest among producers. The details with which we are concerned are explained below.

The interrelation between economic resilience and the geographic distribution of economic activities is important to examine. For example, Davis and Weinstein (2002) found that the distribution of the regional population in Japan is robust, even during large man-made disasters (e.g., the Allied bombing of Japanese cities in WWII). In empirical studies of recent disasters, positive and negative aspects of resilience and spatial dispersion of production processes are present in a supply chain network. The positive aspect is as follows: if we spatially distribute the supply chain, the damage might be less severe on the other plants acting as back-up located outside the disaster-stricken area. In fact, using firm-level data in the affected area, Todo et al. (2013) found that having more suppliers and clients outside the affected areas mostly shortens the recovery time. Nakajima and Todo (2013) showed that 8.1 % of firms that had damaged suppliers addressed the problem by finding new suppliers. The firms' client evaluation, or their satisfaction with the newly contracted suppliers, is lower than with previous suppliers combined. However,

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[2] See ESCAP (2013, 157–158) for the shock in detail.

[3] While Wisner et al. (2004) proposed the definition of disaster or disaster risk because of the interaction between vulnerability and hazards, the World Bank and the United Nations (2010) adopted a similar definition. A hazard is a natural or man-made phenomenon capable of inflicting harm on communities (Gilbert 2013).

Fig. 3.2 Automobile production in Association of Southeast Asian Nations (ASEAN) countries after the Japan Earthquake 2011 (*Source*: Ye and Abe 2012. From ESCAP (2013, p. 155))

in terms of the quality of the newly supplied goods, the evaluation and satisfaction were almost the same as those with the previously supplied goods.

However, as discussed above, the negative reason is as follows: the firms may continually incur damage if they depend on spatially dispersed supply chains. As mentioned above, surprisingly, nearly 90 % of the output loss in Japan from the earthquake was due to the indirect effects of supply chain disruption (Tokui et al. 2012). Ye and Abe (2012) and ESCAP (2013) reported in detail the spillover effects of the earthquake to other countries (Fig. 3.2). Henriet et al. (2012) proposed two strategies to improve the vulnerability of the supply chain structure based on the disaggregated dynamic input–output model. The first strategy isolates many small groups of producers as far from the other groups as possible, to reduce the disaster effects. That is, concentrated and clustered groups of producers are recommended. The second strategy requires producers to have as many suppliers and clients as possible to compensate for the loss incurred from natural hazards. The proposal of Henriet et al. (2012) seemed reasonable for improving the resilience of producers. Large inventories can also protect production against these hazards.[4] However, these policies would increase production costs or compromise efficiency during normal times. Ye and Abe (2012) proposed that enterprises should consider the trade-offs between supply chain efficiency and disaster risk preparation.

Altay and Ramirez (2010) analyzed the impact of over 3,500 natural disasters on more than 100,000 firm-year observations for a span of 15 years. They found that, in the case of floods, the effect is dependent on the firm's position in the supply chain, that is, upstream firms experience a more positive effect than do downstream firms. Although classifying firms as upstream or downstream might be simplistic (i.e., all manufacturing firms are categorized as upstream, whereas retailers are categorized

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[4] Kull and Close (2008) pointed out that increased inventory in a tiered supply chain might increase supply risk rather than decrease it.

as downstream), such an approach presents interesting results. The results of such classification imply that, in addition to the positive and negative effects of disasters on the supply chain, a conflict of interest may exist among producers of different positions within a supply chain.

To our knowledge, no theoretical study has focused on the differences of interests among producers in a spatially dispersed supply chain with respect to static resilience. Thus, the present study makes an initial attempt to examine the issue by establishing a simple model of spatial economy. More precisely, we analyze the static/instantaneous resilience of a spatially dispersed supply chain network, with emphasis on the conflict of interest among producers. To do this, we established a simple model of spatial economy where firms are categorized to capture the ideal characteristics of the supply chain over space and the cascade of spatial risks. Then, we evaluate the structure or distribution of producers in terms of location-specific hazards such as earthquakes. By performing numerical simulations of possible backup within the supply chain, we can show that dispersion may be helpful for the intermediate goods sector but detrimental for the final goods sector. Therefore, intermediate goods producers with more dispersed locations, when final goods producers are also dispersed, may expect less damage. In contrast, final goods producers may be better off being concentrated spatially, according to the simulation results. Moreover, if we assume that such hazards also damage transportation in the supply chain, the loss is more significant for final goods producers than for intermediate goods producers. Although our model is very simple, the results are consistent with the empirical findings of Altay and Ramirez (2010).

The remainder of this chapter is organized as follows. In Sect. 2, our model is described via the basic settings and spatial configurations of the firms considered in the current study. The results of our simulation are presented and examined in Sect. 3. Section 4 presents the concluding remarks.

2 The Model

2.1 Basic Settings

We set up a double-layer structure of circles where firms are categorized to capture the ideal characteristics of the supply chain over space and the cascade of spatial risks.[5] The top circle is occupied by intermediate goods producers who provide differentiated inputs for the final goods producers in the second circle.[6]

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[5] See Venables (1996) for a model of vertically linked industries in the context of the New Economic Geography, although no distances occur among firms within a supply chain in each region.

[6] This assumption of differentiated inputs comes from the example of 'Renesas Shock,' as described above.

For simplicity, we focus on the supply chain of a specific final product, which can be categorized as a homogeneous good. The final goods are produced with capital and intermediate goods. To capture the basic source of fragmentation, we assume that the inputs are differentiated by the location of the intermediate goods producers; for the final goods producers, the scale economy works with respect to a variety of intermediate inputs. Thus, the final goods producers would buy inputs from most intermediate goods producers located in different places, while paying transport costs in the process.[7]

Following Ethier (1982), we adopt the technology given by

$$Y_i = A \cdot K_i^{1-\alpha} \cdot \left(\sum_{j=1}^{M} m_{ji}^{\alpha} \right), \tag{3.1}$$

where

i is the location of final goods production ($i = 1, \cdots, N$),
j is the location of intermediate goods production ($j = 1, \cdots, M$),
A is a parameter (>0),
K_i is the capital input at location i of final goods production,
m_{ji} are the intermediate inputs from j to i, and
α is a parameter [$\alpha \in (0, 1)$].

We assume that clients pay the transport cost of their inputs (see Footnote 7); therefore, for final goods producers to use the input at their plants, they must pay the free on board (FOB) price determined by each intermediate producer, plus the transportation cost.[8] Thus, the cost of production is given by

$$C_i = r \cdot K_i + \sum_{j=1}^{M} \left(p_j + t \cdot d_{ji}^{\theta} \right) \cdot m_{ji}, \tag{3.2}$$

where

r is the capital rent,
p_j is the FOB price of intermediate goods at j,
t, θ are the parameters of transport cost (>0), and
d_{ji} is the distance between j and i.

By using the cost-minimization behavior of the final goods sector, the conditional factor demand functions are given as follows:

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[7] In the case of the Japanese automobile industry, for example, clients pay the transport cost of their inputs.

[8] FOB price is the price effective for the trade at the plant only, and does not include the transport cost. FOB price is also referred to as the mill price. See Beckmann (1976).

$$K_i = \left(\frac{\alpha}{1-\alpha}\right)^{-\alpha} \cdot r^{-\alpha} \cdot A^{-1} \cdot Y_i \cdot \Phi_i^{\alpha-1}, \tag{3.3}$$

$$m_{ji} = \left(\frac{\alpha}{1-\alpha}\right)^{1-\alpha} \cdot r^{1-\alpha} \cdot A^{-1} \cdot Y_i \cdot \varphi_{ji}^{-\frac{1}{1-\alpha}} \cdot \Phi_i^{\alpha-2}, \tag{3.4}$$

where $\varphi_{ji} = p_j + t \cdot d_{ji}^{\theta}$ and

$$\Phi_i = \sum_{j=1}^{M} \varphi_{ji}^{-\frac{\alpha}{1-\alpha}}.$$

Next, the production technology of intermediate goods is assumed as

$$y_j = B \cdot L_j \tag{3.5}$$

where

B is a parameter (>0) and
L_j is the labor input at j.

The production cost is given by

$$c_j = w \cdot L_j + F \tag{3.6}$$

where w is the wage rate and F is the fixed cost for a variety.

We consider only the supply chain in this study. Thus, we assume a small open economy with respect to basic production factors: capital and labor. The prices of these factors (e.g., capital rent and wage rate) are given exogenously. We assume Eq. (3.6) in this study because it is common to introduce a fixed cost for the production of a variety in monopolistic competition models. The fixed cost of a variety is often used to investigate the number of firms sustained in the equilibrium of standard monopolistic competition models. Therefore, a lower fixed cost corresponds to a larger equilibrium number for intermediate goods producers, and vice versa. However, in this study, the number of firms is given exogenously in each numerical simulation to compare the static resilience at different levels of locational dispersion; consequently, the fixed cost does not work explicitly hereafter. Therefore, given Eq. (3.4) as the demand from the final goods producers, the profit of the intermediate sector used in the simulations is not the net of the fixed costs as follows:

$$\pi_j = \eta \cdot \left(p_j - \frac{w}{B}\right) \cdot \sum_{i=1}^{N} Y_i \cdot \varphi_{ji}^{-\frac{1}{1-\alpha}} \cdot \Phi_i^{\alpha-2} \tag{3.7}$$

where $\eta = \left(\frac{\alpha}{1-\alpha}\right)^{1-\alpha} \cdot r^{1-\alpha} \cdot A^{-1}$.
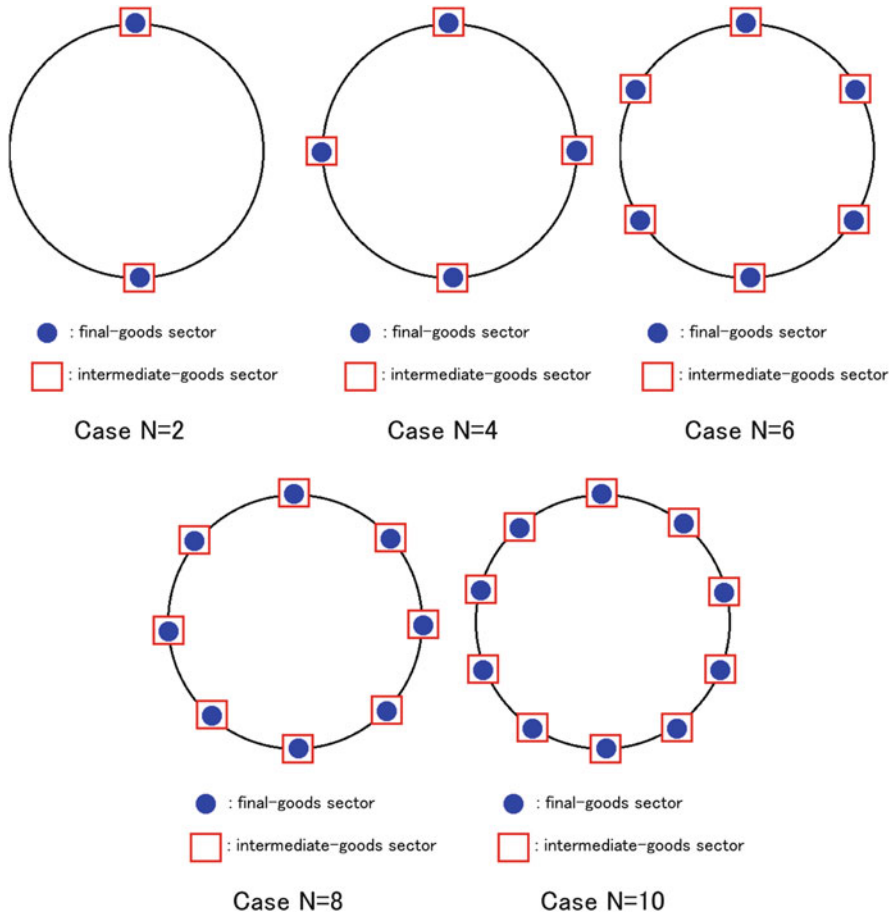
Fig. 3.3 Symmetric cases $(M = N)$

Although Φ_i includes φ_{ji} as a factor, we assume that each intermediate goods producer would suppose Φ_i as a constant. The producer then tries to maximize the profit by choosing.

2.2 Symmetric and Asymmetric Cases

First, we examine the symmetric cases in Fig. 3.3. In these cases, the final goods producers are located in the same points as the intermediate goods producers; however, no specific affiliation exists among the producers in the same location.

Second, we set the 'asymmetric' cases in Fig. 3.4 specifically to examine the effects of the dispersion of the final goods sector. In these cases, we fix the location
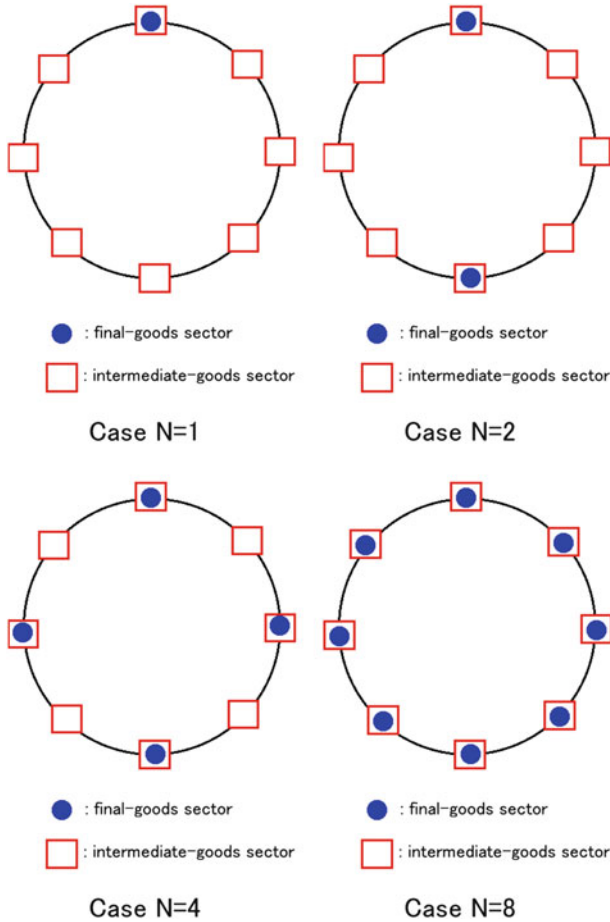
Fig. 3.4 Asymmetric cases ($M = 8$: fixed)

of the intermediate goods producers as $M = 8$ and vary the number of the location of the final goods producers as $N = 1, 2, 4, 8$.

In either case, the intermediate inputs are assumed to be transported along the shorter circumference. However, we do not consider the damage on the transportation from the spatial risks in this instance.

2.3 Asymmetric Cases with Damage on Transportation

In this subsection, we assume that the hazards also damage the transportation in the supply chain. On the basis of the asymmetric cases in Fig. 3.4, the transportation link is assumed to be disrupted at the same point as the stricken plant. For example,

Fig. 3.5 Asymmetric cases
with transportation damage
(Example of case $N = 4$ and
location #3 is stricken)

Case N=4
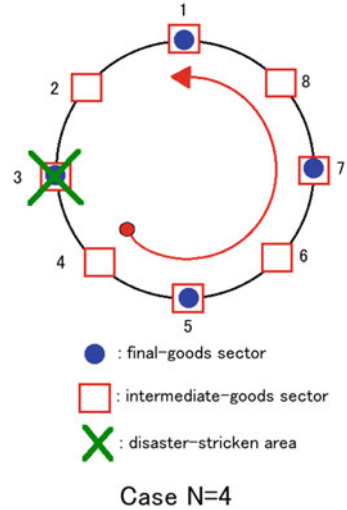
in Fig. 3.5, the plants and transportation link at number 3 are stricken. Thus, the final goods producer at number 1 must make a detour in transporting the intermediate goods produced at number 4. In this case, the distance increases 1.67 times than normal.[9]

3 Simulation Results

3.1 Basic Simulation Procedure

In the numerical simulations described below, we first examine the cases without spatial risks as the basic cases. To examine the performance of this small open economy, we further assume that the total output of the final goods in each of these cases is a fixed constant. Each final goods producer shares the same amount of output. Likewise, the price of the final goods is determined so that the profit of the final goods sector Π_i is zero in the basic cases.

We then introduce a spatial hazard, such as an earthquake, to the setting. To simplify the analysis, we assume that an earthquake only strikes a location and all locations have the same probability of being stricken, and we do not consider the cases where several locations are stricken simultaneously.

In this chapter, we focus on the short-term damage of the spatial hazard. Thus, both prices P_i and p_j are fixed as before the disaster.[10] Although either sector cannot

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[9] See Yamada et al. (1992) or Omer (2013) for studies about restoring the damaged transportation network.

[10] Henriet et al. (2012) adopted similar assumptions. Hallegatte and Przyluski (2010) proposed a definition of the economic cost of a disaster for longer periods.

produce goods in the stricken location, the final goods producers in other locations can change their procurement pattern of intermediate goods to maintain the level of output as before, indicating that under these conditions, the final goods producers minimize their cost by selecting the size of procurement for each type of intermediate goods from an undamaged location. Since prices are fixed and procurements are adjusted in order to maintain the output level, our approach here is a kind of disequilibrium analysis. Even in the short term, these measures taken by the private sector in this case may contribute to static resilience.

Consider the case of a single layer structure rather than double, in which each location produces the same amount of output (i.e., equal share of the fixed total amount) independently (Fig. 3.6). In the short term, if the number of producing locations doubles, the expected damage to each location becomes half in terms of the output, whereas the probability of being stricken doubles. Therefore, assuming risk neutrality, the 'null hypothesis' in this case may mean that "the degree of dispersion does not matter against the risk, because a greater dispersion corresponds to lesser damage at a location yet greater probability of being struck".[11] For example, if the probability of an earthquake striking a location is the same for all points in the circle (i.e., here, a uniform distribution is assumed for the probability of being struck by hazards over the circle), and if we do not consider the possibility of other plants acting as backup in locations outside the affected area, then the expected instantaneous loss should be irrelevant to the distribution of economic activities (total output is fixed here) in the circle.

If producers in Fig. 3.6 were risk averse rather than risk neutral, they would prefer dispersed locations more or less.[12] Even if it was the case, it is still important to recognize the 'true costs' of dispersion in the hierarchical supply chain such as Figs. 3.3 and 3.4, in terms of resilience. In reality, most firms seem to consider only the potential costs due to hazards as those of the single-layer case in Fig. 3.6.

Given that the present analysis is an initial attempt to examine such an hypothesis based on the spatially dispersed supply chain, and the study will not reproduce some specific real events through proper calibration, the numerical simulations described below use simple parameters, as shown in Table 3.1. We adopt relatively realistic values for the capital rent r and the technological parameter α, and the other parameters are set to prevent any loss of generality.[13]

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[11] In traditional economic theory, risk itself is given exogenously, and agents should decide whether or not to take it, which is different from the definition of risk given by Wisner et al. (2004) in Footnote 3.

[12] In reality, producers seem to balance the fixed costs or communication costs due to dispersion of plants with their risk aversion.

[13] Although changing the parameter values is interesting as comparative statics or sensitivity analysis, we could extract the essential characteristics of the supply chain by using this setting at this stage.
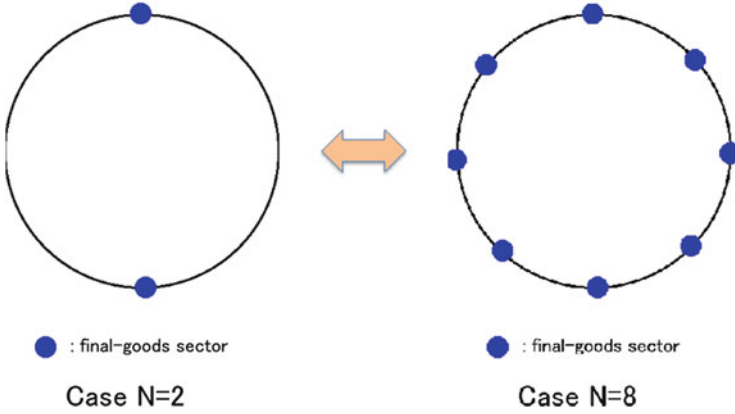
Fig. 3.6 'Null hypothesis': the number of locations does not matter

Table 3.1 Setting of parameters

$\displaystyle\sum_i Y_i$	1
α	0.75
A	1
B	1
θ	1
t	1
r	0.03
w	1
Circumference	1

3.2 Symmetric Cases

First, we examine the symmetric and basic cases. The results are shown in Figs. 3.5 and 3.6. Figure 3.5 shows the intermediate goods sector, whereas Fig. 3.6 presents the final goods sector. Based on these figures, we make the following observations:

Observation 1
- If $N\,(=M)$ increases, the markup or price of the intermediate goods, p_j, also increases because of the dispersion of the final goods production.
- If $N\,(=M)$ increases, the efficiency of the final goods production also increases because of the increase in the variety of intermediate goods.

We adopt the FOB pricing policy for intermediate goods producers (i.e., final goods producers pay the transport costs). Therefore, the markup of the goods increases when the final goods producers disperse over the circumference. However, as variety increases, the final goods production becomes more efficient, and it is able to save the intermediate goods $\sum y_j$ and the capital inputs $\sum K_i$ for a fixed

level of output. In the economy, the total output of final goods is fixed, and the profit of the sector is zero. In addition, the factor markets of capital and labor are perfectly open and competitive. Therefore, the performance of the economy could be captured by the excess profits of intermediate goods $\sum \pi_j$ and the price of final goods P_i. Nevertheless, once we explicitly introduce the fixed cost for a variety to the numerical simulations in Eq. (3.6), the excess profits would be absorbed for the fixed cost, through the free entry and free exit conditions in a standard monopolistic competition. Thus, the price of final goods is solely appropriate as the measure of economic performance in this case. If no spatial risk exists (i.e., in normal time), the dispersion/fragmentation of production is good for the economy because of the increase in variety.

We now introduce the spatial risk to the setting by following the procedure described above. The results are shown in Figs. 3.7 and 3.8, where the damage is measured by the differences of the results from the normal time (superior 'dam' means the values at damage or disaster in the figures hereafter).[14] Based on these figures, our observations are as follows:

Observation 2
- If $N (=M)$ increases, the total expected damage of the disaster to the intermediate goods sector measured by the excess profits, $\sum \pi_j$, would decrease.
- If $N (=M)$ increases, the total expected damage of the disaster to the final goods sector measured by the profits, $\sum \Pi_i$, would not decrease.

In order to maintain the same level of output for the final goods sector outside the affected area, a greater demand for both intermediate goods, $\sum y_j$, and capital inputs, $\sum K_i$, is needed based on the increase in locations N.

Despite the spatial risks, dispersion/fragmentation is beneficial to the intermediate goods sector, which is relatively resilient enough to withstand the risks. To an extent, this is opposite for the final goods sector. Thus, there may be some conflict of interest between the final goods and intermediate goods sectors in terms of the progress of dispersion/fragmentation over space. However, in the symmetric cases, the dispersion of the intermediate goods sector is better for the final goods sector because of an increase in variety, as shown in Observation 1. Therefore, in the following subsection, we remove this effect to focus on the static resilience of the final goods sector with respect to its own dispersion.

3.3 Asymmetric Cases (Without Damage on Transportation)

We examine the asymmetric cases described in Sect. 3.2 to further investigate the possible conflict of interest between the final goods and intermediate goods sectors.

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[14] In Figs. 3.8, 3.12, and 3.14, note that the profit of the final goods sector in normal times is zero by assumption (i.e., $\sum \Pi_i = 0$).

Fig. 3.7 Symmetric cases:
basic cases of intermediate
goods
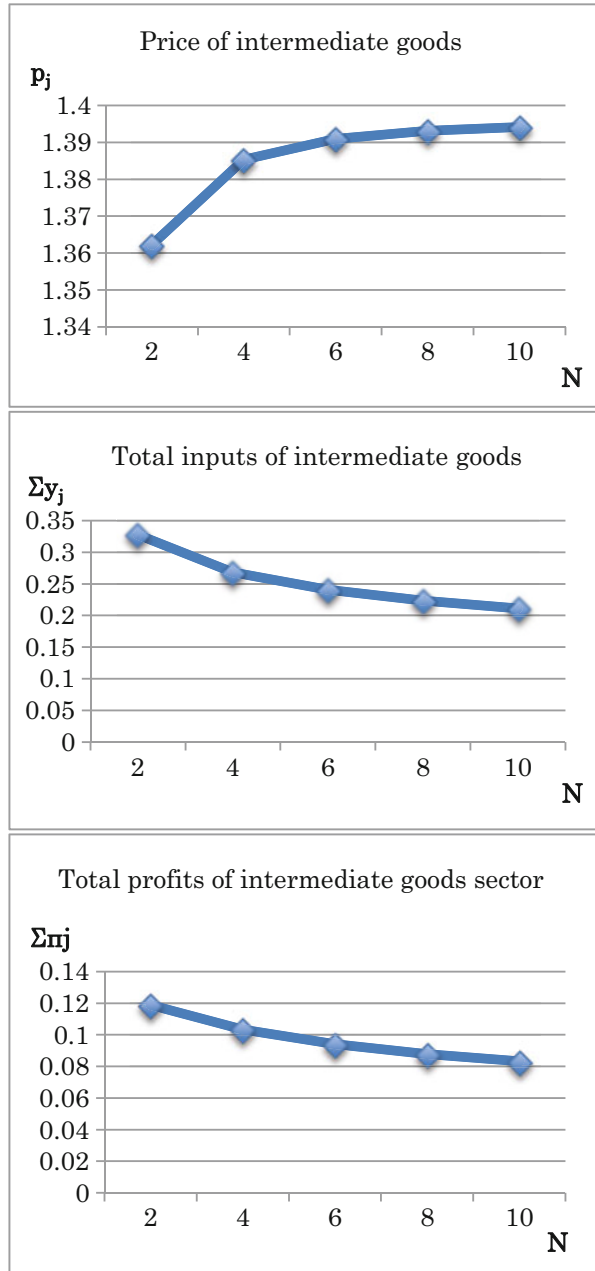
We obtain the results for the basic cases by fixing the location of the intermediate
goods producers and varying the number of locations of the final goods producers.
The results of the investigation for the intermediate goods sector and the final goods

Fig. 3.8 Symmetric cases:
basic cases of final goods
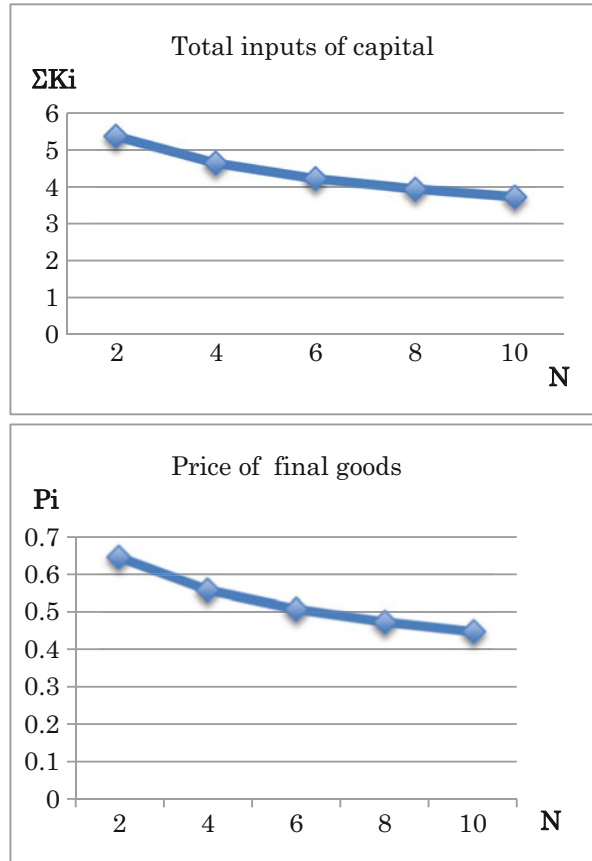
sector are shown in Figs. 3.9 and 3.10, respectively. Based on these figures, we make the following observations:

Observation 3

- If N increases, the markup or price of the intermediate goods, p_j, (in terms of weighted average according to the quantity produced) also increases because of the dispersion of the final goods production.
- If N increases, the efficiency of the final goods production also increases because of the dispersion; thus, the price of the final goods decreases.

In cases where the location of the intermediate goods producers is fixed, we can expect a positive outcome when the final goods producers further disperse independently because of the increase in accessibility of the intermediate goods. Again, the final goods producers are able to save the intermediate goods, $\sum y_j$, and the capital inputs, $\sum K_i$, for a fixed level of output.

Fig. 3.9 Symmetric cases
with damage on
intermediate goods
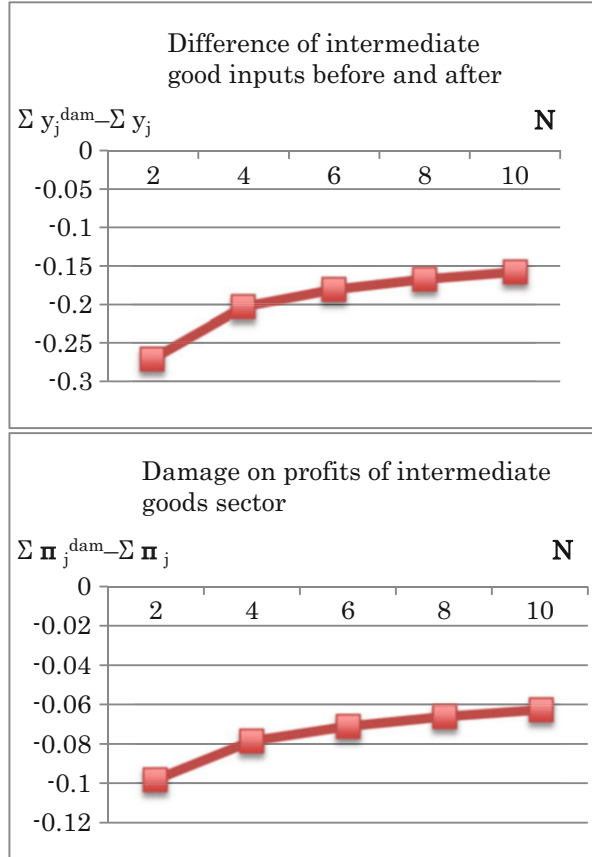
We then introduce the spatial risk to this asymmetric setting. The results are
shown in Figs. 3.11 and 3.12. Based on these figures, our observations are as
follows:

Observation 4
- If N increases, the total expected damage of disasters to the intermediate goods
  sector, measured by excess profits $\sum \pi_j$ would decrease. In particular, the
  resilience of the intermediate goods sector has greatly improved from $N = 1$ to
  $N = 2$.
- If N increases, the total expected damage of disasters to the final goods sector,
  measured by profits $\sum \Pi_i$, would also increase.

In the case of asymmetric distributions, the trade-off between the interests of the
final goods and intermediate goods sectors becomes clearer. From the viewpoint of
the intermediate goods sector, a dispersed final goods sector is desirable. In
contrast, in terms of static resilience, being spatially concentrated is better for the
final goods sector. These results are consistent with the empirical findings of Altay

Fig. 3.10 Symmetric cases with the damage on final goods

Difference of capital input before and after

$\Sigma\, K_i{}^{dam} - \Sigma\, K_i$

Damage on profits of final goods sector

$\Sigma\, \Pi_i{}^{dam} - \Sigma\, \Pi_i$
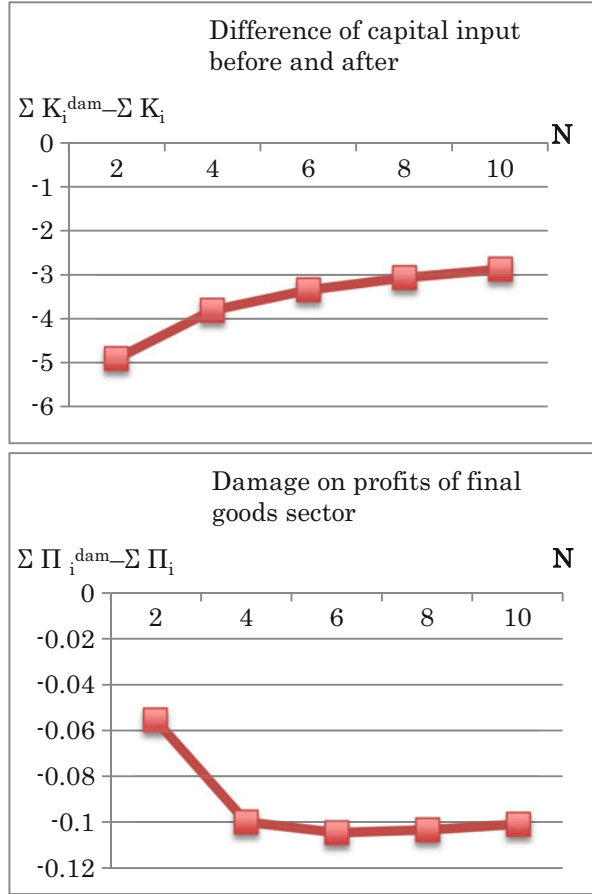
and Ramirez (2010), who posited that upstream firms experience a more positive effect from natural disasters, and downstream firms experience the opposite. In this case, the movement of the intermediate goods supply, $\sum K_i$, looks irregular if $N = 2$, whereas there is more demand for capital inputs, $\sum y_j$, based on the increase in locations N.

3.4   Asymmetric Cases (with Damage on Transportation)

As described in Sect. 3.3, we assume in this subsection that the hazards also damage the transportation in the supply chain. On the basis of the asymmetric cases in Fig. 3.3, the transportation link is assumed to be disrupted at the same point of the

Fig. 3.11 Asymmetric
cases: basic cases of
intermediate goods

Price of intermediate goods
(weighted ave.)

Total inputs of intermediate goods

Total profits of intermediate
goods sector
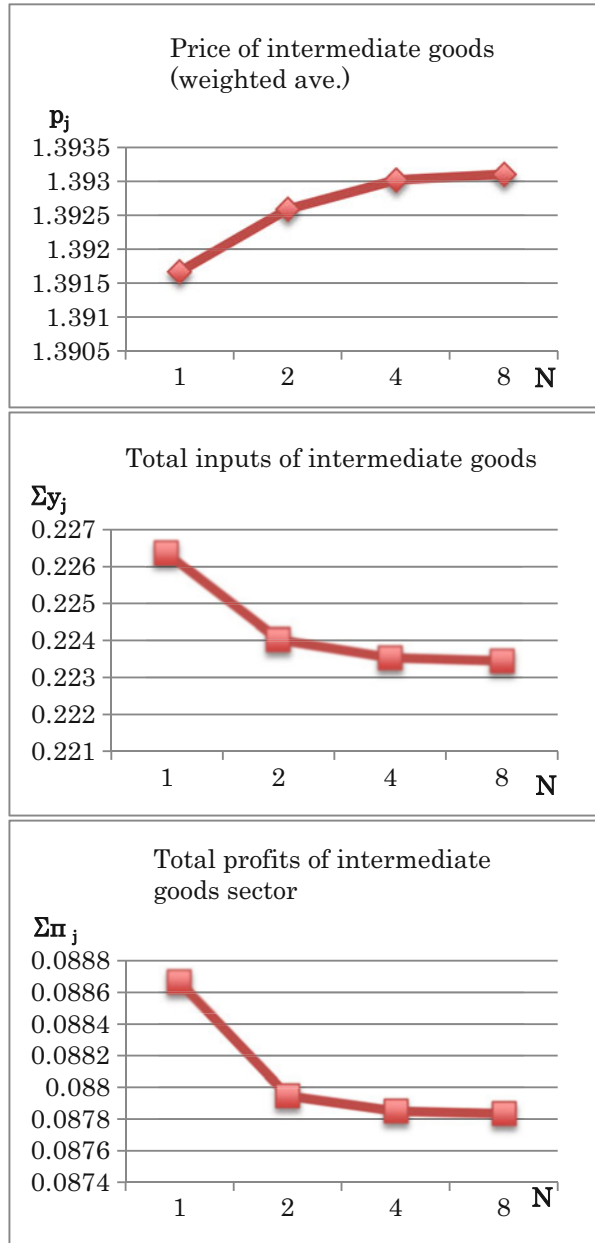
stricken plant. The results are shown in Figs. 3.13 and 3.14, where we compare the
outcome of this case with the results presented in the former subsection (i.e.,
Figs. 3.11 and 3.12). Based on these figures, our observations are as follows:

Fig. 3.12 Asymmetric cases: basic cases of final goods
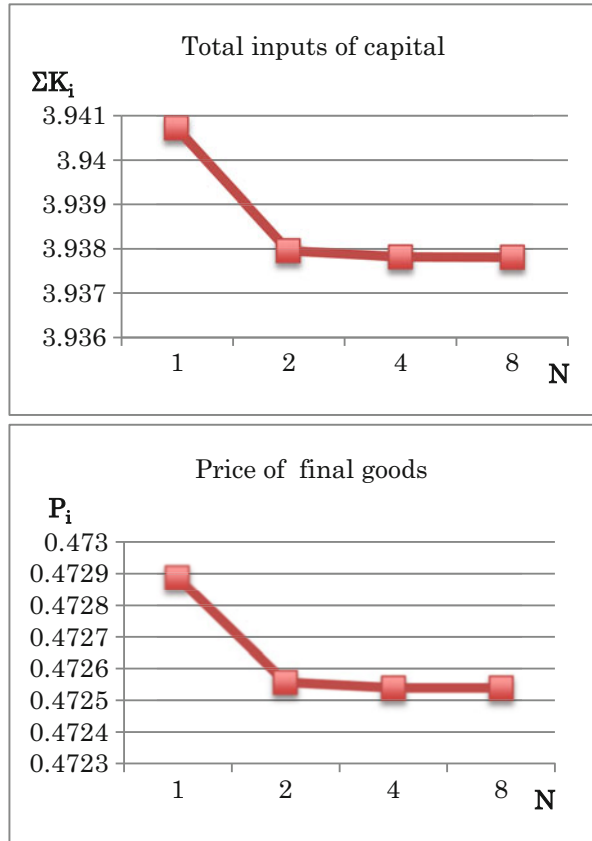
Observation 5

- With the damage to transportation, the total expected damage from disasters to the intermediate goods sector, measured by excess profits $\sum \pi_j$ would not increase significantly.
- With the damage to transportation, the total expected damage from disasters to the final goods sector, measured by profits $\sum \Pi_i$, would increase significantly.

To be precise, the disruption of the transportation network has a greater effect on the final goods producers than on the intermediate goods producers. This result again supports the empirical findings of Altay and Ramirez (2010). Both intermediate goods, $\sum y_j$, and capital inputs, $\sum K_i$, are more in demand in this case, according to the damage to transportation.

Fig. 3.13 Asymmetric
cases with the damage on
intermediate goods
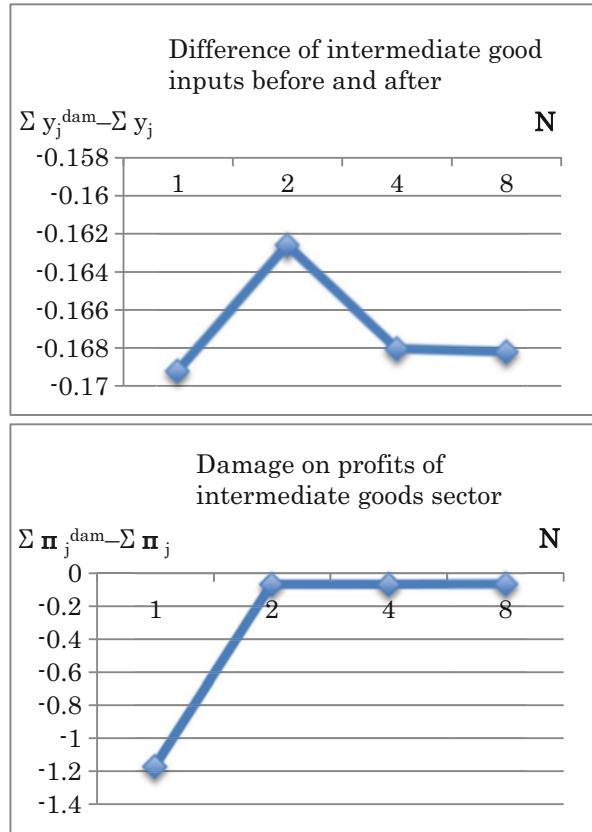
4 Concluding Remarks

By establishing a simple model of a spatially dispersed supply chain, we examined
the static resilience of the structure with respect to the degree of dispersion, the
possible damage on transportation, and the position of producers in the supply chain
(i.e., upstream or downstream). Our main results are discussed in the succeeding
paragraphs.

In normal time, or when there are no locational hazards, and given the technol-
ogy with increasing returns to scale and variety, spatial or geographical dispersion
of producers is always beneficial. This result is consistent with the recent phenom-
enon of the rapid fragmentation of foreign and domestic trade proceeds. However,
we are faced with natural and man-made hazards such as earthquakes, floods,
hurricanes, and political conflicts almost everywhere. The effects of these hazards
often disrupt some parts of a supply chain, and such damage is diffused over space.
By focusing on static or instantaneous resilience, we find that, on one hand,
dispersion/fragmentation is beneficial for the intermediate goods sector, which is

Fig. 3.14 Asymmetric cases with the damage on final goods
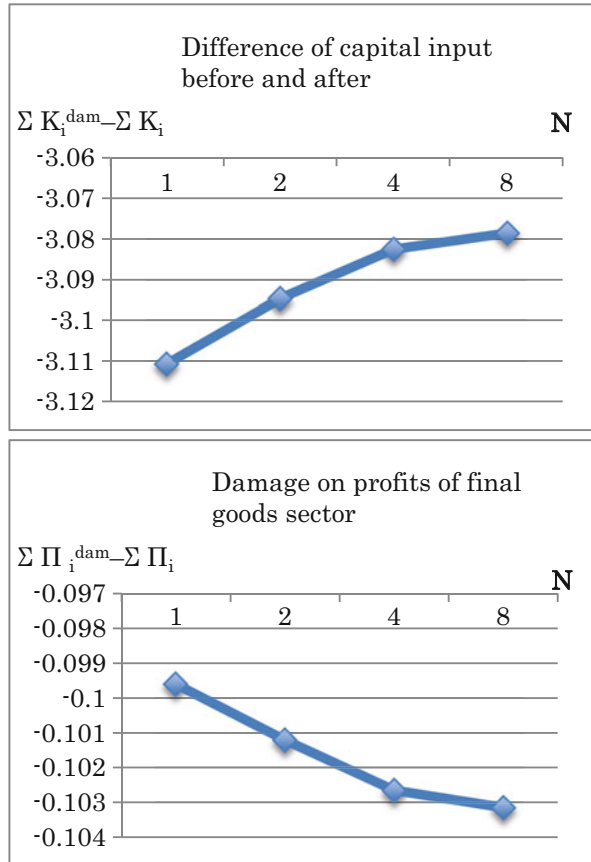
resilient enough to withstand the risks. However, on the other hand, the effect of dispersion/fragmentation on the final goods sector is the opposite because this sector is less resilient to withstand the risks. This result is consistent with the empirical findings of Altay and Ramirez (2010), who stated that upstream firms experience a more positive impact from disasters, and downstream firms experience the opposite. In addition, when the transportation system in the supply chain is also damaged, the damage would be more significant for the final goods sector than for the intermediate goods sector. Overall, in terms of static resilience, the results of this study imply the existence of a conflict among the sectors that make up supply chain.

Although the results of the numerical simulations seem interesting, and the essential characteristics of a stratified supply chain were captured, the analysis is still a prototype of the theoretical experiment for the investigation. First, we construct the basic structure of hierarchical supply chain, following the automobile industries in Japan. For example, we adopt FOB pricing policy for intermediate goods (Footnote 8). It affects price elasticity of demand for the goods, and thus the

monopolistic pricing by intermediate goods producers at different locations. Consequently, that might be a basic reason for the conflict among the sectors in a supply chain. There are two other spatial pricing policies, namely uniform delivered pricing and discriminatory local pricing (Beckmann 1976). It is better, therefore, to examine the models with those pricing policies.

Finally, our analysis concerns static resilience only. There is still a need to analyze dynamic resilience, which should be more important for the economy in general. Given that most empirical studies (some are introduced in Sect. 1) describe the behavior of communities, firms, and governments after disasters, developing theoretical models to examine or reproduce the findings of these studies would be necessary.

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Chapter 4
Formation of Supply Chains in East Asia

Yutaka Yamada

Abstract The GATT-WTO (General Agreement on Tariffs and Trade – World Trade Organization) system has promoted and fostered multilateral trade liberalization. However, recently, developed countries in Europe and developing countries in East Asia have entered into bilateral free trade agreements (FTAs) and economic partnership agreements (EPAs) as a result of prolonged discussions over multilateral trade liberalization and facilitation among WTO members in the Doha Development Round. In addition, the evolution of transportation and communication technologies has led to rapid economic globalization and accelerated free movement of human resources, goods, capital, and information across borders. In the meantime, as worldwide price competition has intensified, manufacturing firms have accelerated international specialization in the production of goods through the fragmentation of production processes at locations that provide conditions stable to the nature of the fragmented production processes in order to minimize production costs.

1 Introduction

The GATT-WTO (General Agreement on Tariffs and Trade – World Trade Organization) system has promoted and fostered multilateral trade liberalization. However, recently, developed countries in Europe and developing countries in East Asia have entered into bilateral free trade agreements (FTAs) and economic partnership agreements (EPAs) as a result of prolonged discussions over multilateral trade liberalization and facilitation among WTO members in the Doha Development Round. In addition, the evolution of transportation and communication technologies has led to rapid economic globalization and accelerated free movement of human resources, goods, capital, and information across borders.

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In the meantime, as worldwide price competition has intensified, manufacturing firms have accelerated international specialization in the production of goods through the fragmentation of production processes in locations that provide conditions stable to the nature of the fragmented production processes in order to minimize production costs.

This chapter examines the current status of the establishment of East Asian supply chains with statistical data on trade and investment activities of Japanese-affiliated manufacturers.

2 The Trade Structure of East Asia

First, we examine the trade structure of East Asia[1] from 1990 to 2010 with statistical data released by the Research Institute of Economy, Trade & Industry–Trade Industry Database (RIETI-TID) for 2012.

Although incidents such as the Asian currency crisis, the collapse of the dotcom bubble in the USA, and the bankruptcy of Lehman Brothers caused a temporary decrease in the trade value in East Asia, the pace of growth in the East Asian trade value, which increased from US$1,349.7 billion in 1990 to US$8,005.8 billion in 2010, was faster than that of the world trade value.[2] While the trade value of Japan also increased from US$527.3 billion to US$1,428.8 billion during the same period, China, the recent rapid economic growth rate of which led to it being referred to as "the world's factory" and a "world's consumer market" after it joined the WTO in 2001, replaced Japan as the largest trading country in East Asia. China has expanded merchandise trade with Japan, ASEAN4[3] and NIEs3.[4] In fact, these countries have become an engine of growth in regional trade, with their total trade value accounting for 91.7 % of the regional trade value in 2010.

Furthermore, types of traded goods and the transaction structure changed from 1990 to 2010. With respect to the merchandise trade in East Asia, trade values of industrial goods such as intermediate and final goods increased more than those of raw materials and the value of intermediate goods imported from both inside and outside East Asia, and the value of final goods exported to outside the region increased. Such an increase in the trade value of intermediate goods in East Asia clearly indicates that trade transactions were booming between manufacturing firms within the region.

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[1] In this section and Sect. 4 below, East Asia is defined as the area classified in RIETI-TID 2012, excluding India.

[2] Since statistical data of RIETI-TID 2012 is worked out on 'Cost, Insurance and Freight (CIF) prices, the world trade value tends to be larger than that of other foreign trade statistics.

[3] In this chapter, ASEAN4 is defined as the region that consists of Indonesia, Malaysia, Philippines, and Thailand.

[4] In this section and Sect. 4 below, NIEs3 is defined as the region that consists of Hong Kong, Korea, and Taiwan.

The trade structure of Japan also changed from 1990 to 2010. China replaced NIEs3 and ASEAN4 as the largest trading partner for exports and imports of Japan, respectively. Among the major Japanese manufacturing industries, such as textile products, chemical products, general machinery, electrical machinery, home electronics appliances, transportation equipment, and precision machinery, the biggest export industry is electrical machinery, followed by general machinery and chemical products. Electrical machinery is the largest import industry, followed by general machinery, textile products, and chemical products. In addition, in terms of the production process, the value of intermediate goods exported to East Asia is the largest, with their export ratio accounting for 69.2 % in 2010. Although there are no obvious trends in the largest import value goods imported from East Asia during the period, the import ratio of intermediate goods was at its highest in 2010, accounting for 48.1 % of total imports. On the other hand, the import ratio of final goods accounted for 44.8 % in 2010, and both export and import ratios of raw materials were very low.

In conclusion, international specialization has developed in industries such as electrical machinery, chemical products, and general machinery, mainly among Japan, China, ASEAN4 and NIEs3.

3   The Activities of Japanese-Affiliated Manufacturing Firms in East Asia

In this section, we examine sales and procurement activities of Japanese-affiliated manufacturing firms in East Asia[5] with statistical data released by the Ministry of Economy, Trade and Industry METI (2003–12).

Despite the negative impact from the bankruptcy of Lehman Brothers on the sales value of Japanese-affiliated manufacturing firms in East Asia, it increased from JPY19,410.4 billion in fiscal year 2000 to JPY47,204.4 billion in fiscal year 2010. Similarly, the procurement value increased from JPY14,262.2 billion to JPY34,048.5 billion. Above all, the sales ratio of Japanese-affiliated manufacturing firms in China rapidly increased from 14.7 to 39.3 % and their procurement ratio also increased from 13.2 to 36.1 % during the same period, respectively.

We also examine sales destinations and procurement sources of Japanese-affiliated manufacturing firms by categorizing them into local countries or regions, Japan, and third countries. As a result, we found that both local sales and procurement ratios are relatively high. In particular, both local sales and procurement ratios of transportation equipment have increased in ASEAN4 and China as Japanese-affiliated manufacturing firms in the region have increased their foreign direct

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[5] In this section, East Asia is defined as the area classified in METI (2003–12), excluding India when examining sales, and, as data are limited, when examining procurement, East Asia is defined as the area classified in METI (2003–12).

investments as a result of tariff reductions in the ASEAN Free Trade Area (AFTA), the open market policy adopted by the Chinese government and so on. On the other hand, both local sales and procurement ratios of electrical machinery and the chemical products have increased in NIEs3.[6]

In terms of the sales ratio to Japan and the procurement ratio from Japan of Japanese-affiliated manufacturing firms in those countries and regions, the ratios for electrical machinery are relatively high as a whole, with a few exceptions, which is consistent with the result of the examination in Sect. 2 above. However, they have been declining, while the aforementioned local sales and procurement ratios have increased. The examination in this section denotes that the increase in trade value with local manufacturing firms, which are non- Japanese affiliates, is why export and import ratios of general machinery and chemical products are relatively high, as shown in Sect. 2 above.

Finally, as far as the sales ratio to, and the procurement ratio from, third countries of Japanese-affiliated manufacturing firms in those countries and regions are concerned, the ratios for electrical machinery are relatively high, as a whole, with a few exceptions, although they have been declining.

The examination in this section implies that industrial clusters (See Krugman 1991) have successfully developed in industrial sectors such as transportation equipment and electrical machinery, mainly in Japan, China, ASEAN4 and NIEs3, while fragmentation of the production process (See Jones and Kierzkowski 2000; Pontes and Parr 2004, 2005; Ishikawa 2009) has accelerated among them.

4 Intra-Industry Specializations of Japanese Manufacturing Firms in East Asia

In order to analyze intra-industry specializations of Japanese manufacturing firms, we first examine their comparative advantages by industry with the trade specialization coefficients every 3 years during 1990–2010 (seven periods in total).

In the process of the flying geese pattern development in NIEs3, ASEAN4, and China during the period, manufacturing firms in those countries and regions gradually strengthened their international competitiveness in such industrial areas as chemical products, general machinery, electrical machinery, transportation equipment, and precision machinery, in which Japanese manufacturing firms previously had a huge comparative advantage. Figure 4.1 shows that the comparative advantage of Japanese manufacturing firms has weakened as a whole.[7,8] In other

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[6] In this section, NIEs3 is defined as the region that consists of Korea, Singapore, and Taiwan.

[7] See Jones (1971), Ohlin (1967), Ricardo (1914), and Smith (1947) on international specialization based on traditional trade theories.

[8] See Akamatsu (1962), Hirsch (1967), Posner (1961), and Vernon (1966) on international specialization based on new trade theories such as the flying geese pattern model.
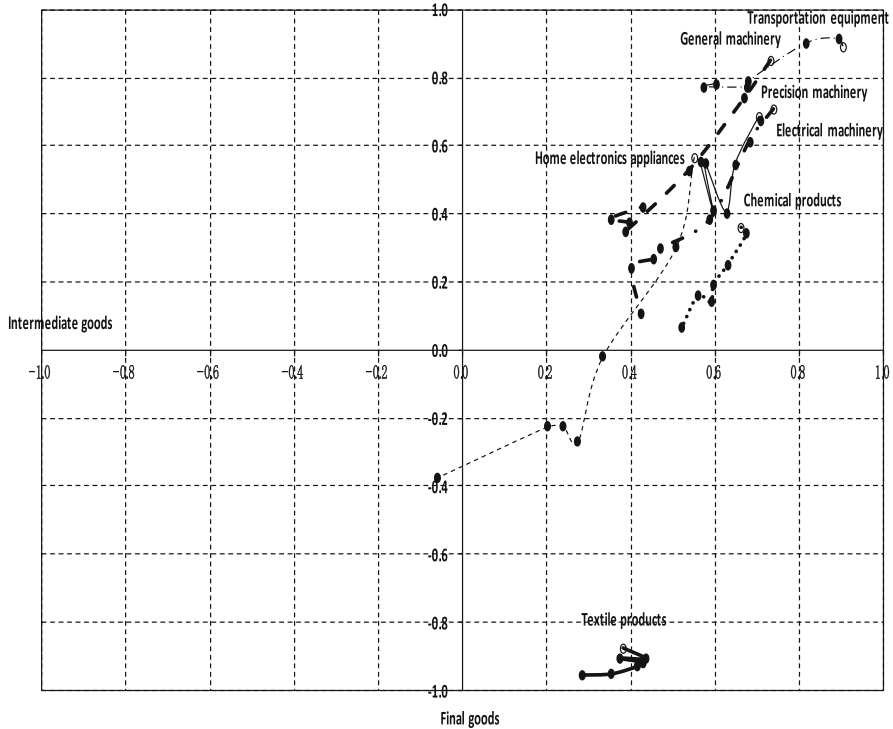
Fig. 4.1 Changes in trade specialization coefficients of Japan's major industries in East Asia. Source: RIETI-TID 2012. Note 1: East Asia is defined as the area classified in RIETI-TID 2012, excluding India. Note 2: The *dots* show trade specialization coefficients of different industries in periods from 1990 to 2010. The coefficients in the first period (1990–1992) are shown as *dots* that are not completely black

words, Japanese manufacturing firms have strengthened comparative advantage through their foreign direct investments that have promoted fragmentation of their production processes and developed industrial clusters.

Similarly, we examine time–series changes in intra-industry specialization with the Grubel-Lloyd index between Japan and China, Thailand (from ASEAN4) and Korea (from NIEs3) by different industries.[9]

Figure 4.2 shows that intra-industry specialization of both intermediate and final goods of chemical products, general machinery, and electrical machinery had developed between Japan and China. Intra-industry specialization of the intermediate goods of textile products and home electronics appliances also progressed.[10]

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[9] See Grubel and Lloyd (1975) for the measurement method of intra-industry specialization.

[10] In this analysis, the degree of intra-industry specialization was assumed to be relatively high if the Grubel-Lloyd index is at least 0.5 or larger.
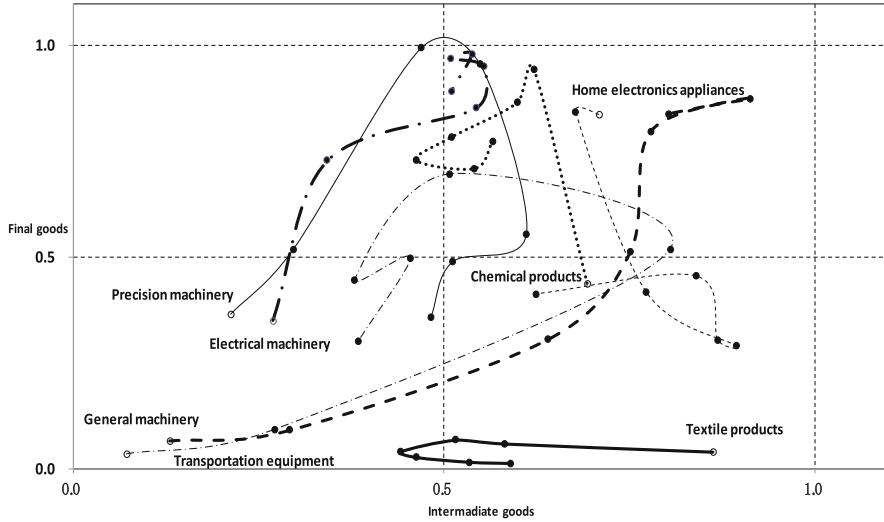
Fig. 4.2 Changes in the Grubel–Lloyd index related to goods trade between Japan and China. Source: RITI-TID 2012. Note 2: The *dots* show trade specialization coefficients of different industries in periods from 1990 to 2010. The coefficients in the first period (1990–1992) are shown as *dots* that are not completely black

Similarly, Fig. 4.3 shows that intra-industry specialization of both the intermediate and the final goods of chemical products, electrical machinery, and precision machinery advanced between Japan and Thailand. Intra-industry specialization of intermediate goods for textile goods and that of final goods for general machinery and transportation equipment also developed.

Furthermore, Fig. 4.4 shows that intra-industry specialization of intermediate and final goods for electrical machinery and home electronics appliances developed between Japan and Korea. Intra-industry specialization of intermediate goods for textile goods, general machinery, and transportation equipment and that of the final goods for chemical products and precision machinery also advanced.

In conclusion, supply chains have expanded among Japanese manufacturing firms, both Japanese-affiliated firms and local firms in East Asia. At the same time, with regard to industries such as electrical machinery, in which Japanese manufacturing firms have already strengthened intra-industry specialization in East Asia, the current complementary relationship among countries and areas in East Asia may change to a competitive relationship if factor endowments in those countries and areas become similar, affecting the formation of supply chains in East Asia.[11]

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[11] See Helpman and Krugman (1985) on intra-industry specialization theory based on economy of scale and product differentiation.
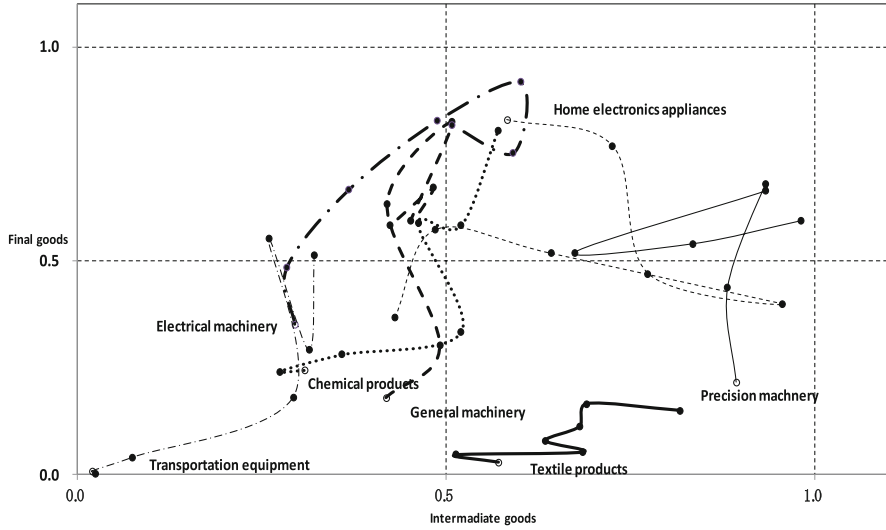
Fig. 4.3 Changes in the Grubel–Lloyd index related to goods traded between Japan and Thailand. Source: RIETI-TID 2012. Note 2: The *dots* show trade specialization coefficients of different industries in periods from 1990 to 2010. The coefficients in the first period (1990–1992) are shown as *dots* that are not completely black
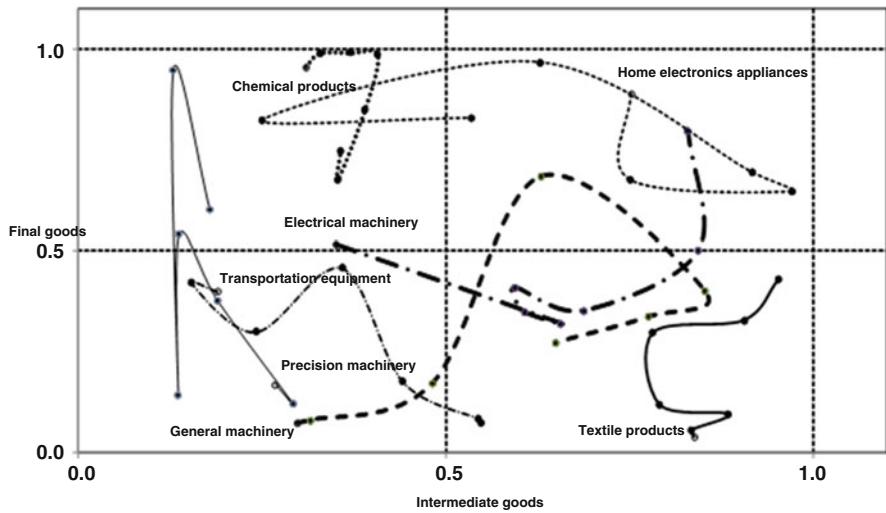
Fig. 4.4 Changes in the Grubel–Lloyd index related to goods traded between Japan and Korea. Source: RIETI-TID 2012. Note 2: The *dots* show trade specialization coefficients of different industries in periods from 1990 to 2010. The coefficients in the first period (1990–1992) are shown as *dots* that are not completely black

5 Conclusions

In this chapter, we focused on East Asia and examined the current situation of supply chains developed by Japanese manufacturing firms with statistical data of the trade structure of East Asia from 1990 to 2010 and those of sales and procurement activities of Japanese-affiliated manufacturing firms in East Asia from fiscal year 2000 to fiscal year 2010, respectively.

While the trade value in East Asia increased at a greater pace than the world trade value from 1990 to 2010, China increased its trade value with Japan, ASEAN4, and NIEs3 and replaced Japan as the largest trading country in East Asia. In addition, traded goods and their transaction structure also changed during the same period. More specifically, trade values of industrial goods such as intermediate and final goods increased more than those of raw materials, and the value of intermediate goods imported from both inside and outside East Asia and the value of final goods exported to regions outside East Asia increased.

Furthermore, the trade structure of Japan also changed from 1990 to 2010. China replaced NIEs3 and ASEAN4 as the largest export and import partner of Japan, respectively. The largest export industry is electrical machinery, followed by general machinery and chemical products. Electrical machinery is also the largest import industry, followed by general machinery, textile products, and chemical products. On the other hand, in terms of the production process, the export value of intermediate goods to East Asia is the largest. In contrast, there are no obvious trends in the largest import value goods from East Asia, although the import ratio of intermediate goods has risen recently.

Behind the change in trade structure of East Asia and Japan stated above, manufacturing firms, including those from Japan, have developed intra-industry specialization in East Asia through their direct investments as both sales and procurement values of Japanese-affiliated manufacturing firms mainly in China, ASEAN4 and NIEs3 have increased. In particular, both local sales and procurement ratios of Japanese-affiliated manufacturing firms are relatively high. Taking advantages of tariff reductions in the AFTA and the open market policy adopted by the Chinese government, both local sales and procurement ratios of transportation equipment of Japanese-affiliated manufacturing firms have increased in ASEAN4 and China. On the other hand, both local sales and procurement ratios of electrical machinery and chemical products of those in NIEs3 have increased.

With regard to the sales ratio to Japan and the procurement ratio from Japan of Japanese-affiliated manufacturing firms, those ratios of electrical machinery are relatively high as a whole, with a few exceptions. Although they have been declining, the aforementioned local sales and procurement ratios have increased. And with regard to the sales ratio to third countries and the procurement ratio from third countries of Japanese-affiliated manufacturing firms, those ratios of electrical machinery are also relatively high as a whole, with a few exceptions, although they have been declining.

In the process of the development of the flying geese pattern in NIEs3, ASEAN4, and China during the period, manufacturing firms in those countries and regions gradually strengthened their international competitiveness in industrial areas such as chemical products, general machinery, electrical machinery, transportation equipment, and precision machinery where Japanese manufacturing firms used to have comparatively dominant advantages. In other words, Japanese manufacturing firms have strengthened their comparative advantages through their foreign direct investments to promote the fragmentation of their production processes and to realize clusters of industries. For example, intra-industry specialization of both intermediate and final goods of chemical products, general machinery, and electrical machinery have developed between Japan and China. Similarly, intra-industry specialization of intermediate goods for textile products and home electronics appliances also progressed. Between Japan and Thailand, intra-industry specialization of both intermediate and final goods for chemical products, electrical machinery, and precision machinery advanced. Intra-industry specialization of intermediate goods for textile goods and that of final goods for general machinery and transportation equipment also developed. In addition, intra-industry specialization between Japan and Korea of intermediate and final goods for electrical machinery and home electronics appliances developed, and intra-industry specialization of intermediate goods for textile goods, general machinery, and transportation equipment and that of final goods for chemical products and precision machinery advanced.

In conclusion, supply chains have expanded among Japanese manufacturing firms, both Japanese-affiliated firms and local firms in East Asia. However, if factor endowments in those countries and areas in East Asia become similar, the current complementary relationship among those countries and areas may become competitive, which will affect the formation of supply chains in East Asia.

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Part II
New Location Factors in Global Economy

Chapter 5
Effects of Corporation Tax Rates on Factory Locations Through the Function of the Transfer Price

Toshiharu Ishikawa

Abstract In the globalized economy, a firm that is planning to establish a new factory must pay attention to new factors that were not previously recognized as a location factor: corporation tax and interest rates. In addition, a firm comes to consider a new function that works between factories located in different countries, the function of the transfer price of the intermediate goods. Taking corporation tax rates and the transfer price into consideration, this chapter explains how a firm determines a new factory's location in a large geographical area. In the explanation, some chaotic phenomena are used, and the usefulness of the phenomenon in a firm's location selections is clarified..

Keywords Transfer price • Corporation tax rate • Factory's location • Chaotic phenomenon • Location prospective area

1 Introduction

In the highly globalized economy, manufacturing firms are exposed to severe price competition. To cope with this, many firms fragment production processes into blocs and distribute the fragmented blocs internationally to reduce production costs. When a firm organizes production activity internationally, it determines the optimum location of the factory by considering factors that were previously not considered. Since the geographical area of a firm's production activity is large enough to include several countries, the location is not decided promptly but instead is determined step by step: in the early stage of the location-decision process, corporation tax rates and interest rates of the countries play an important role. In addition, the transfer price of the intermediate goods becomes an issue.[1] This

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[1] Bond ([1980](#)), Eden ([1985](#)), Hirshleifer ([1956](#)), and Zhao ([2000](#)) analyze the roles of the transfer pricing system in firms' activity and international trade.

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chapter shows how a firm determines the optimum location for a factory, giving consideration to corporation tax rates and the function of the transfer price.

2 A Function of the Transfer Price in the Movement of Intermediate Goods

2.1 Increasing a Firms' Production Activity

Rapid economic expansion during the latter half of the twentieth century brought about significant transformation in production systems. This transformation has significantly changed the spatial distribution of production activities. To reduce production costs, many manufacturing firms fragment their production processes and assign some fragmented production processes to appropriate locations across the globe: if production processes are divided into small blocs, a factory in charge of part of the process becomes smaller. Therefore, a factory can be moved a long distance across borders to a location that provides production conditions suitable for the factory. As a result, firms establish a wide production system that consists of factories scattered over a large geographical area.

Once a factory is established at a site and the production activity starts, a firm cannot easily relocate it to another site. The location of the factory continues to influence a firm's production activity as a whole for a long time. The location decision is always an important management task for a firm. Therefore, when a firm plans to build a new factory, management carefully seek prospective sites over a large geographical area by analyzing fundamental location factors and the relationships between the nature of the factory and the characteristics of feasible locations.

Previously, a firm's production activity was effectively confined to a country or a small area. Given this, it did not take long for a firm to find an agreeable location for a new factory, as the area being searched was homogeneous in terms of social and economic conditions and the firm had enough knowledge and information about prospective sites. Hence, to determine a factory's optimum location, a firm would, without incurring substantial costs, analyze fundamental factors such as transportation costs, labor costs, and agglomeration economies, which Weber (1909) defined as general location factors. In this situation, corporation tax rates and interest rates were not general location factors.

These days, as mentioned above, a firm searches for prospective sites for its factory in a large geographical area that may cover different countries and many regions. Correspondingly, the way in which an optimum location is determined has changed. Economic characteristics differ in each region, and there are differences in legal and commerce institutions regarding corporation tax rates, interest rates, transfer pricing tax systems, and custom duties. Since these differences affect the performance of a factory in different ways, a firm needs to identify the differences between countries and regions, and then estimate their influences on the firm. In this
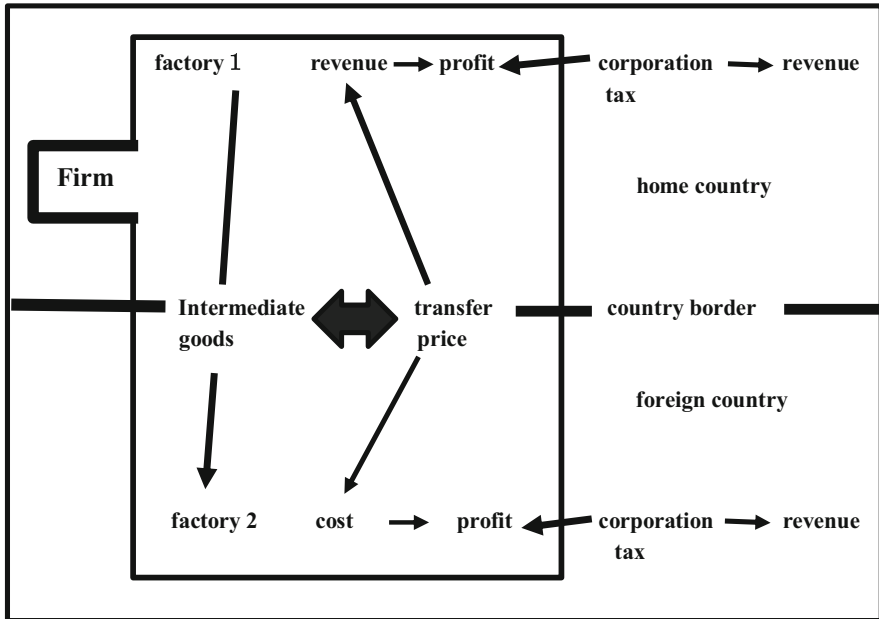
Fig. 5.1 The role of the transfer price in the movement of intermediate goods

situation, they become important location factors. Hence, a firm cannot determine the optimum location quickly; it must take a series of steps to decide on a location. The first step is to set up a search in a prospective location range. The second step is the selection of a country or region in that prospective range. As a result, it may take a relatively long time to decide on a factory's location these days. In the following subsection, the function of the transfer price of intermediate goods will be considered.

2.2 A Basic Function of the Transfer Price in a Firm's Production Activity

Let us consider a role of the transfer price in the movement of intermediate goods between factories belonging to a multinational firm. Suppose a firm produces final goods in two production processes: the first process and the second process. As illustrated in Fig. 5.1, factory 1, which is assigned to the first production process, manufactures intermediate goods in the home country. The intermediate goods are transported from factory 1 to factory 2, located in the foreign country, using the transfer price, and factory 2 composes the final goods using the intermediate goods. Factory 2 sells them in the foreign country.

By using the transfer price of the intermediate goods, the revenue and profit of factory 1, which arises from selling the intermediate goods to factory 2, are derived. Similarly, the cost and profit of factory 2, which arises with the purchase of the intermediate goods, are also derived by the transfer price. The firm managing these two factories can measure each factory's profit and estimate its contribution to the firm's profits. The home and the foreign country charge corporation tax on the profits of factory 1 and 2, and this can be collected by the taxation authority with the transfer price. The role of the transfer price is crucial for both the firm's production management and the government's financial manoeuvres.

3   Derivation of the Profit Function of Firm

3.1   Assumptions and Framework

The following assumptions and framework are used for the analysis. A firm produces final goods via two processes; the first is conducted by factory 1, and the second is conducted by factory 2. Factory 1 manufactures intermediate goods, mq, in the home country. The intermediate goods are transported by the transfer price, mp, to factory 2, which is located in a marketplace in a foreign country. Factory 2 uses one unit of the intermediate goods to produce one unit of final goods.

Factory 1 decides the transfer price of the intermediate goods to maximize the firm's profit. Factory 2 sells the finished goods at price p to the market, and it determines the supply quantity of the final goods to maximize its own profit. Factory 2 monopolizes the final goods market.

Now, factory 1 uses two kinds of materials, m_1, m_2, to produce the intermediate goods. The factory also uses lubricating oil, m_3, to operate machines. The materials m_1, m_2, and oil m_3 are produced at points M_1, M_2, and M_3, which are identified by the coordinates (x_1, y_1), (x_2, y_2), and (x_3, y_3), respectively. The materials are transported to factory 1 at point L, indicated by (x, y). Freight rates of materials m_1, m_2 are denoted by t_m, and the rate for the oil m_3 is t_e. Mill prices of the items are given by p_1, p_2, and p_3. The intermediate goods are transported to factory 2, which is located at the market of point $M_4(x_4, y_4)$. The freight rate of the intermediate goods is t_g. Figure 5.2 illustrates the location figure.

While the home country has a large geographical area, the foreign country is assumed to be a city. The country to which it belongs is shown by the black square in Fig. 5.2. The corporation tax rates of the home and the foreign country are shown by t and t^*, respectively.

Fig. 5.2 Location figure
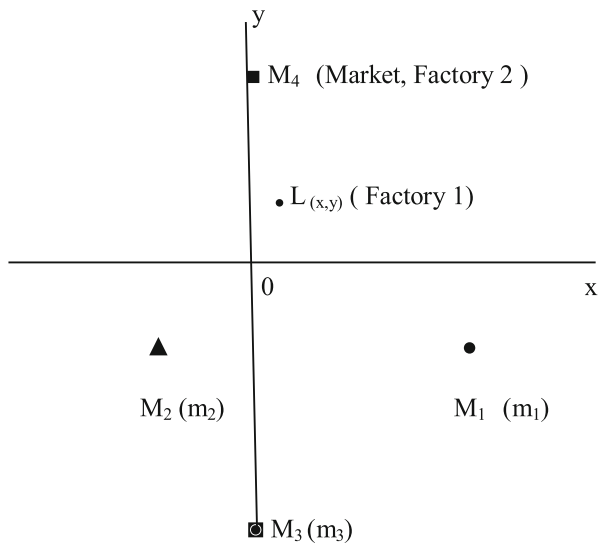
3.2   Derivation of the Profit Function of Factory 1

The profits of factory 1 are given by Eq. 5.1

$$Y_1 = (1 - t)[m p^* mq - C(mq) - F_1] \tag{5.1}$$

The production function of factory 1 is assumed as in Eq. 5.2,

$$mq = A m_1^\alpha m_2^\beta \tag{5.2}$$

where A, α, and β are parameters and are defined as $A > 0$, $0 < (\alpha + \beta) < 1$.

The distances between the material places, M_i $(i = 1, 2, 3)$ and factory 1 are represented by d_1, d_2, and d_3, respectively. The distance between the two factories is given by d_4,

$$d_1 = \left((x - x_1)^2 + (y + y_1)^2 \right)^{0.5} \tag{5.3a}$$

$$d_2 = \left((x - x_2)^2 + (y + y_2)^2 \right)^{0.5} \tag{5.3b}$$

$$d_3 = \left(x^2 + (y + y_3)^2 \right)^{0.5} \tag{5.3c}$$

$$d_4 = \left(x^2 + (y - y_4)^2 \right)^{0.5} \tag{5.3d}$$

Thus, the delivered prices, Pi $(i = 1, 2, 3)$, of the two materials and the lubricating oil at the location site of factory 1 are shown by Eqs. 5.4a and 5.4b, respectively.

$$P_i = p_i + t_m d_i$$
$$(i = 1, 2)$$

(5.4a)

$$P_3 = p_3 + t_e d_3$$

(5.4b)

The price of the intermediate goods at factory 2, DP, which is needed to calculate the revenue of factory 1 is represented by Eq. 5.4c,

$$DP = mp - t_g d_4$$

(5.4c)

Now, making use of the law of equi-marginal productivity, that is, the ratio between the productivities of the two intermediate goods should be equal to the ratio between the delivered prices of them, quantities of these materials are derived as in Eqs. 5.5a and 5.5b (for simplicity, α and β are assumed as $\alpha = \beta = 0.4$).

$$m_1 = A^{-1.25} mq^{1.25} ((p_2 + t_m d_2)/(p_1 + t_m d_1))^{0.5}$$

(5.5a)

$$m_2 = A^{-1.25} mq^{1.25} ((p_1 + t_m d_1)/(p_2 + t_m d_2))^{0.5}$$

(5.5b)

The quantity of oil, m_3, is given by a linear function of amount of the final goods as in Eq. 5.5c,

$$m_3 = mq$$

(5.5c)

From the above equations, the cost function $C(qm)$ is obtained as Eq. 5.6.

$$C(mq) = 2A^{-1.25} mq^{1.25} (p_1 + t_m d_1)^{0.5} (p_2 + t_m d_2)^{0.5} + mq(p_3 + t_e d_3) + F_1$$

(5.6)

The profit function of the factory 1 can be rewritten as Eq. 5.7,

$$Y_1 = (1 - t) \left[mq((mp - t_g d_4) - (p_3 + t_e d_3)) \\ -2mq^{1.25} A^{-1.25} (p_1 + t_m d_1)^{0.5} (p_2 + t_m d_2)^{0.5}, -F_1 \right]$$

(5.7)

3.3   The Profit Functions of Factory 2 and the Firm

Let us derive the profit of factory 2 under the following assumptions: the reverse market demand function is represented by Eq. 5.8,

$$p = a - vQ$$

(5.8)

where a is the maximum reservation price and v is parameter. For simplicity, a and v are assumed to be 600 and 1, respectively. If the cost of composing the intermediate goods to finished goods is represented by $C(Q)$ and the fixed cost of factory 2 is represented by F_2, the profit of factory 2, Y_2, is represented by Eq. 5.9,

$$Y_2 = (1 - t^*)[pQ - mp^*mq - C(Q) - F_2] \qquad (5.9)$$

Suppose that the composing cost $C(Q)$ is given by Eq. 5.10,

$$C(Q) = b \ Q(g + Q)^2/h \qquad (5.10)$$

where parameters b, g, and h are assumed to be 1.5, 2, and 200 for the simplicity of the calculation, respectively.

Since factory 2 uses one unit of the intermediate goods to produce one unit of final goods, mq can be replaced by Q. The profit function of factory 2 is rewritten as Eq. 5.11,

$$Y_2 = (1 - t^*)\left[(p - mp)Q - 1.5 \ Q(2 + Q)^2/200 - F_2\right] \qquad (5.11)$$

Using Eqs. 5.8 and 5.11, the optimal quantity supplied at the market to maximize the profit of factory 2 can be obtained as in Eq. 5.12,

$$Q = 0.22\left(-206 + (582409 - 900mp)^{0.5}\right) \qquad (5.12)$$

As the supply quantity Q is a function of the transfer price, mp, then the profit of factory 2 is also represented as a function of the transfer price as in Eq. 5.13,

$$Y_2 = (1 - t^*)\left[\left(600 - \left(0.22\left(-206 + (582409 - 900mp)^{0.5}\right)\right) - mp\right)\right.$$
$$\left.\left(0.22\left(-206 + (582409 - 900mp)^{0.5}\right) - F_2\right]. \qquad (5.13)$$

Eventually, summing up the profits of factory 1 and 2, the firm's profits, Y, can be obtained as in Eq. 5.14. The firm's profit is a function of the transfer price, mp, and the location site, (x, y), of factory 1.

$$Y = (1 - t)\left[\left(0.22\left(-206 + (582409 - 900mp)^{0.5}\right)\right)(mp - t_g d_4)\right.$$
$$- (p_3 + t_e d_3)) - 2\left(0.22\left(-206 + (582409 - 900mp)^{0.5}\right)\right)^{1.25}$$
$$A^{-1.25}(p_1 + t_m d_1)^{0.5}(p_2 + t_m d_2)^{0.5} - F_1\right] + (1 - t^*)$$
$$\left[\left(600 - \left(0.22\left(-206 + (582409 - 900mp)^{0.5}\right)\right) - mp\right)\right.$$
$$\left(0.22\left(-206 + (582409 - 900mp)^{0.5}\right)\right) - F_2\right]. \qquad (5.14)$$

4   Derivation of the Optimal Transfer Price and Factory Location

Let us derive the transfer price and the location (X, Y) of factory 1 using Eq. 5.14. To derive them, the gradient dynamic, which is elucidated by Puu (1998), is used.[2] This method is explained as follows: first, an initial value set is given to x_n, y_n, and mp_n in Eqs. 5.15a, 5.15b, and 5.15c as a temporal solution, and obtain the values of x_{n+1}, y_{n+1}, and mp_{n+1} by calculations indicated by Eqs. 5.15a, 5.15b, and 5.15c. The same calculation is iterated until a given tentative solution can be judged as the solution. If the values of $(x_{n+1}, y_{n+1}, mp_{n+1})$ in Eqs. 5.15a, 5.15b, and 5.15c become approximately the same as those of (x_n, y_n, mp_n), the values can be admitted as the solution.

$$x_{n+1} = x_n + j * \partial Y / \partial x, \tag{5.15a}$$

$$y_{n+1} = y_n + j * \partial Y / \partial y, \tag{5.15b}$$

$$mp_{n+1} = mp_n + j * \partial Y / \partial mp \tag{5.15c}$$

where j is the width of a step and n shows the number of the calculation. The equations of $\partial Y / \partial x$, $\partial Y / \partial y$, and $\partial Y / \partial mp$ are shown in the Appendix. The corporation tax rates are assumed to be the same in the home country and in the foreign country, $t = t^* = 0.82$. Values of other parameters are assumed as follows: $(x_1 = 3,\ y_1 = -0.5)$, $(x_2 = -3^{0.5},\ y_2 = -0.5)$, $(x_3 = 0,\ y_3 = -1.5)$, $(x_4 = 0,\ y_4 = 1)$, $A = 1$, $p_1 = 0.25$, $p_2 = 2$, $p_3 = 0.2$, $t_m = 0.11$, $t_e = 0.01$, $t_g = 0.225$, $F_1 = 5,000$, $F_2 = 2,500$, $j = 0.0018$.

The results obtained by gradient dynamics using Eqs. 5.15a, 5.15b, and 5.15c are shown by Fig. 5.3. Figure 5.3 indicates that the optimal transfer price is 442, while the optimal location of factory 1 is not clearly specified since a chaotic phenomenon appears.[3]

Although the firm cannot specify the best location site, it can determine the prospective spatial range for the factory's location because a chaotic phenomenon appears around the optimal location site. The chaotic phenomenon provides the firm with important information: the spatial area indicates the prospective area for the location of factory 1.

It is concluded that the firm cannot identify the optimal location of the factory in the first step of the location determination process. What the firm can do in the first step is set up a prospective location area. The significance of this area is explained in subsection 5.

---

[2] Ishikawa (2009) analyzes the firm's location in the three detentions by using chaotic phenomena.

[3] The phenomenon shown in Fig. 5.2 is a chaos or a result of Cauchy Convergence occurring in the calculation. The issue to identify this phenomenon is not discussed here because this problem does not affect the logical development in this article.
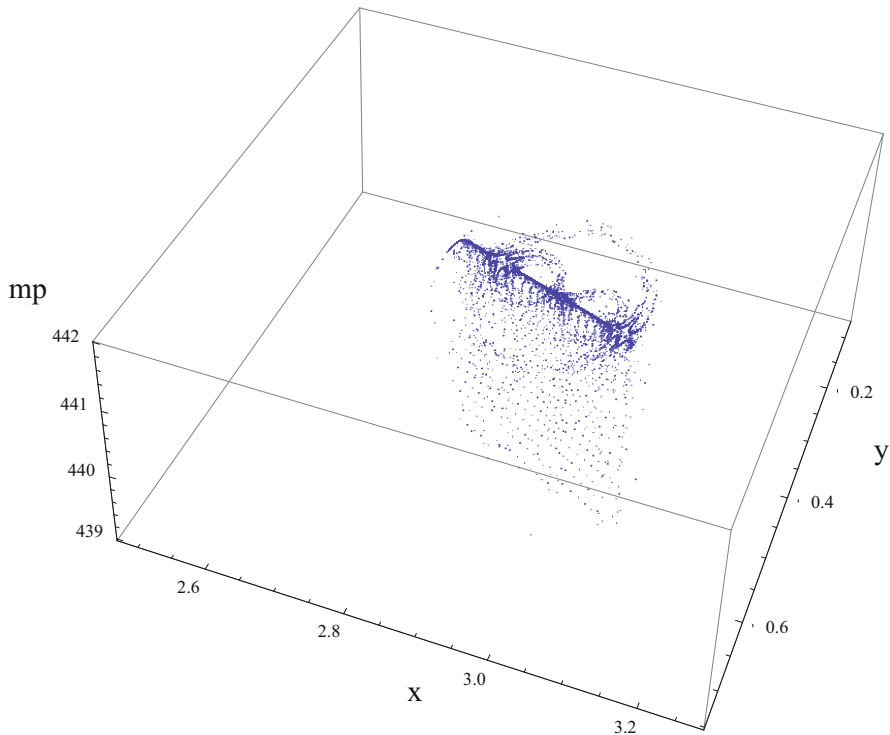
Fig. 5.3 The optimal transfer price and the prospective location area

If the firm locates factory 1 at point M_1 and the transfer price is 442, the price and the firm's profits are derived in order. They are shown in the first row of Table 5.1. Tax revenue of each country is indicated in the same row.

Then, suppose that the corporation tax rates of the two countries are decreased to 0.27, $t = t^* = 0.27$. The same techniques can be applied to derive the location of factory 1 and the firm's profits. A prospective location area appears at the same location that is shown Fig. 5.3; the prospective location area becomes larger. This means that the firm has wider options in the determination of the factor's location. The transfer price is the same. The firm's profits and the tax revenues of the two countries are shown in the second row in Table 5.1. As shown in Table 5.1, they become different values as the tax rates differ.

Table 5.1 Profits and tax revenues by reduction of tax rates

	$t = t* = 0.82$	$t = t* = 0.27$
LPA	Near M_1	Near M_1
Transfer price	442	442
Price	551	551
Quantity	49	49
Profits Y	3,308	13,417
Profits Y_1	2,969	12,040
Profits Y_2	339	1,377
Tax revenue T_1	13,525	4,453
Tax revenue T_2	1,544	509

5 Effects of the Change in the Corporation Tax Rate on Factory Location

5.1 High Corporation Tax Rate and Factory Location

Assuming that the freight rate of the intermediate goods is 0.725 and the tax rate of the foreign country is fixed at 0.82, let us analyze the effects of a change in the corporation tax rate of the home country. First, suppose that the tax rate of the home country is 0.7, which implies it is relatively high. In this case, a linear prospective location area is formed near point M_1 as shown Fig. 5.4.

5.2 Moderate Corporation Tax Rate and Factory Location

If the corporation tax rate of the home country is reduced to 0.61401, which implies a moderate level, a chaotic phenomenon appears from point M_1 to point M_4, the market place. The phenomenon is depicted by Fig. 5.5. The transfer price and profits of the firm are shown in the second row in Table 5.2.

As shown in Fig. 5.5, the firm can locate the factory in the wide range from point M_1 to M_4. This case could be considered as a footloose location because the difference in the levels of the two profits derived from the different locations of point M_1 and M_4 is only 10.

5.3 Low Corporation Tax Rate and Factory Location

When the corporation tax rate of the home country is reduced from 0.61401 to 0.6, which implies a relatively low level, a chaotic phenomenon appears around point M_4. The phenomenon is depicted in Fig. 5.6. The transfer price and the total profits of firm are shown in the third row in Table 5.2.
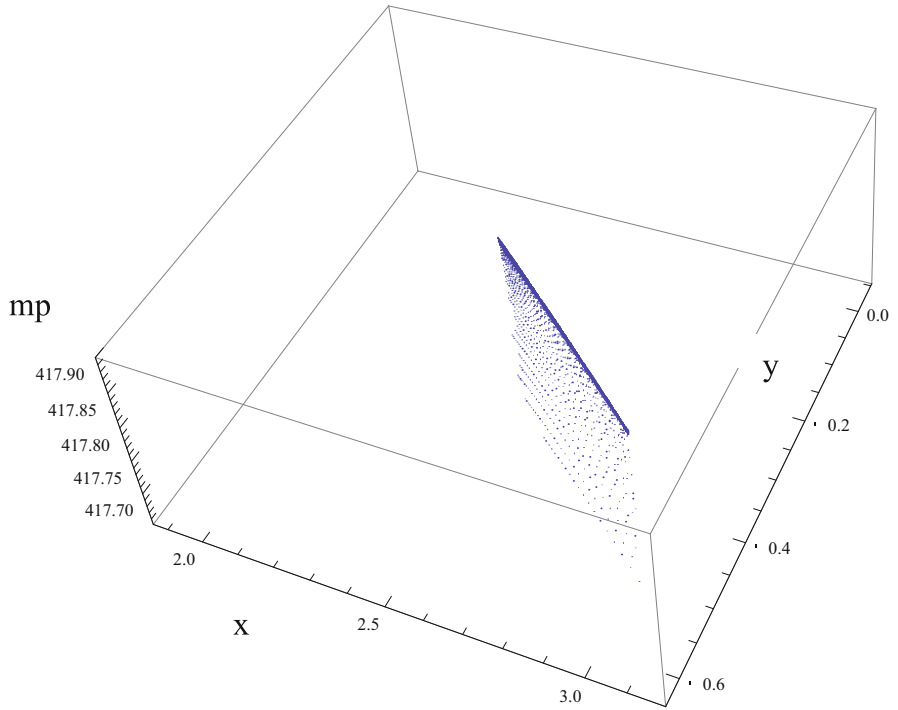
Fig. 5.4 A prospective location area around point M_1
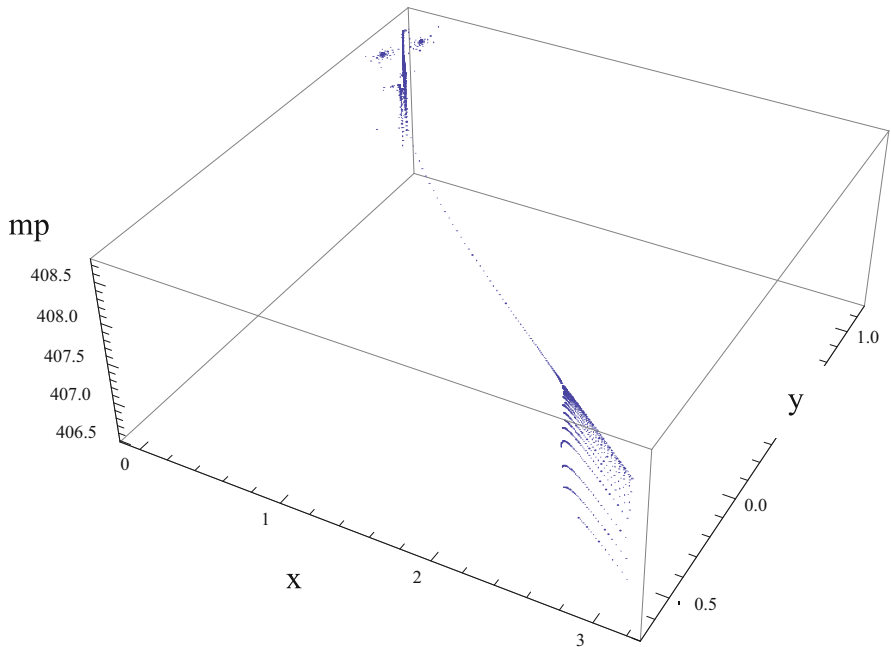
Fig. 5.5 A large prospective location area

Table 5.2 Effects of the tax rates on factory location and profits

	$t = 0.7, t^* = 0.82$	$t = 0.614, t^* = 0.82$		$t = 0.6, t^* = 0.82$
Location	Near M_1	Near $M_1 \sim$ near M_4		Near M_4
Transfer price	448	408	408	407
Profits	5,810	7,536	7,525	7,789
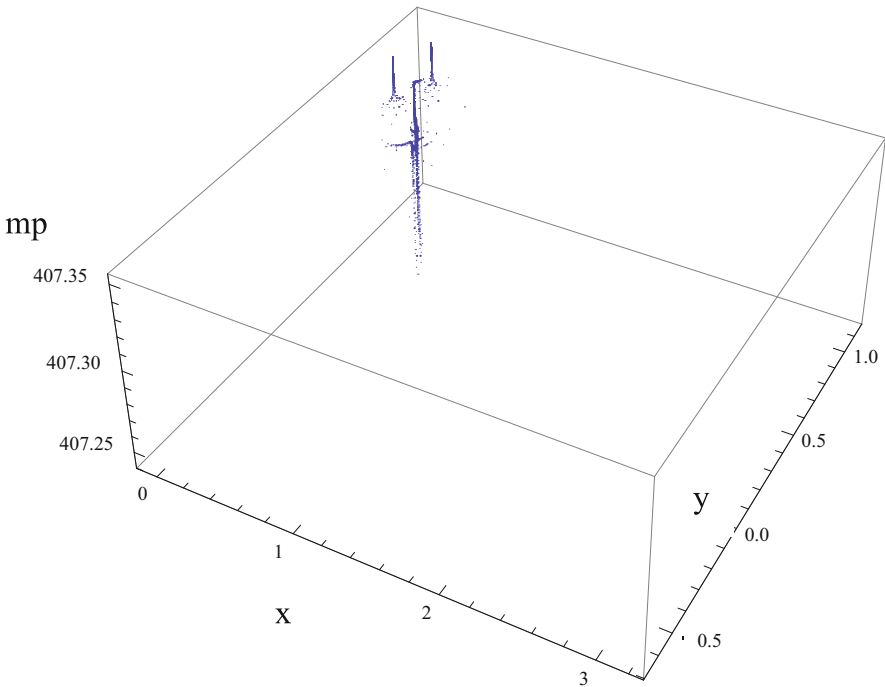
Fig. 5.6 Prospective location area around a market place

As shown in Fig. 5.6, a prospective location area is formed near point M_4, the market place. The firm locates factory 1 near the market place. Of course, since the tax rate of the foreign country is higher than that in the home country, factory 1 and 2 cannot form an agglomeration. At most, the two factories co-exist across the border. The firm's profits are shown in the third row of Table 5.2.

From the analysis, it can be said that the corporation tax rate has the power to change the factory's location. In those days, the corporation tax rates did not directly influence the factory's location. These days, the firm's production activities are conducted beyond countries' borders, so the tax rate influences not only the selection of a country but the determination of location within the selected country.

6   Location Factors in a Prospective Area and Determination Process

6.1   New Location Factors in a Location Prospective Area

It would not be realistic for many firms to aim only for maximum profits; they tend to achieve targeted profits. In this case, it is valid for firms in the early stage of the location determination processes to set up a prospective location area where the targeted profit is achieved. Chaotic phenomenon provides the firms with useful information in settling on the prospective location area.

The location meanings of the chaotic phenomenon as shown in the figures are explained from the viewpoint of the industrial location theory as follows: even if a firm identifies the optimal site for its factory, it may not establish it there for some reason. For instance, the site may have been occupied by another firm, or the land at the site is too weak to hold a factory. In these cases, the firm has to search for second-best sites around the optimal location. In the search for second-best places, chaotic phenomena can be used to squeeze the spatial range to be searched since the phenomenon appears around the optimal location point. The firm can discover second-best sites in a relatively short time. Chaotic phenomena could be useful to alleviating firms' location issues.

In addition, the concept of the prospective area introduces new location factors to firms: when a firm decides the factory's location in a prospective area indicated by a chaotic phenomenon, the firm may consider the location problem in a broader perspective. Aside from location factors that directly affect profit levels, the firm can incorporate various location factors, such as education, culture, safety, and welfare in a region, into its decision making. Considering the effects of these new factors within the prospective location area, the firm selects a country and a site for the factory in the prospective area.

6.2   Four Steps of the Firm's Decision Making in a Large Geographical Area

Based on the above analysis, it is considered that when a firm selects a factory's location in a large geographical area, the firm takes the following four steps to determine that location.

1. A firm initially identifies the spatial range where the factory should be located. Chaotic phenomenon can be used to settle a prospective area in which some countries are contained.
2. Within the prospective area, the firm selects a country from among the prospective countries. The firm deliberates the effects of corporation tax rates, transfer pricing tax, and the interest rates to choose a country.

3. After a country is chosen, the firm selects a region in the selected country. Various kinds of location factors are examined in the selection, such as economic organization, the number of educational facilities, and levels of security and medical care in each region within the country.
4. Finally, the firm determines a city within the selected region. The firm estimates practical factors such as the ease of obtaining land and landscape and so on.

These steps should be taken by every firm when determining a site for a factory within a large geographical area.

7 Concluding Remarks

When the activities of a firm expand, new mechanisms begin to work in the firm's production activity, and some economic elements begin to influence the location of the factory. The transfer price of intermediate goods begins to play an important role in goods transportation between a firm's factories that are located in different countries. The corporation tax rate, which is manipulated by the government, is taken into consideration. This article analyzes the effects of corporation tax rates on the location decision of a firm through the function of the transfer price.[4] This analysis shows that the corporation tax rate influences the spatial area in which the location of a factory is prospective and affects the transfer price of intermediate goods. Furthermore, the analysis shows that the corporation tax rate plays a part in the selection of the country by a manufacturer, and also plays a role in the determination of the factory's location site within the selected country.

Appendix: Equations Used in the Gradient Dynamics

The terms of $\partial Y / \partial x$, $\partial Y / \partial y$, and $\partial Y / \partial mp$ contained in Eqs. 5.15a, 5.15b, and 5.15c are shown by following Eqs. 5.A1, 5.A2, and 5.A3:

$$
\begin{aligned}
\partial Y / \partial x = 0.18 \Big[& -A^{-1.25} Q^{1.25} t_m \Big[\big\{ (p_2 + t_m d_2)^{0.5} / (p_1 + t_m d_1)^{0.5} \big\} (x - x_1)/d_1 \\
& + \big\{ (p_1 + t_m d_1)^{0.5} / (p_2 + t_m d_2)^{0.5} \big\} (x + x_2)/d_2 - t g x\, Q/d_4 \\
& + Q \big(-t_g(x/d_4) - t_e(x/d_3) \big) \Big] = 0
\end{aligned}
$$

$$(5.A1)$$

---

[4] The factory's location is affected by the interest rates as well as the corporation tax rates. A location power of the interest rates of countries has been clarified by Ishikawa (2014).

$$\partial Y/\partial y = 0.18\big[- A^{-1.25}Q^{1.25}t_m\big[\big\{(p_2 + t_md_2)^{0.5}/(p_1 + t_md_1)^{0.5}\big\}(y + y_1)/d_1$$
$$+ \big\{(p_1 + t_md_1)^{0.5}/(p_2 + t_md_2)^{0.5}\big\}(y + y_2)/d_2 - tg(y - 1)Q/d_4$$
$$+ Q\big(-t_g((y - y_4)/d_4) - t_e((y - y_3)/d_3)\big)\big] = 0$$

$$(5.A2)$$

$$\partial Y/\partial mp = 0.18\Big[\big(Q - 99mp/(582409 - 900mp)^{0.5}\big)$$
$$+ \big(99mp/(582409 - 900*mp)^{0.5}\big)t_g(x/d_4)$$
$$+ \big(99mp/(582409 - 900mp)^{0.5}\big)t_e(x/d_3))$$
$$+ 2.5*0.5A^{-1.25}(p_2 + t_md_2)^{0.5}(p_1 + t_md_1)^{0.5}Q)^{0.25}))$$
$$- 0.18\big[- Q - 99(600 - Q))/(582409 - 900*mp)^{0.5}$$
$$+ \big(0.7425(2 + Q)^2\big)/(582409 - 900*mp)^{0.5}$$
$$+ (21.78Q)/(582409 - 900*mp)^{0.5}$$
$$+ \big(0.3267(2 + Q)*\big(-206 + (582409 - 900*mp)^{0.5}\big)/$$
$$(582409 - 900*mp)^{0.5} + 99mp/(582409 - 900mp)^{0.5}\big]\Big] = 0.$$

$$(5.A3)$$

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Chapter 6
The Impact of Transfer Pricing Regulations on the Location Decisions of MNEs

Jumpei Ito and Yoshimasa Komoriya

Abstract This chapter provides a survey of transfer pricing regulations in 28 countries over four years. Using variables related to the regulations obtained from the survey, we explore the effects of transfer pricing regulations on foreign direct investments (FDIs). We also investigate the impacts of introducing Organisation for Economic Cooperation and Development (OECD) 2010 guidelines on FDI incentives. Among several elements in the regulations, advance pricing agreements (APAs) in source countries and documentation rules in host countries have significant effects on FDI flow. APAs in source countries increase FDI incentives, and documentation rules in host countries decrease them. This implies that transfer pricing regulations play an important role in the location decisions of multinationals. We also find that the guideline reform in 2010 has no significant effect to date on location decisions.

Keywords Transfer pricing regulations • Foreign direct investment • Firm's location decision

1 Introduction

The behavior of multinational enterprises (MNEs) seeking tax savings is common in the global economy. Amazon, Apple, Google, and Starbucks have been criticized in recent years. In a situation where governments do not harmonize their corporate tax rates and tax rates differ between countries, multinationals have incentives to shift their tax bases within the firm. Multinationals could potentially use profit shifting, debt shifting, and/or earnings stripping as a method for tax-base shifting.

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The most common of these is profit shifting. Multinationals use transfer pricing to shift their profits within the firm from high-tax countries to low-tax countries.

Regardless of whether they are source or host countries, governments care deeply about tax bases being shifted abroad because of potential losses of tax revenue. To combat profit shifting, debt shifting, and earnings stripping, governments implement transfer pricing regulations, thin capitalization rules, and earnings stripping rules, respectively. Transfer pricing regulations are very complex. While governments can use Organisation for Economic Co-operation and Development (OECD) guidelines to establish rules, the rules are not completely harmonized between countries. Lohse et al. (2012) provide a comprehensive summary of transfer pricing regulations of 44 countries from 2001 to 2009.

The literature focuses heavily on profit shifting and transfer pricing. However, the extent to which multinationals can use transfer prices for profit shifting is not considered an important factor in the location decisions of multinationals. Because worldwide net profits of multinationals theoretically depend not only on tax rates but also on the difficulties of profit shifting, these difficulties should be included in the determining factors in location decisions.[1] While several papers have examined the effects of transfer pricing regulations on profit shifting, the effects on location decisions and foreign direct investment (FDI) flows have not been investigated.[2] Thus, in this chapter, we investigate how transfer pricing regulations affect FDI incentives.

The OECD guidelines were revised in 2010. The main purpose of this reform was to reconsider hierarchy among transfer pricing methods. How does this reform affect multinational profit shifting behaviors and FDI incentives? In this chapter, we also investigate the impacts of the regulation reform in 2010 on FDI flows through profit shifting. As already mentioned, Lohse et al. (2012) provide a good survey. However, we could not use this survey for our second purpose because it does not cover the period after the 2010 reform. Thus, we needed to conduct our own regulation survey.

The chapter is organized as follows. Section 2 introduces our transfer pricing regulation survey from 2009 to 2012 and compares it with the survey in Lohse et al. (2012). The background model and data are explained in Sect. 3. Section 4 presents our results, and Sect. 5 concludes.

---

[1] Amerighi and Peralta (2010) theoretically show the role of the difficulty of profit shifting in multinationals' location decisions.

[2] In the literature, the effects of transfer pricing regulations on profit shifting have been examined. See Jost et al. (2011) and Lohse and Riedel (2013).

2 Transfer Pricing Regulations

In this section, we briefly introduce our survey of transfer pricing regulations.[3] In existing research, Lohse et al. (2012) examined detailed information about transfer pricing regulations in 44 countries from 2001 to 2009. They categorized six rules of transfer pricing regulations (pricing methods, documentation requirements, submission deadlines, penalties, statute of limitations [SOL], and advance pricing agreements [APAs]) and considered features of different countries for a single aspect by categorizing various rules. In contrast, we examine six regulations in 28 OECD countries from 2009 to 2012 in this section.[4] Our purposes in this section is to extend the work of Lohse et al. (2012) and identify how the trends in the application of transfer pricing regulations changed before and after the amendment of *OECD Transfer Pricing Guidelines* (OECD-TPG) in the 2010 reform. We do not consider the rule of submission deadlines as in Lohse et al. (2012), but we focus on secret comparables (SECCOMs) instead.

To collect information about transfer pricing regulations, we mainly refer to the KPMG, *Global Transfer Pricing Review* and also use surveys from the other 'Big 4' audit firms for data verification.[5] Our results of data aggregation follow.

2.1 Pricing Methods

Since the OECD-TPG was published in 1995, the OECD has recommended five methods for determining appropriate transfer price: the comparable uncontrolled price (CUP) method, the resale price (RP) method, the cost plus (CP) method, the profit split (PS) method, and the transactional net margin method (TNMM). The first three methods are called traditional transaction methods and the last two methods are called transactional profit methods. Traditional transaction methods were recommended among the five methods, and top priority was granted to the CUP method until the 2010 reform. As a consequence of firm's aggressive transactions, the OECD-TPG was amended and the relative benefits of traditional methods were reconsidered in 2010.

In the observed periods of Lohse et al. (2012), most OECD countries used all of the five methods except for Ireland, but some non-OECD countries did not apply profit methods. In our examination, all countries applied the five methods as at 2012 (see Table 6.1[6]).

---

[3] While we could obtain more information by describing our survey in detail, we only show some of it here because the main purpose of this paper is to show effects of the regulation on FDIs.

[4] Observations of our data focus on OECD countries, but six OECD countries (Canada, Mexico, Iceland, Korea, New Zealand, and Slovak Republic) are excluded because we cannot collect sufficient data for panel estimation. Observed countries in our research and Lohse et al. (2012) are listed in the Appendix for comparison.

[5] Deloitte, *Global Transfer Pricing Country Guide*; Ernst & Young, *Transfer Pricing Global Reference Guide*; PwC, *International Transfer Pricing*.

[6] In Table 6.1, 6.2, 6.3, 6.4, 6.5 and 6.6 except 6.5a, "1" indicates a country adopting the rule and "0" shows no-adopted country. Table 6.5a shows duration time at units of month.

Table 6.1 Transfer pricing regulations: pricing methods

	AUS	AUT	BEL	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC
(a) CUP														
2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2010	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2012	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(b) RP														
2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2010	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2012	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(c) CP														
2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2010	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2012	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(d) PS														
2009	1	0	1	1	0	1	1	1	1	1	1	1	1	1
2010	1	1	1	1	0	1	1	1	1	1	1	1	1	1
2011	1	1	1	1	0	1	1	1	1	1	1	1	1	1
2012	1	1	1	1	1	1	1	1	1	1	1	1	1	1
(e) TNMM														
2009	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2010	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2011	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2012	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Table 6.2 Transfer pricing regulations: selection of methods

	AUS	AUT	BEL	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC
(a) Most appropriate method														
2009	1	0	0	0	0	0	0	0	0	1	0	0	1	0
2010	1	0	0	0	0	1	0	0	0	1	0	1	1	0
2011	1	0	0	0	0	1	0	0	0	1	0	1	1	0
2012	1	1	1	1	0	1	0	0	0	1	0	1	1	0
(b) Priority														
2009	0	1	1	0	0	1	1	1	1	0	0	1	0	1
2010	0	1	1	0	0	0	1	1	1	0	0	0	0	1
2011	0	1	1	0	0	0	1	1	1	0	0	0	0	1
2012	0	0	0	0	0	0	1	1	1	0	0	0	0	1

HUN	IRL	ISR	ITA	JPN	LUX	NLD	NOR	POL	PRT	SVN	SWE	TUR	USA	Total
1	0	1	1	1	1	1	1	1	1	1	1	1	1	27
1	0	1	1	1	1	1	1	1	1	1	1	1	1	27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	0	1	1	1	1	1	1	1	1	1	1	1	1	27
1	0	1	1	1	1	1	1	1	1	1	1	1	1	27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	0	1	1	1	1	1	1	1	1	1	1	1	1	27
1	0	1	1	1	1	1	1	1	1	1	1	1	1	27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	0	1	1	1	1	1	1	1	1	1	1	1	1	25
1	0	1	1	1	1	1	1	1	1	1	1	1	1	26
1	1	1	1	1	1	1	1	1	1	1	1	1	1	27
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	0	1	0	1	1	1	1	1	1	1	1	1	1	26
1	0	1	0	1	1	1	1	1	1	1	1	1	1	26
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28
1	1	1	1	1	1	1	1	1	1	1	1	1	1	28

HUN	IRL	ISR	ITA	JPN	LUX	NLD	NOR	POL	PRT	SVN	SWE	TUR	USA	Total
0	0	0	0	0	0	0	1	0	1	0	0	0	1	6
0	0	0	0	0	1	0	1	0	1	0	0	0	1	9
0	1	0	0	0	1	0	1	0	1	0	0	0	1	10
1	1	0	0	1	1	0	1	0	1	0	0	0	1	15
1	0	1	1	1	1	0	0	1	0	1	0	1	0	16
1	0	1	1	1	0	0	0	1	0	1	0	1	0	13
1	0	1	1	1	0	0	0	1	0	1	0	1	0	13
0	0	1	1	0	0	0	0	1	0	1	0	1	0	9

A main feature of the 2010 reform of the OECD-TPG is the adoption of the most appropriate method. This fact indicates the collapse of hierarchy of transfer pricing methods. Originally, the spirit of the OECD-TPG was to mitigate costs caused by conflicts between tax authorities and taxpayers. However, the 2010 reform might head in a different direction from the original spirit of cost mitigation. Before the 2010 reform, when taxpayers or tax authorities determined an arm's-length price, the OECD had a clear priority for direct comparability between several alternative methods. When priority is defined clearly, taxpayers and/or tax authorities do not need to spend time in selecting the pricing method themselves. However, as intellectual property transactions increased it became difficult to maintain such a priority, and it was broken down by the 2010 reform. Luckhaupt et al. (2012) argue that the lack of the priority increased compliance and administrative costs as well as risks of double taxation caused by an enlargement of discretion to selection of transfer pricing methods. That may be the reason 13 countries have not used the most appropriate method (e.g., Germany, Netherlands, and Nordic countries except Norway).

In Lohse et al. (2012), the great majority of countries indicated a priority among several methods, and few countries used the most appropriate method in their observed periods. However, according to our examination, trends of priority of methods have significantly changed. Countries where the most appropriate method was available increased from six in 2009 to 15 in 2012 among the 28 OECD countries (Table 6.2a), although adoption of clear priority decreased from 16 to nine (Table 6.2b).

2.2 Documentation

Most tax authorities often require proper documentation from taxpayers to govern the burden of proof in their countries. As long as MNEs submit sufficient documentation, the burden of proof is shifted from taxpayers to tax authorities. Therefore, MNEs are incentivized to prepare detailed documentation, not to have the burden of proof.

From the tax administration view, the more aggressive transfer pricing activities become, the stricter the documentation rules required from governments. According to Ernst & Young (2013), "the rate at which transfer pricing documentation was rejected as inadequate increased in 22 of 25 countries surveyed since 2010." This fact suggests that compliance costs are higher than ever for sufficient documentation.

Lohse et al. (2012) show that all of the countries had documentation rules at a statutory or practical level, except Brazil, Chile, and Ireland. Table 6.3a provides information about whether statutory documentation rules are applied during our sample period. From among our observed period, four new countries started to implement documentation requirements statutorily and one country discontinued (Estonia). As a result, 21 of 28 OECD countries had statutory documentation rules in 2012.

Some governments have transfer pricing disclosure forms. The forms are country-specific documents attached to annual tax returns. This means taxpayers mandatorily

disclose transfer pricing information about their transactions. In Lohse et al. (2012), 24 of 44 countries adopted a disclosure obligation. In our examination, two countries started to apply it (Hungary and Luxemburg) and two countries discontinued (Estonia and Japan). As a result, 16 countries had disclosure requirements (Table 6.3b).

2.3   Advance Pricing Agreements

To understand what APAs are, we can use the following explanation:[7] "An advance pricing arrangement is an arrangement that determines, in advance of controlled transactions, an appropriate set of criteria (e.g. method, comparables and appropriate adjustments thereto, critical assumptions as to future events) for the determination of the transfer pricing for those transactions over a fixed period of time." Once an APA is contracted, as long as taxpayers conform to the APA, a taxpayer can significantly avoid double taxation risks.

In Lohse et al. (2012), it can be observed that the number of countries adopting APAs increased. In recent years, this upward trend appears to have slowed (Table 6.4a), and some countries have discontinued APAs altogether (Czech Republic and Spain) in 2012. Of 28 OECD countries, 22 have some type of APA system (unilateral, bilateral, or multilateral APA); 18 countries have unilateral APA (APA between taxpayer and one tax authority), 18 countries have bilateral APA (APA between taxpayer and two tax authorities that are in source and host countries), and 17 countries have multilateral APA (APA between taxpayer and more than two tax authorities) in 2012 (Table 6.4b–d).

2.4   Statute of Limitations

Tax authorities establish SOLs for transfer pricing adjustment. The longer limitations exist, the greater double taxation risks would be generated. In terms of implementing SOLs, there are two types of countries. The duration of limitations is extendable in fraud cases in some countries and the duration is applied in only general cases in other countries.

In Lohse et al. (2012), most countries applied a duration of up to 5 years in 2009. Similarly, in the our 28 OECD samples, 19 countries applied a duration of up to 5 years.[8] Limitations in the general cases were shortened, on average, from 58.3 months in 2009 to 55.3 months in 2012 (Table 6.5a). On the other hand, the number of countries that introduced fraud case SOLs increased from six to 14 (Table 6.5b). The USA applies unlimited durations in extended cases.

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[7] OECD (2010), p. 168.

[8] Lohse et al. (2012) identify the beginning of statutes of limitations and adjust the duration according to these dates. In contrast to Lohse et al. (2012), our analysis does not consider the adjustment.

Table 6.3 Transfer pricing regulations: documentation requirements

	AUS	AUT	BEL	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC
(a) Documentation														
2009	1	1	0	0	0	1	0	1	1	1	1	0	0	1
2010	1	1	0	0	0	1	0	1	1	1	1	0	0	1
2011	1	1	0	0	1	1	0	1	1	0	1	0	0	1
2012	1	1	1	0	1	1	0	1	1	0	1	0	0	1
(b) Disclosure														
2009	1	0	0	0	0	0	0	1	1	1	1	0	0	1
2010	1	0	0	0	0	0	0	1	1	1	1	0	0	1
2011	1	0	0	0	0	0	0	1	1	0	1	0	0	1
2012	1	0	0	0	0	0	0	1	1	0	1	0	0	1

Table 6.4 Transfer pricing regulations: advance pricing agreements

	AUS	AUT	BEL	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC
(a) APA														
2009	1	1	1	1	0	1	1	1	1	0	1	1	1	0
2010	1	1	1	1	0	1	1	1	1	0	1	1	1	0
2011	1	1	1	1	0	1	1	1	1	0	1	1	1	0
2012	1	1	1	1	1	0	1	1	0	0	1	1	1	0
(b) Unilateral APA														
2009	1	1	1	1	0	0	0	1	1	0	1	1	1	0
2010	1	1	1	1	0	0	0	1	1	0	1	1	1	0
2011	1	1	1	1	0	0	0	1	1	0	1	1	1	0
2012	1	1	1	1	1	0	0	1	0	0	1	1	1	0
(c) Bilateral APA														
2009	1	0	1	1	0	0	1	1	1	0	1	1	1	0
2010	1	0	1	1	0	0	1	1	1	0	1	1	1	0
2011	1	0	1	1	0	0	1	1	1	0	1	1	1	0
2012	1	0	1	1	1	0	1	1	0	0	1	1	1	0
(d) Multilateral APA														
2009	1	0	1	1	0	0	1	1	1	0	1	1	0	0
2010	1	0	1	1	0	0	1	1	1	0	1	1	0	0
2011	1	0	1	1	0	0	1	1	1	0	1	1	0	0
2012	1	0	1	1	1	0	1	1	0	0	1	1	0	0

HUN	IRL	ISR	ITA	JPN	LUX	NLD	NOR	POL	PRT	SVN	SWE	TUR	USA	Total
1	0	1	1	0	0	1	1	1	1	1	0	1	1	18
1	0	1	1	0	0	1	1	1	1	1	0	1	1	18
1	0	1	1	1	1	1	1	1	1	1	0	1	1	20
1	0	1	1	1	1	1	1	1	1	1	0	1	1	21
0	0	1	1	1	0	1	1	1	1	1	0	1	1	16
1	0	1	1	1	0	1	1	1	1	1	0	1	1	17
1	0	1	1	1	1	1	1	1	1	1	0	1	1	17
1	0	1	1	0	1	1	1	1	1	1	0	1	1	16

HUN	IRL	ISR	ITA	JPN	LUX	NLD	NOR	POL	PRT	SVN	SWE	TUR	USA	Total
1	1	1	1	1	0	1	0	1	1	0	0	1	1	21
1	1	1	1	1	0	1	0	1	1	0	1	1	1	22
1	1	1	1	1	0	1	0	1	1	0	1	1	1	22
1	1	1	1	1	1	1	0	1	1	0	1	1	1	22
1	0	1	1	1	0	1	0	1	1	0	0	1	1	18
1	0	1	1	1	0	1	0	1	1	0	0	1	1	18
1	0	1	1	1	0	1	0	1	1	0	0	1	1	18
1	0	1	1	1	0	1	0	1	1	0	0	1	1	18
1	0	0	0	1	0	1	0	1	1	0	0	1	1	16
1	0	0	0	1	0	1	0	1	1	0	1	1	1	17
1	0	0	1	1	0	1	0	1	1	0	1	1	1	18
1	0	0	1	1	0	1	0	1	1	0	1	1	1	18
1	0	0	0	1	0	1	0	1	1	0	0	1	1	15
1	0	0	0	1	0	1	0	1	1	0	1	1	1	16
1	0	0	1	1	0	1	0	1	1	0	1	1	1	17
1	0	0	1	1	0	1	0	1	1	0	1	1	1	17

Table 6.5 Transfer pricing regulations: statute of limitations

	AUS	AUT	BEL	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC
(a) General SOL														
2009	no limit	60	36	120	36	36	48	72	48	36	60	36	72	60
2010	no limit	60	36	120	36	36	48	72	48	36	60	36	72	60
2011	no limit	60	36	120	36	36	48	72	48	36	60	36	72	60
2012	no limit	72	36	120	36	36	48	60	48	36	60	36	48	60
	AUS	AUT	BEL	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC
(b) Extension of SOL														
2009	0	0	1	0	0	0	0	1	0	0	0	1	0	1
2010	0	0	1	0	1	0	0	1	0	0	0	1	0	1
2011	0	0	1	0	1	1	0	1	0	0	0	1	0	1
2012	0	1	1	0	1	1	1	1	0	1	0	1	1	1
(c) No limitation														
2009	1	0	0	0	0	0	0	1	0	0	0	0	0	0
2010	1	0	0	0	0	0	0	1	0	0	0	0	0	0
2011	1	0	0	0	0	0	0	1	0	0	0	0	0	0
2012	1	0	0	0	0	0	0	1	0	0	0	0	0	0

Table 6.6 Transfer pricing regulations: penalties and secret comparables

	AUS	AUT	BEL	CHE	CHL	CZE	DEU	DNK	ESP	EST	FIN	FRA	GBR	GRC
(a) Specific penalty														
2009	0	0	0	0	0	0	0	1	0	0	1	0	0	1
2010	0	0	0	0	1	0	0	1	1	0	1	0	0	1
2011	0	0	0	0	1	0	0	1	1	0	1	0	0	1
2012	0	0	0	0	1	0	0	1	1	0	1	0	0	1
(b) Secret comparables														
2009	0	1	0	0	0	1	1	0	0	0	0	1	0	1
2010	0	1	0	0	0	1	1	0	0	0	0	1	0	1
2011	0	1	0	0	0	1	1	0	0	0	0	1	0	1
2012	0	1	0	0	1	1	1	0	0	0	0	1	0	1

HUN	IRL	ISR	ITA	JPN	LUX	NLD	NOR	POL	PRT	SVN	SWE	TUR	USA	Average
60	48	36	48	72	60	60	120	72	48	120	72	60	36	58.29
60	48	36	48	72	60	60	120	72	48	60	72	60	36	56.14
60	48	36	48	72	60	60	120	72	48	60	72	60	36	56.14
60	48	36	48	72	60	60	120	72	48	60	72	60	36	55.29

HUN	IRL	ISR	ITA	JPN	LUX	NLD	NOR	POL	PRT	SVN	SWE	TUR	USA	Total
0	0	1	0	0	0	1	0	0	0	0	0	0	0	6
0	0	1	0	0	0	1	0	0	0	1	0	0	0	8
0	0	1	0	0	0	1	0	0	0	1	0	0	0	9
0	0	1	0	0	1	1	0	0	0	1	0	0	1	14

0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0	0	1	3

HUN	IRL	ISR	ITA	JPN	LUX	NLD	NOR	POL	PRT	SVN	SWE	TUR	USA	Total
1	0	0	0	0	0	0	0	1	0	0	0	0	1	6
1	0	0	0	0	0	0	0	1	0	0	0	0	1	8
1	0	0	0	0	0	0	0	1	0	0	0	0	1	8
1	0	0	0	0	0	0	0	1	0	1	0	0	1	9

0	0	0	0	1	0	1	1	1	0	0	1	1	0	11
0	0	0	0	1	0	1	1	1	0	0	1	1	0	11
0	0	0	0	1	0	1	1	1	0	0	1	1	0	11
0	0	0	0	1	0	1	1	1	0	0	1	1	0	12

2.5 Transfer Pricing Penalty

There are two types of countries when tax authorities penalize taxpayers in transfer pricing. Some countries provide penalties in the general tax code only, but others provide transfer pricing-specific penalties in addition to general tax penalties. Transfer pricing penalties are categorized into two categories: penalties on adjustment and penalties on documentation. Lohse et al. (2012) suggest that specific penalties refer to documentation requirements, although transfer pricing adjustments are usually covered in the general tax code. Therefore, adoption of specific penalties may induce higher compliance costs for firms.

In our observed sample, the adoption of a transfer pricing-specific penalty has gradually increased. Six countries introduced transfer pricing-specific penalties in 2009 and nine in 2012 (Table 6.6a). As observed by Lohse et al. (2012) about their observed periods, most countries do not apply specific penalties.

2.6 Secret Comparables

Some governments use SECCOMs when a taxpayer does not file full documentation about transfer pricing. SECCOMs is third-party information that is referred to when tax authorities determine arm's-length pricing. This information is compared with information on intra-firm transactions and is collected without being publicly disclosed. If a tax authority uses SECCOMs, the tax authority can arbitrarily choose a price as an arm's-length price. In this case, taxpayers cannot deny the price used by government, even if the price is not the proper price. Therefore, the use of SECCOMs may raise double taxation risks of taxpayers.

Table 6.6b shows the status of SECCOMs applied. A large proportion of countries (16) did not use SECCOMs in 2012. This rule is a secretary and arbitrary, and most governments have not adopted this rule.

Finally, we describe the features of the regulations in Estonia, Israel, and Turkey, which are not mentioned by Lohse et al. (2012). Estonia is one of the few countries in which a tax authority adopted the most appropriate method at an early stage (one of six countries in 2009). As at 2012, the Estonian tax authority adopted the shortest SOL duration (2 years), and introduced extended durations in fraud cases. Disclosure obligations were discontinued in 2012.

Israel gives a priority to traditional transaction methods (in particular, the CUP method is most preferable) among pricing methods. As mentioned above, there are few countries where clear priority exists.

Turkey also have a priority among pricing methods, APAs are available for all methods (i.e. unilateral, bilateral, and multilateral). Turkish tax authorities sometimes use SECCOMs in fraud transfer pricing cases.

3   Empirical Strategy

3.1   Background Model

In this subsection, we briefly show a simple model to explain the impacts of transfer pricing regulation on FDI incentives. We use two countries, one firm, and one market model. The firm is a multinational firm based in the source country. The firm has a subsidiary in the host country and sells its product to the host market through the subsidiary. The demand function of the host market is $P = A - BX$, and X is the output level of the firm. Governments in the source and host countries tax profits earned in their own countries at t and T, respectively.

After-tax profit of the multinational is

$$\Pi = (1 - t)(m - c)X + (1 - T)(P - \tau - m)X - \frac{\mu}{2}(m - c)^2, \qquad (6.1)$$

where m is the price for intra-firm transactions (transfer price), c is the marginal cost of production, and τ is the transport cost. The last term in the right-hand side of Eq. (6.1) is the transfer pricing cost. We assume $c = \tau = 0$ for simplification. The transfer pricing cost can be considered an expected cost that reflects the detection rate of manipulation of transfer price and the additional tax payment because of double taxation and penalties.[9] Some elements of transfer pricing regulation affect the detection rate and others change the amount of tax payment and penalty. The transfer pricing cost can also be considered the cost of multinationals hiring lawyers and accountants for justification of their use of a transfer price. Some elements of transfer pricing regulation affect those compliance and administrative costs. In our model, we can capture the introduction of stricter regulations by increasing the parameter μ independently of elements of transfer pricing regulation. The subsidiary chooses its output level to maximize its profit. Given m, the output level is

$$X = \frac{A - m}{2B}. \qquad (6.2)$$

The headquarters of the multinational sets its transfer price to maximize its worldwide after-tax profit. The optimal transfer price is

$$m = \frac{(T - t)A}{T - 2t + 1 + 2B\mu}. \qquad (6.3)$$

For any given combination of corporate tax rates, when the governments

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[9] Nielsen and Raimondos-Møller (2012) discuss in detail this interpretation of transfer pricing cost.

implement stricter regulation, μ rises. The effect of introducing stricter rules on transfer pricing is

$$\frac{dm}{d\mu} = -\frac{2B(T-t)A}{(T-2t+1+2B\mu)^2} = -\frac{2Bm}{T-2t+1+2B\mu}. \tag{6.4}$$

If the source country has the higher corporate tax rate $(t > T)$, the multinational sets its transfer price below the real cost $(m < 0)$; introducing stricter rules increases the transfer price. If the host country has the higher corporate tax rate $(T > t)$, the multinational sets its transfer price above the real cost $(m > 0)$; introducing stricter rules decreases the transfer price. Thus, in both cases, the deviation of transfer price from the real cost decreases by introducing stricter rules.

In the equilibrium, the worldwide after-tax profit of the multinational firm is

$$\Pi = \frac{\left\{(1-t)^2 + 2B\mu(1-T)\right\}A^2}{4(T-2t+1+2B\mu)}. \tag{6.5}$$

Given the corporate tax rates, when the governments implement stricter regulations, its effect on the after-tax profit is

$$\frac{d\Pi}{d\mu} = -\frac{(T-t)^2A^2}{2(T-2t+1+2B\mu)^2} < 0. \tag{6.6}$$

When potential multinationals consider whether to undertake FDI in the host country, the headquarters of the multinationals compare Π and the profit earned in the case of export (Π^{EX}). Because transfer pricing regulations do not affect the export profit, introducing stricter rules reduces the possibilities of obtaining a positive additional profit by undertaking FDI $(\Pi - \Pi^{EX} > 0)$.

3.2 Empirical Strategy

To estimate the effects of transfer pricing opportunities and regulations on location decisions (in detail, annual FDI outflows), we adopt the gravity model using 28 OECD countries between 2009 and 2012. The gravity model is developed to explain bilateral trade, and it is applied to other bilateral transactions such as FDIs and tourism.[10] Our estimation follows the traditional log linear model. Traditionally, the basic gravity model comprises the log of gross domestic product (GDP) in the

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[10] Using the gravity model, Ito (2013) shows the 2009 Japanese tax reform, which contains the change of international taxation rules to territorial system, induced aggressive FDI outflows.

source country, the log of GDP in the host country, and the log of the distance between the two countries. Starting from this basic model, the gravity model is improved by adopting additional variables. Following existing studies, we also include those additional variables in our regression model.

In our equations, we use the log of GDP and the log of GDP per capita (*GDPCa*) in the source and host countries. We also use a bilateral exchange rate (*XRate*) measured as units of the host country's currency per unit of the source country's currency. GDP indicates market size in the country. A larger GDP in source countries implies that these countries have a greater potential for investing abroad than in a small country and a larger GDP in host countries implies that those countries have larger markets than do small countries. GDPCa measures a person's ability to purchase goods in his market, and also reflects earning power. In our definition, a high exchange rate implies appreciations of the source countries' currencies and relatively low costs of merger and acquisition in a host country. As a result, we expect a positive sign for all these variables in our estimates. Our estimations omit bilateral distance, because we accept random effect model capturing bilateral country-specific effects.

To capture distortions in FDI decisions caused by transfer pricing activities, we adopt variables of transfer pricing opportunities and regulations. Differences in corporate tax rates between source and host countries create a transfer pricing opportunity for multinationals. MNEs have strong incentives to shift their profit from jurisdictions with high corporate tax rates to those with low corporate tax rates. Our tax rate variable is defined as the difference in the source and host country tax rate (*DifTax*), and this variable is expected to have a positive sign for outward FDI.

The main purpose of our empirical test is to examine the effects of transfer pricing regulation on FDI incentives. For this purpose, we also adopt SOL, documentation (DOC), APAs, and SECCOMs from Sect. 2 as variables in transfer pricing regulations in source and host countries. SOL is a scale variable and the others are dummy variables. In our regulation dummies, '1' indicates country where the rule is accepted and '0' indicates a country where it is not accepted. As mentioned in Sect. 2, these anti-tax avoidance rules will have different impacts on FDI as well as profit shifting.

SOLs with longer durations may induce greater double taxation risks so that MNEs would be exposed to the surveillance of a tax authority in the longer term. In summary, a host country that has longer duration SOLs may have disadvantages in attracting a firm's profits and investments. On the other hand, if longer duration were applied in a source country, MNEs would have disincentives to invest abroad and to shift their profits to foreign countries. As a result, SOLs in both source and host countries are expected to have negative signs. For estimation, we adopt general case SOL as an explanatory variable.

Documentation requirements incur greater compliance costs. Therefore, a host country that adopts documentation rules is less attractive for (potential) multinationals, and a source country that applies the rules disturbs a firm's FDI and profit

Table 6.7 Hypotheses: effects of transfer pricing regulations on foreign direct investment

	Source country	Host country
Statute of limitations (SOL)	Negative	Negative
Documentations (DOC)	Negative	Negative
Advance pricing agreements (APA)	Positive	Positive
Secret comparables (SECCOM)	Negative	Negative

shifting. In short, there may be negative effects on FDI from applying documentation rules in both countries.

APA is a measure of risk mitigation in transfer pricing regulations. If MNEs could apply APAs in a source country, they can shift their profits with low double taxation risks. A host country that has APAs would be attractive to MNEs. Therefore, APAs in both countries would have positive effects on FDI.

SECCOM increases discretion of tax administrators in determining arm's-length pricing, and may increase the double taxation risks of the taxpayer. Therefore, SECCOM in both countries is expected to have negative signs. Table 6.7 summarizes hypotheses about transfer pricing regulations.

As a result, we find the following equation to estimate FDI outflows, which includes transfer pricing-related variables (opportunity and regulations) and control variables (gravity variables and exchange rate).

$$
\ln FDI_{hst} = \beta_1 \ln GDP_{st} + \beta_2 \ln GDP_{ht} + \beta_3 \ln GDPCa_{st} + \beta_4 \ln GDPCa_{ht}
$$
$$
+ \beta_5 X\,Rate_{sht} + \beta_6 Dif\,Tax_{sht} + \sum \gamma TP\,Reg_t + \omega_{sh} + \varepsilon_{sht} \qquad (6.7)
$$

Each subscription of s (h) indicates variables in the source (host) country, and t indicates year. TPReg is transfer pricing regulation variables in the source and/or host countries. ω_{sh} indicates bilateral country effects, and ε_{sht} is a disturbance term.

In addition to this equation, we consider another equation using additional interaction terms. If a source (host) country has a higher tax rate than a host (source) country, these terms are defined as a product of each regulation variable in source (host) countries and the absolute difference in tax rates. Otherwise, the terms set equal to zero. By considering transfer pricing strategies, MNEs have an incentive to shift their profits from high-tax countries to low-tax countries. Governments with lower tax rates do not care about the transfer pricing strategies of MNEs because the governments do not lose their tax revenue. Thus, between transfer pricing regulations in the source and host countries, potential multinationals care about the regulations in the higher tax country only. While this tendency does not depend on whether the high tax country is a source country or a host country, it becomes strong if the two countries have a large difference in tax rates. The interaction terms can help us to identify differences in investment between high- and low-tax countries.

3.3 Data

This subsection describes the sources for our dependent and independent variables in detail. We obtained bilateral country FDI outflow data from the OECD *International Direct Investment* database. These flow data are constructed from bilateral FDI flows from 34 OECD countries to 301 countries or areas. To use a log linear model for estimation, we exchange nonpositive values to zero in logarithmic transformation.

For gravity model estimation, we use GDP, GDPCa, and exchange rates. GDP and GDPCa are obtained from the International Monetary Fund (IMF), the World Economic Outlook Database. The exchange rate is obtained from OECD data. We can access the exchange rates of all OECD and seven other countries, and those rates are calculated as national currency units per US dollars.

The corporate tax rates are obtained from the KPMG *Corporate Tax Rate Table* as transfer pricing opportunities. The data can refer to the statutory corporate tax rates of 135 countries between 2006 and 2014.

As mentioned in Sect. 2, our data for transfer pricing regulations are collected from four surveys published by Deloitte, Ernst & Young, KPMG, and PwC. In some countries (e.g., Australia), there is no limitation to the duration of SOL, and unlimited values cannot be used as explanatory variables. In these cases, we use a maximum value of duration among the observed countries (120 months).

In sum, theoretically, the number of observations is 3,024 (28 source countries × 27 host countries × 4 years), and there are 277 missing values in the FDI data. As a result, the number of observations is 2,747 in our estimations.

4 Results

We use FDI in the balance of payments as the independent variable in our estimations. Large and rich source countries undertake more outward FDI, and large and rich host countries receive more inward FDI. We use logarithmic forms of these variables as control variables in our estimations. In the results, most of these control variables have positive effects on FDI flows, as expected. Because appreciations of source countries' currencies boost outward FDI of the countries, exchange rates are also added as independent variables. However, they have no significant effect on FDI flows.

In Sect. 2, we discussed our survey of transfer pricing regulations in 28 countries from 2009 to 2012. In our estimations, we use four transfer pricing regulation variables to show how transfer pricing regulations affect FDI incentives. We also add variables measuring differences in corporate tax rates as independent variables. When the source countries have lower tax rates than the host countries, incentives for outward FDI should be low.

4.1 Effects of Transfer Pricing Regulation on FDI

In Table 6.8, we use SOL on assessment of transfer pricing adjustments (SOL), documentation requirements for transfer pricing (DOC), APA options, and SECCOM in the source and host countries as transfer pricing regulation variables.

Theoretically, as the SOL expands, the risk of paying penalties increases and the (expected) transfer pricing costs increase. SECCOMs theoretically increase uncertainty about penalties and transfer pricing costs. However, Table 6.8 shows that SOL and SECCOM in both the source and host countries do not have significant effects on bilateral FDI flows.

APAs in source countries significantly increase bilateral FDI flows both in ordinary least squares (OLS) and two-stage least squares (2SLS) estimations. This implies that APAs reduce uncertainty about penalties for use of transfer pricing and increases FDI incentives.

While DOC in source countries and APA in host countries have less significant effects relative to APA in source countries, DOC rules in source countries significantly decrease bilateral FDI flow, and APA in host countries significantly increases these flows according to the OLS estimations. DOC in source countries increases compliance costs and reduces FDI incentives. APAs in host countries have a positive impact on bilateral FDI as does APA in source countries. However, in the 2SLS estimation, we do not obtain significant results for those two variables. We cannot deny the possibility of reverse causality.

While DOC in host countries does not have significant effects in the OLS estimation, the variable significantly decreases bilateral FDI flows in the 2SLS estimation. We can conclude that DOC increases compliance costs and decreases FDI incentives.

Thus, APA in source countries reduces the risk of penalties related to transactions within multinationals and increases FDI incentives. DOC rules in host countries reduce the FDI incentives of firms due to high compliance costs. Differences in corporate tax rates between the source and host countries significantly affect FDI flow. When source countries have high tax rates relative to host countries, FDI incentives are increased.

Regardless of the source and host countries, when firms can shift their profits from high-tax countries to low-tax countries, the firms have large worldwide profits, and FDI is highly attractive for the firms. Because low-tax countries do not have incentives to criticize multinationals for profit shifting, transfer pricing regulations in high-tax countries would have significant effects on FDI incentives. To capture this hypothesis, we add interaction terms as independent variables. Table 6.9 shows the results of this case. From this table, we find that when host countries have higher tax rates than source countries, the interaction of tax rate difference and DOC has a positive effect. Because DOC itself has a negative effect, this implies that profit-shifting incentives because of tax-rate differences mitigate or fully offset a negative effect because of the high compliance costs of DOC. We also find that when host countries have higher tax rates than source countries, the interaction of tax rate difference and SECCOM has a negative effect. This implies that increasing

Table 6.8 Estimation results

	OLS	2SLS	OLS	2SLS	OLS	2SLS
Control variables						
ln(GDP)s	0.493***	0.442***	0.570***	0.573***	0.496***	0.459***
	6.11	5.90	8.50	9.91	6.12	5.92
ln(GDP)f	0.560***	0.580***	0.467***	0.486***	0.484***	0.511***
	8.58	10.11	5.89	6.45	6.15	6.55
ln(GDPCa)s	1.156***	1.099***	1.282***	1.311***	1.170***	1.129***
	7.32	6.84	9.32	9.95	7.38	6.88
ln(GDPCa)f	0.462***	0.423***	0.494***	0.377**	0.519***	0.410***
	3.43	3.56	3.11	2.48	3.25	2.65
XRate	0.000	0.000	0.000	0.000	0.000	0.000
	0.59	0.64	0.72	0.39	0.53	0.55
Transfer pricing opportunity						
DifTax	0.043***	0.044***	0.034***	0.030**	0.040***	0.038***
	3.63	3.76	2.74	2.52	3.16	2.83
Source country regulations						
SOL	0.000	0.002			0.000	0.001
	0.09	0.52			−0.05	0.27
DOC	−0.350**	−0.206			−0.353**	−0.208
	−2.36	−1.15			−2.38	−1.16
APA	0.412**	0.903***			0.418**	0.892***
	2.16	3.29			2.19	3.24
SECCOM	−0.147	−0.237			−0.140	−0.233
	−0.94	−1.58			−0.90	−1.56

(continued)

Table 6.8 (continued)

	OLS	2SLS	OLS	2SLS	OLS	2SLS
Host country regulations						
SOL			-0.003	-0.002	-0.004	-0.002
			-1.07	-0.49	-1.23	-0.67
DOC			-0.153	-0.365**	-0.146	-0.347*
			-1.01	-2.04	-0.97	-1.93
APA			0.341*	0.241	0.340*	0.235
			1.67	0.92	1.67	0.90
SECCOM			0.118	0.132	0.109	0.121
			0.75	0.89	0.70	0.81
Constant	-38.95***	-37.45***	-41.44***	-40.08***	-39.19***	-36.85***
	-12.00	-11.93	-12.60	-12.81	-11.53	-11.02
Obs.	2,747	2,038	2,747	2,038	2,747	2,038
R squared	0.235	0.234	0.233	0.229	0.238	0.237
F test	$F(734,2002) = 2.23$	$F(731,1297) = 0.74$	$F(734,2002) = 2.25$	$F(731,1297) = 0.31$	$F(734, 1998) = 2.21$	$F(731,1294) = 0.13$
	$P = 0.000$	$P = 1.000$	$P = 0.000$	$P = 1.000$	$P = 0.000$	$P = 1.000$
Hausman test	$chi2(10) = 15.77$	$chi2(9) = 1.08$	$chi2(10) = 6.88$	$chi2(8) = 0.42$	$chi2(14) = 17.21$	$chi2(12) = 0.34$
	$P = 0.1063$	$P = 0.999$	$P = 0.737$	$P = 1.000$	$P = 0.245$	$P = 1.000$
Breusch-Pagan LM test	$chibar2(1) = 240.22$		$chibar2(1) = 249.18$		$chibar2(1) = 235.54$	
	$P = 0.000$		$P = 0.000$		$P = 0.000$	

Notes t values in parentheses

***significant at 1 %, **significant at 5 %, *significant at 10 %. P refers to p values

Table 6.9 Estimation results with interaction terms

	OLS	2SLS	OLS	2SLS	OLS	2SLS
Control variables						
ln(GDP)s	0.491***	0.348***	0.625***	0.637***	0.522***	0.401***
	6.15	4.15	9.46	10.76	6.48	4.58
ln(GDP)f	0.610***	0.632***	0.432***	0.439***	0.471***	0.517***
	9.10	10.79	5.03	5.17	5.44	5.82
ln(GDPCa)s	1.097***	0.976***	1.293***	1.335***	1.132***	1.050***
	6.92	6.01	9.42	10.13	7.09	6.24
ln(GDPCa)f	0.465***	0.454***	0.396**	0.245	0.450***	0.289*
	3.47	3.81	2.50	1.57	2.79	1.76
XRate	0.001	0.001	0.000	0.000	0.000	0.000
	1.13	1.23	0.76	0.43	0.74	0.68
Transfer pricing opportunity						
DifTax	0.087***	0.078***	−0.012	−0.018	0.026	−0.125
	5.21	4.62	−0.70	−1.08	0.54	−1.62
Source country regulations						
SOL	0.003	0.007			0.001	0.004
	0.71	1.49			0.27	0.75
DOC	−0.581***	−0.812***			0.035	−0.870***
	−3.12	−3.53			1.52	−3.72
APA	0.522***	1.123***			0.466**	0.935***
	2.64	3.95			2.36	3.24
SECCOM	0.016	0.135			−0.030	0.127
	0.09	0.71			−0.95	0.67

(continued)

Table 6.9 (continued)

	OLS	2SLS	OLS	2SLS	OLS	2SLS
Regulations × DifCIT × HighTaxDummy						
SOL	−0.001	−0.001*			0.000	−0.001
	−1.44	−1.87			−0.73	−0.75
DOC	0.032	0.117***			−0.606***	0.131***
	1.37	2.86			−3.27	3.12
APA	−0.045	−0.034			0.001	0.102
	−1.35	−0.77			0.18	1.39
SECCOM	−0.031	−0.035			0.008	−0.037
	−0.98	−1.06			0.04	−1.11
Host country regulations						
SOL			0.002	0.001**	−0.001**	0.005
			0.54	2.37	−2.39	1.18
DOC			−0.493**	−0.070*	−0.044*	−0.665***
			−2.43	−1.71	−1.81	−2.78
APA			0.393*	0.028	0.339	0.370
			1.79	0.74	1.48	1.29
SECCOM			0.444**	0.047	0.060**	0.381**
			2.22	1.52	2.25	1.98
Regulations × DifCIT × HighTaxDummy						
SOL			−0.001***	0.004	−0.017	−0.002***
			−2.76	1.00	−0.41	−3.00
DOC			0.043*	0.820***	0.481**	0.040
			1.79	3.51	2.34	0.94
APA			−0.007	−0.350	0.008	−0.102
			−0.21	−1.28	0.20	−1.62

SECCOM			-0.063^{**}	-0.437^{**}	-0.419^{**}	-0.046
			-2.33	-2.27	-2.08	-1.47
Constant	-38.47^{***}	-35.35^{***}	-40.18^{***}	-38.41^{***}	-37.33^{***}	-32.77^{***}
	-11.91	-11.01	-12.43	-11.99	-11.18	-9.45
Obs.	2,747	2,038	2,747	2,038	2,747	2,038
Rsquared	0.242	0.239	0.244	0.237	0.253	0.244
Ftest	$F_{(734,1996)} = 2.19$	$F_{(731,1293)} = 0.58$	$F_{(734,1998)} = 2.17$	$F_{(731,1293)} = 0.13$	$F_{(734,1990)} = 2.12$	$F_{(731,1286)} = 0.22$
	$P = 0.000$	$P = 1.000$	$P = 0.000$	$P = 1.000$	$P = 0.000$	$P = 1.000$
Hausmantest	$chi2(15) = 20.55$	$chi2(11) = 2.82$	$chi2(13) = 14.41$	$chi2(11) = 0.31$	$chi2(20) = 29.40$	$chi2(18) = 1.62$
	$P = 0.152$	$P = 0.993$	$P = 0.345$	$P = 1.000$	$P = 0.080$	$P = 1.000$
Breusch-PaganLMtest	$chibar2(1) = 227.34$		$chibar2(1) = 224.71$		$chibar2(1) = 203.99$	
	$P = 0.000$		$P = 0.000$		$P = 0.000$	

Notes t values in parentheses

***significant at 1 %, **significant at 5 %, *significant at 10 %. P refers to p values

risk because of host countries' SECCOM is important for multinationals when the host countries are high-tax countries.

4.2 Effects of the 2010 Reform

In the previous subsection, we do not use pricing methods and transfer pricing penalties. Adding the two variables as independent variables does not change our results, because the variables have no significant effects on FDI flows. As we mentioned in Sect. 2, the main feature of the OECD-TPG 2010 reform is the adoption of the most appropriate method. This means that, while the 2010 reform would reduce profit-shifting incentives, it has no impact on FDI flow and FDI incentives related to profit shifting with transfer pricing.

5 Conclusions

We explore the effects of transfer pricing regulations on FDI flows. Among several elements in the regulations, APAs and DOC have significant effects on FDI incentives. In particular, APAs increase and DOC decreases FDI incentives. When host countries have higher tax rates than source countries, the interaction of tax rate difference and DOC has a positive effect and the interaction of tax rate difference and SECCOM has a negative effect on FDI flows. These results show that transfer pricing regulations play an important role in the location decisions of multinationals. We also discuss the impacts of introducing the OECD 2010 guideline on FDI incentives, and we find that the 2010 reform has had no significant effect to date on location decisions.

In this chapter, we discussed our original survey of transfer pricing regulations in 28 countries over four years. To focus on the effects of transfer pricing regulations on FDI incentives, we did not describe it in detail. Discussion using summary statistics is our future work. Data coupling with Lohse et al. (2012) would be useful for improving empirical tests.

In this analysis, we use macro data, however, our future work will investigate FDI incentives using micro data for FDI. In this way, we can check the robustness of our findings and understand differences in the effect of transfer pricing regulations between industries and goods.

In our dataset, we only have 2 years after the 2010 reform. While, as we highlighted, the reform has had no significant effect on FDI incentives, we cannot deny the possibility of appearance of effects of the reform in subsequent data. After obtaining relatively long dataset in the postreform period, we need to reinvestigate the effect using more complex empirical methods.

Appendix: Dataset

Table 6.A1 Sample countries

Country	Lohse et al. (2012)	Our research
Argentina	Yes	
Australia	Yes	Yes
Austria	Yes	Yes
Belgium	Yes	Yes
Brazil	Yes	
Canada	Yes	
Chile	Yes	Yes
China	Yes	
Colombia	Yes	
Czech Republic	Yes	Yes
Denmark	Yes	Yes
Ecuador	Yes	
Estonia[a]		Yes
Finland	Yes	Yes
France	Yes	Yes
Germany	Yes	Yes
Greece	Yes	Yes
Hungary	Yes	Yes
India	Yes	
Indonesia	Yes	
Ireland	Yes	Yes
Israel[a]		Yes
Italy	Yes	Yes
Japan	Yes	Yes
Luxembourg	Yes	Yes
Malaysia	Yes	
Mexico	Yes	
Netherlands	Yes	Yes
Norway	Yes	Yes
Peru	Yes	
Philippines	Yes	
Poland	Yes	Yes
Portugal	Yes	Yes
Romania	Yes	
Russia	Yes	
Slovak Republic	Yes	
Slovenia	Yes	Yes
Spain	Yes	Yes
Sweden	Yes	Yes

(continued)

Table 6.A1 (continued)

Country	Lohse et al. (2012)	Our research
Switzerland	Yes	Yes
Thailand	Yes	
Turkey[a]		Yes
Ukraine	Yes	
United Kingdom	Yes	Yes
United States	Yes	Yes
Venezuela	Yes	
Vietnam	Yes	

[a]indicates that the country's data are not incorporated in the analysis by Lohse et al. (2012).

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Chapter 7
International Comparison of Corporate Taxation Systems

Masahiro Shinohara

Abstract According to a survey of business location costs conducted regularly by KPMG in ten countries (Australia, Canada, France, Germany, Italy, Japan, Mexico, the Netherlands, the UK, and the USA), costs in Japan were 99.2 % of those in the USA in 2014, having fallen drastically compared with 2012 (109.4 %) as a result of the weak yen. Business location costs include labor, facilities, transportation and distribution, utilities, depreciation, financing, and tax. The survey covered a range of sectors, including digital services, manufacturing, corporate services, and research and development. Within business location costs, this chapter focuses on taxation and attempts an international comparison. However, the aim is not a simple institutional comparison, but rather an examination of the state of Japan's corporate taxation and its reform from an international perspective.

1 Introduction

According to a survey of business location costs (Table 7.1) conducted regularly by KPMG in ten countries (Australia, Canada, France, Germany, Italy, Japan, Mexico, the Netherlands, the UK, and the USA), costs in Japan are 99.2 % of those in the USA in 2014, having fallen drastically compared with 2012 (109.4 %) as a result of the weak yen. Business location costs include labor, facilities, transportation and distribution, utilities, depreciation, financing, and tax (see KPMG (2014b)). The survey covered a range of sectors, including digital services, manufacturing, corporate services, and research and development (R&D).

Within business location costs, this chapter focuses on taxation and attempts an international comparison. However, the aim is not a simple institutional comparison, but rather an examination of the state of Japan's corporate taxation and its reform from an international perspective.

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Table 7.1 International comparison of business location costs

	Australia	Canada	France	Germany	Italy	Japan	Mexico	Netherlands	UK	USA
2012	103.7	95.0	96.1	100.1	97.9	109.4	79.0	94.7	94.5	100.0
2014	99.3	92.8	97.4	100.9	98.8	99.2	81.3	94.5	94.6	100.0

Source: KPMG (2014a), p. 2

The chapter is structured as follows. First, it examines the corporate taxation of the world's major developed countries through a comparison of their effective tax rates. Second, in order to explicitly position corporate taxation reform within the context of wider tax reform, it outlines the tax reform trends in Organisation for Economic Co-operation and Development (OECD) countries after the bankruptcy of the Lehman Brothers. Third, with regard to corporate taxation reform, the chapter introduces the cases of New Zealand and France to highlight the debate in developed countries surrounding capital income taxation and property holding tax, while at the same time focusing on the Japanese Tax Commission report (Japan Tax Commission (2014)). Finally, based on the above, we comment on future corporate taxation reform in Japan.

2   The Current State of Corporate Taxation

2.1   Corporate Taxation Concepts

Corporate taxation is made up of tax and social insurance contributions by employers. Tax generally includes taxes on income and property, and does not include taxes on consumption due to be shifted by companies. Social insurance contributions are of the same nature as tax in that their payment to the state is compulsory, and therefore they are treated as tax here.

The amount of corporate taxation can be measured based on two major indicators, broadly speaking – the backward-looking effective tax rate and the forward-looking effective tax rate. The former focuses on the public contributions actually made by companies in the past, and the latter on those they are predicted to pay on their future investments (hypothetical investments). It is the forward-looking effective tax rate that affects companies' decisions to invest.

The backward-looking effective tax rate is calculated with total income, gross domestic product (GDP) or value added as the denominator, and tax amount as the numerator. The forward-looking effective tax rate involves the concepts of effective marginal tax rate (EMTR) and effective average tax rate (EATR). EMTR is shown in Formula (7.1). $\widetilde{p}$ represents the real cost of capital before tax, and s represents the rate of return after tax. If we take p to be the pre-tax net rate of return, then EATR is given by Formula (7.2), and is calculated as the weighted average of the EMTR and the statutory tax rate τ (see Devereux & Griffith (1998),

p. 21). The EMTR affects decisions on optimal investment scale, and the EATR affects selection of production bases (see Devereux (2007), pp. 9–13).

$$\text{EMTR} = \frac{\widetilde{p} - s}{\widetilde{p}} \tag{7.1}$$

$$\text{EATR} = \frac{\widetilde{p}}{p} \times \text{EMTR} + \frac{p - \widetilde{p}}{p} \times \tau \tag{7.2}$$

2.2 International Comparison of Effective Tax Rates

2.2.1 Backward-Looking Effective Tax Rate

The World Bank and PricewaterhouseCoopers (2014) estimated the proportion of pre-tax profit of a model medium-sized enterprise (see The World Bank and PricewaterhouseCoopers (2014), p. 140) that would be used in 2012 to pay corporate income taxes (national and local), property taxes (property holding tax, property transfer tax), social insurance contributions by employers, and payroll tax, in 189 different countries. Their report separates corporate taxation into profit taxes, labor taxes, and other taxes, and deems corporate income taxes to be profit taxes, social insurance contributions, and payroll tax to be labour taxes, and property taxes to be classified as other taxes.

The results of the report are given in Table 7.2. The total contribution in Japan was 49.7 %, which is lower than that of Italy and France, but higher than that of the USA, UK, and Germany. It is also substantially higher than the rate in other Asian countries such as South Korea, Singapore, and Hong Kong SAR.

Table 7.2 Proportion of pre-tax profit contributed by corporations as tax (2012, %)

	Profit taxes	Labor taxes	Other taxes	Total
USA	27.9	9.9	8.5	46.3
UK	21.6	10.6	1.8	34.0
Germany	23.0	21.8	4.6	49.4
France	8.7	51.7	4.3	64.7
Japan	27.2	17.9	4.6	49.7
Italy	20.3	43.4	2.1	65.8
Sweden	16.0	35.5	0.5	52.0
South Korea	14.2	13.4	0.3	27.9
Singapore	4.9	17.6	4.6	27.1
Hong Kong SAR	17.5	5.3	0.1	22.9

Source: The World Bank and PricewaterhouseCoopers (2014), pp. 173–175

2.2.2 Forward-Looking Effective Tax Rate

Spengel et al. (2012a) estimated the effective tax rates (EMTR and EATR) of corporate income taxes (national and regional) and property taxes (real estate tax, annual wealth tax, etc.) at the corporate and shareholder levels. They also estimated the cost of capital for SMEs and partnerships at the shareholder level. Included in the study were 27 EU countries[1] along with eight other countries (Croatia, the Former Yugoslav Republic of Macedonia, Norway, Switzerland, Turkey, Canada, Japan, and the USA), and the periods in question were 1998–2012 for the EU countries and 2005–2012 for the remaining eight countries.

Additionally, Spengel et al. (2012b) estimated effective tax rates (EMTR and EATR) by industry. The countries investigated in this study were 13 EU countries (Austria, the Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Slovenia, Spain, Sweden, and the UK) along with the USA, and Japan.

Figures 7.1 and 7.2 show changes in the EMTR and EATR at the corporate level for seven of the major developed countries covered by Spengel et al. (2012a). The

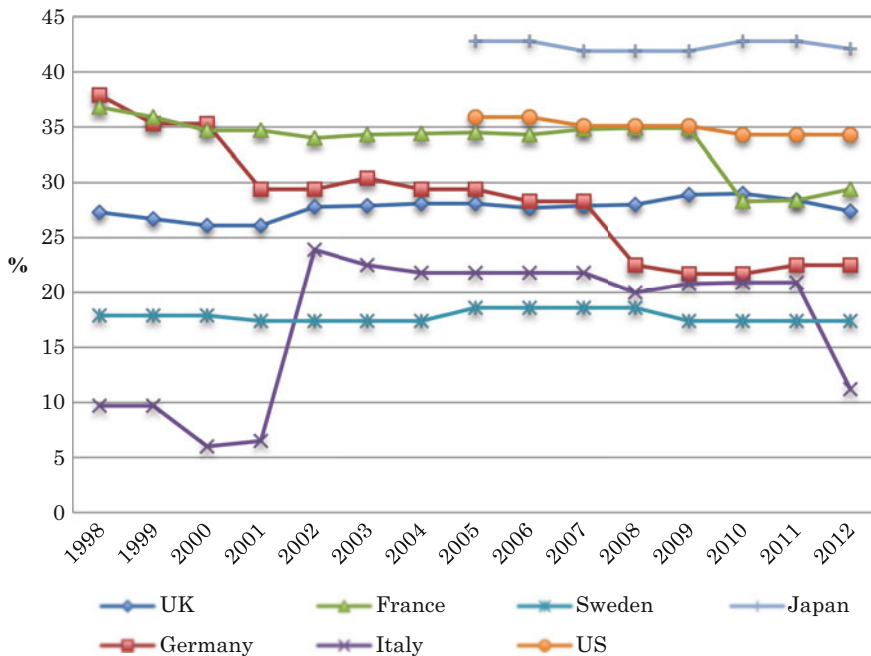**Fig. 7.1** Changes in effective marginal tax rate (EMTR) in seven major developed countries (Source: Spengel et al. (2012a))

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[1] Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, and the UK.
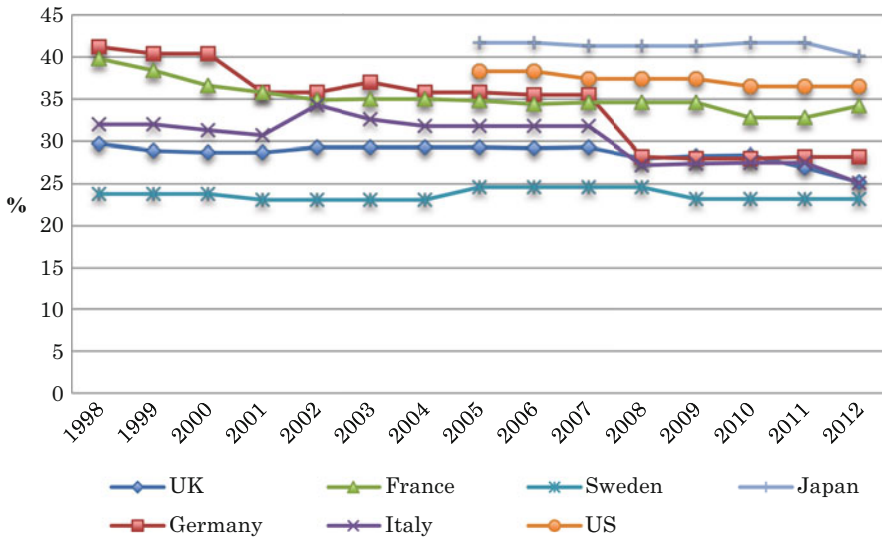
Fig. 7.2 Changes in effective average tax rate (EATR) in seven major developed countries (Source: Spengel et al. (2012a))

EMTR and EATR in Japan in 2012 were 42.1 and 40.1 %, respectively, the highest of the seven major countries depicted.

2.3 Corporate Taxation Reform

2.3.1 Trends in Tax Reform in OECD Countries

The global financial crisis caused by the bankruptcy of the Lehman Brothers in September 2008 drove most of the OECD countries into recession[2]. When we compare figures before and after the bankruptcy (all the following figures are OECD averages), the real GDP growth rate fell from 2.6 % (average between 2002 and 2007) to −3.6 % (2009), and unemployment rates grew from 5.7 % (2007) to 8.3 % (2009). Moreover, general government budget deficits as a proportion of GDP worsened from −1.3 % (2007) to −8.2 % (2009). Although a recovery trend was observed from 2010, with real GDP climbing to 1.2 % in 2013 and general government budget deficit as a proportion of GDP recovering to −4.3 %, the unemployment rate was still high at 8.1 %.

Given these kinds of changes in economic conditions, the OECD countries are seeking to rebuild their taxation systems that simultaneously promote economic growth and reduce government debt. Regarding growth-oriented tax reform, the

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[2] The following is from Brys et al. (2011) and LeBlanc et al. (2013).

OECD (2010) found the following: (1) reducing income taxes and increasing consumption and recurrent residential property taxes promotes economic growth (assuming revenue neutrality); (2) the most detrimental tax to economic growth is corporate income taxes, followed by individual income taxes, consumption taxes, and recurrent taxes on residential property; (3) broad-base–low-rate (BBLR) approaches and policies that rectify externalities (e.g., tax assistance for R&D investments) promote economic growth.

With the above in mind, let us examine trends in tax reform in OECD countries after the Lehman Brothers bankruptcy. First, corporate income taxes have seen a lowering of corporate tax rate, and reductions in investment and R&D taxes, with the objective of promoting corporate investment. With regard to individual income taxes, maximum income tax rates are being raised, capital income (interest, dividends, and capital gains) taxation is being strengthened, and high-income earner privileges are being curtailed, with the aim of income redistribution and securing tax revenue. In addition, a range of both supply and demand measures are being taken to promote employment of lower-paid, lower-skilled workers, such as reducing the social insurance contributions by employers and expanding in-work tax credits.

With regard to consumption taxes, value-added tax rates are being raised with the aim of securing tax revenue. However, due to decreases in housing prices after 2008 (or reduced housing appreciation rates), few moves to raise asset tax revenue have been observed, particularly taxes on residential property.

2.3.2   Debate on Corporate Taxation in Japan

Corporate Income Taxes

The Tax Commission (2014) argues for growth-oriented corporate tax reform through the simultaneous broadening of tax base and lowering of tax rates. Another important issue is the balancing of such reform with fiscal reconstruction, and thus the Commission points to the necessity of not only working towards revenue neutrality within corporate tax, but also revising other items of taxation. Moreover, it points out that Japan need not necessarily achieve revenue neutrality on a single fiscal year basis.

The combined rate of national and local corporate income taxes in Japan was 38.01 % in 2014 (26.08 % for national and 11.93 % for local).[3] This level of taxation is relatively high compared with other major developed countries and Asian countries, and when we consider the need to strengthen Japan's competitiveness as a site for corporate investment and the competitiveness of Japanese businesses, it is necessary to lower tax rates even further. In terms of broadening the tax

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[3] This is the sum of national tax and local tax rates and adjusts for the deductible part of corporate income tax contributions.

base, the Commission recommends reviewing special taxation measures, loss carryover deduction schemes, schemes for exclusion of dividend income etc. from gross revenue, depreciation schemes, and the inclusion of local taxes (corporate enterprise tax and fixed asset tax) as a deductible expense. It also suggests the structure of taxes for small- and medium-size corporations and public-service corporations should be examined.

Local corporate income taxes comprise corporate enterprise tax and corporate inhabitant tax. For corporate enterprise tax, the Tax Commission holds that the size-based taxation system[4] introduced in part in 2004 should be expanded. Specifically, it recommends the introduction of a value-added base for corporations with 100 million yen of capital or less and the switch from a capital base to a value-added base. The above assumes that the tax basis for corporate enterprise tax conforms to the benefit principle and is based on the judgment that value added is more appropriate than capital as an indicator of the scale of business activities.

Corporate inhabitant tax is made up on a per capita basis,[5] which determines the taxation amount based on a company's capital (including working capital and capital surplus reserve) and number of employees, as well as corporation tax base, which uses national corporate tax as its tax base. The Commission recommends increasing the per capita basis and reducing the corporate tax basis, with the objective of strengthening the relationship between local tax contributions and public services, rectifying uneven tax revenues between localities, and securing stable tax revenue. It also suggests that the current standards for calculating the per capita basis, i.e., the amount of capital and number of workers, should be reviewed as it does not appropriately reflect company size.

Along with the above corporate income taxation reforms, the report also recommends strengthening of individual capital income taxation and review of employment income deductions. The former is because corporate income tax is by nature the prepayment of individual income tax. The latter is because treating the business form to be the corporate form means the business operator's wages are not only subject to inclusion in corporate tax expenses, but also to employment income deduction within income tax, and this increases the incentive to incorporate.[6]

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[4] This system applies to corporations with 100 million yen or more of capital and is a tax payable on added value and capital on top of the income base. In 2011, corporations subject to it accounted for 1.2 % of all corporations, and the relevant tax paid accounted for 30.4 % of all corporate enterprise tax (Ministry of Internal Affairs and Communications, Local Tax Bureau (2013), p. 105).

[5] For prefectural inhabitants' tax, the contribution amount is determined by the amount of capital, and for municipal inhabitants tax it is determined by the amount of capital as well as number of employees (Ministry of Internal Affairs and Communications, Local Tax Bureau (2013), p. 99).

[6] Lowering corporate tax rates and increasing the gap with income tax rates also creates incentive to incorporate. For this reason, there is a need to review lower tax rates for small- and medium-size corporations.

Property Taxes

With regard to property taxes, the report identifies the importance of enhancing fixed asset tax[7] to strengthen the relationship between local tax contributions and public services.

Although not mentioned by the Tax Commission (2014), one problem with property taxes on companies is the fixed asset tax involved in depreciable business assets. Depreciable business assets are made up of construction (e.g., bridges, railways, dams), machinery and equipment (e.g., refrigeration devices, office automation equipments, communications equipment), tools, instruments and fixtures, and others (e.g., ships, vehicles, aircraft). Revenue from fixed asset tax payable on depreciable assets accounted for 7.7 % of municipal tax revenue and 17.5 % of fixed asset tax revenue in 2011.

The business community is calling for the abolition or easing of this kind of taxation (see Japan Federation of Economic Organizations 2013). Reasons for this include that (1) it is rare among other countries to pay tax on depreciable business assets; (2) tax contributions become skewed towards particular sectors; (3) it decreases the incentive for businesses to invest in facilities or equipment and hinders employment; and (4) it makes Japan less internationally competitive and brings about the hollowing out of industry.

2.3.3 Debate on Corporate Taxation Reform in Developed Countries

New Zealand

New Zealand's 2010 tax reform was the largest in scale since the tax reform conducted in the 1980s under the Labour Party government[8]. The basic framework for the reform was a BBLR policy, and it involved lowering income taxation rates (income tax and corporate tax) whilst reviewing the depreciation schemes and thin capitalization rules. In order to promote economic growth, the country also reduced income taxes while raising Goods and Services Tax (GST) and increased the relative dependence of the tax system on consumption taxes.

The 2010 tax reform took place within a context of a falling rate of economic growth, a negative private saving rate, and a budget deficit. The population of New Zealand is also aging, albeit gradually, and the government considered stable financing necessary in order to respond to aging in the long term.

Before the reform, the New Zealand tax system was centered on income taxes, and there was a high risk of constraining economic growth. With regard to individual income tax, issues included the effect that the low-income level for application of the highest tax rate had on incentive for taxpayers to work and save, as well as the effect it had on tax avoidance. There was also the issue of labor

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[7] Tax objects are land, buildings, and depreciable assets. These are taxed at the municipal levels. They accounted for 44.0 % of municipal tax revenue in the 2011 financial year.

[8] The below is based on Shinohara (2012) and Shinohara (2013).

emigration to Australia due to its lower EATR. Finally, the benefit payment tax credit system raised the EMTR, again affecting the incentive to work and save.

With regard to corporate tax, the first concern was that the statutory tax rate was higher than the OECD average, and was causing fears of controls on inwards investments and an acceleration of profits heading overseas. Second, the allowable limits of deductible expenses on interest paid by foreign corporations to domestic parent companies was set quite high, reducing corporate tax revenue. Third, the generous depreciation measures in place were inhibiting investment neutrality as well as reducing tax revenue. Finally, there was a gap between the maximum individual income tax rate and the corporate tax rate, encouraging tax avoidance in corporate and investment entities by high-income earners.

In the 2010 tax reform, New Zealand considered two different methods for capital income taxation: (1) setting the maximum income tax rate equal to tax rates of corporations and investment entities; and (2) allowing a gap between the maximum income tax rate and tax rates for corporations and investment entities. The second method included options between (3) significantly lowering the corporate tax rate, (4) dual income tax, (5) ACE (Allowance for Corporate Equity: a taxation method that allows not only interest paid but also share issuance opportunity costs to be tax deductible), and (6) a combination of dual income tax and ACE.

In the past (in 1987 and between 1989 and 1999), the government had chosen the first method. However, this had become difficult to maintain given international pressure to lower corporate tax rates. In the end, a version of the second method that closed the gap as much as possible between the maximum individual tax rate and tax rates for corporations and investment entities was selected for the reform. Methods 3 through 6 were not taken up, since economic rent (excess profits) in New Zealand centers around region-specific rent (which arises where companies conduct their business activities in a particular country because of abundant natural resources, low labor costs, or well-established infrastructure), labor immigration in New Zealand is strong, there is strong opposition to capital gains tax, and there was concern that taxation system changes would encourage tax evasion.

France

In France, depreciable business assets were subject to occupation tax or '*taxe professionnelle*' (established in 1975). *Taxe professionnelle* is one kind of fundamental local tax; it accounted for around 30 % of local tax revenue in 2009. However, since President Chirac announced plans for its abolition in 2004, moves to eliminate it accelerated, concluding with the replacement of *taxe professionnelle* with a regional economic tax or '*Contribution Économique Territorial*' (CET) by the 2010 Finance Act.[9]

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[9] CET is composed of corporate real estate tax (*Cotisation Foncière des Entreprises*, CFE) and corporate value-added tax (*Cotisation sur la Valeur Ajoutée des Entreprises*, CVAE). The proportion of the *taxe professionnelle* base accounted for by business real estate was replaced by CFE, and that accounted for by depreciable business assets was replaced by CVAE.

Reasons why *taxe professionnelle* was abolished, explained below, include the fact that approximately 80 % of its tax base prior to reform was made up of asset value of depreciatory business assets, which was thought to inhibit business investment and employment,[10] and taxes on business depreciable assets did not exist in any other EU nations, decreasing global competitiveness.

First, *taxe professionnelle* increases business costs and inhibits investment. These kinds of effects are felt the most in capital-intensive industries such as manufacturing, and in loss-making and newly established enterprises.

The constraining of investment prompted the consideration of effects on not only domestic companies' domestic investment but also domestic companies' selection of production base locations, and investment by foreign companies in France.

Taxe professionnelle puts a relatively large burden on capital-intensive industries and reduces the global competitiveness (cost competitiveness) of affected industries. It runs the risk of companies increasing their foreign direct investment and foreign outsourcing in order to cut production costs. In fact, France has been losing cost competitiveness since the 1990s. However, the main reason for this is thought to be the increasing cost of wages. In 2008, the unit wage cost (wage cost per hour of work) in France was the second highest in the Eurozone after Belgium. In addition, according to a 2008 questionnaire conducted by L'Institut National de la Statistique et des Études Économiques (INSEE) in collaboration with *Comité National des Conseillers du Commerce Extérieur de la France* (CNCCEF) covering 4,000 manufacturing companies with 20 or more employees, 'low-cost labor', 'proximity to clients', and 'relaxed regulations' ranked higher than 'taxation' (corporate tax and *taxe professionnelle*) as motivations for moving production activities in the manufacturing industry overseas.

With regard to foreign investment in France, there was great concern that the fact that tax on depreciatory business assets did not exist in other EU countries would reduce the appeal of France as a site for investment. However, investment in France is actually going well. Although the fact that the EATR of corporate taxes in France is the highest of all EU countries is a disadvantage of doing business there, advantages exist (such as high levels of infrastructure and high-quality labor) that outweigh it. The country is thus considered a very appealing site for investment by foreign companies.

Second, there is a possibility that *taxe professionnelle* constrains employment due to reduced labor productivity and increased foreign direct investment and foreign outsourcing. In fact, if we look at changes in employees by industry after 1990, the number of employees in manufacturing has been declining. Reasons for this include outsourcing to foreign firms and partial relocation of production activities overseas.

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[10] The base of *taxe professionnelle* in 2009 was 17.7 % real estate rental value, 79.7 % depreciable asset rental value, and 2.6 % business revenue.

3 Conclusions

When looking at the state of Japan's corporate taxation in recent years in comparison with effective tax rates in other countries, we see that its forward-looking EMTR and forward-looking EATR are both higher than those of other major developed countries (the USA, the UK, Germany, and France). Moreover, the backward-looking effective tax rate is also higher than that of the USA, the UK, and Germany.

After the bankruptcy of the Lehman Brothers, OECD countries have been seeking to rebuild their taxation systems, balancing economic growth with reduction of budget deficits. Revising tax structures and BBLR are two methods of growth-oriented tax reform, while New Zealand's 2010 tax reform is one example of a radical tax reform conducted from this perspective.

The Japanese Tax Commission (2014) gives recommendations on corporate taxation reform from a similar perspective. With regard to tax structures, the Commission's report recommends reducing corporate income tax, strengthening individual capital income taxation, and strengthening property holding tax (fixed asset tax). However, the government should also consider the effect of these reforms coupled with rises in the consumption tax on economic growth.[11] The author conducted a time series analysis regarding the relationship between tax structures and economic growth in Japan based on tax revenue neutrality. This analysis observed that (1) reducing income taxes and property taxes while increasing consumption taxes has a positive effect on economic growth, and (2) high corporate income taxes negatively affect economic growth, while high individual income taxes positively affect economic growth (see Shinohara (2014a, b)).

Furthermore, although it was not explicitly mentioned by the Tax Commission (2014), there is also a need to review the structure of fixed asset tax on depreciatory business assets. If we look at the situation in other developed countries, cases like France, where taxes on such assets have been abolished, suggest a need to also either eliminate or reduce fixed asset tax on depreciatory business assets in Japan. However, the reasons for opposing such a move put forth by the business community (Sect. 7.2.2) stop at merely identifying the possibility for consequences, failing to proffer supporting facts except for (1). In the case of Japan, little progress has been made in analyzing the state of a fixed asset tax on depreciable business assets or its effectiveness. Without such analysis, it is difficult to debate possible schemes for a fixed asset tax on depreciable business assets, and therefore further research is desirable.

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[11] The Japanese version of value-added tax, consumption tax, was increased from 5 % to 8 % in April 2014, and another increase to 10 % is planned for 2015.

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Chapter 8
Features of Industrial and Economic Structure as Factors for Firms' Location Selections: An Analysis of ASEAN Countries

Mitsuhiro Hayashi

Abstract Globalization in economic activities has had a large impact on the behavior of firms. Recently, with the progress of globalization, firms tend to fragment activities and functions of their production, sales, and management into many processes, and to concentrate production bases in a limited area or disperse them into various areas. While location trends of firms have an impact on industrial and trade structures in each region or country, such trends are also influenced by those structures. Clarifying the factors that may influence the choice of location for activities and functions of production, sales, and management is one of the most important tasks for central/local governments in the potential host countries as well as firms. This study, therefore, compares the data and information on the economy, industry, trade, and investment between the four Association of Southeast Asian Nations (ASEAN) member countries (Indonesia, Malaysia, the Philippines, and Thailand) and attempts to elucidate the industrial and economic features of those countries. Such a comparison analysis would provide us with basic information that can clarify how industrial locations and each country's participation in the international production and distribution networks are decided. This study pays special attention to the manufacturing industry, and in particular, to the processing and assembly production type machinery industry, which intensively entails the inter-process division of labor.

Keywords ASEAN • Industrial structure • Business environment • Foreign direct investment

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1 Introduction

Globalization in economic activities has had a large impact on the behavior of firms. Recently, with the progress of globalization, firms tend to fragment activities and functions of their production, sales, and management into many processes, and to concentrate bases for the division of labor among those processes or disperse them into various areas.[1] While location trends of firms have an impact on industrial and trade structures in each region or country, such trends are also influenced by those structures. Clarifying the factors that may influence the choice of location for activities and functions of production, sales, and management is one of the most important tasks for central/local governments in the potential host countries as well as firms.

When economic activities are undertaken over spatially wide areas, firms will be required to locate their production processes in regions/countries without detailed information. In such a case, firms would decide to locate their own production processes by narrowing down a geographical range in a gradual manner. According to Matsumoto et al. (2013), firms would take the following four steps to make their choice of relevant location: (1) the selection of, from a spatially wide range, optimal locations, including not only the best location but also the second best or feasible locations, based on basic factors and information; (2) the selection of a particular country from among the optimal locations given the economic and social characteristics; (3) the selection of, from the particular country, a particular city that can minimize the production cost for production processes; and (4) the selection of a specific area as a final location point from the particular city given the convenience of land and transportation.

Using several Association of Southeast Asian Nations (ASEAN) member countries as cases, this paper shows current situations and characteristics of the economy, industry, foreign trade, investment, etc. to indicate the important roles of economic features in each country in the firms' location decision-making processes at earlier stages such as step 1 or 2 outlined above. This study deals with four ASEAN member countries, including Thailand, which has been developed as an established production base for processing and assembly production type industry and as a market, together with its neighboring countries Indonesia, Malaysia, and the Philippines. This paper examines the situations of economy, industry, trade and investment in these four countries.

In the following sections, this study compares the data and information on economy, industry, trade, and investment between the four ASEAN member countries, and attempts to elucidate the industrial and economic features of those countries. Such a comparison analysis would provide us with basic information that can clarify how industrial locations and each country's participation in international production networks are decided. This paper pays special attention to the

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[1] While there are many theoretical studies concerning the division or fragmentation of production, Shi and Yang (1995) and Malone et al. (2011) are helpful here as a reference.

manufacturing industry, and in particular, to the processing and assembly production type machinery industry, which intensively involves fragmentation of production processes in the international division of labor.

2 Basic Characteristics of ASEAN Countries

Table 8.1 shows that Indonesia is the largest of the four ASEAN countries in terms of land area, population, and economic size. Indonesia has an area of 1.8 million km^2 (about five times larger than Japan) and is rich in natural and agricultural resources such as natural gas, coal, tin, copper, nickel, bauxite, rubber, and palm oil. In 2010, Indonesia had a population of 240 million people and a gross domestic product (GDP) of US$700 billion, with an average annual growth rate of 5.2 % for the 10 years from 2000. It is presumed that the size of both production and the market in Indonesia is large. GDP per capita has grown to nearly US$3,000 in 2010 from only US$800 in 2000 following the Asian economic crisis. Such a rise in people's purchasing power in Indonesia, along with the massive population, has increased the attractiveness of the market.

Malaysia comprises the Malay Peninsula and the northern side of the island of Borneo and has an area of 330,000 km^2 (equivalent to almost 90 % of the size of Japan), in which 28 million people live. GDP has grown at an average annual rate of 4.6 % for the 10 years from 2000 to reach US$238 billion in 2010. Malaysia's per capita GDP in 2010 became more than US$8,000, the highest among the four ASEAN countries. Although the population is relatively small, per capita income has been rising, as has the middle-income population, as might be expected of a country aiming to join the ranks of developed countries by 2020.

The Philippines is an island country consisting of approximately 7,000 islands, including three main islands of Luzon, Visayas, and Mindanao. The total land area of the Philippines is around 300,000 km^2, almost equal to that of Malaysia. It has a population of 93 million people, the second largest population in the four ASEAN countries, next to Indonesia. Its GDP has grown at an average annual rate of 4.8 % over the past 10 years since 2000. However, the Philippines has a GDP of approximately US$200 billion and per capita GDP of around US$2,100, both of which are the lowest among the four countries in 2010. Although the Philippines was ahead of the pack among southeast Asian countries in terms of per capita GDP during the 1950–1960 period, its economic levels have currently been low.

Thailand has a land area of 510,000 km^2 (about 1.4 times larger than Japan) and a population of nearly 70 million people. GDP in Thailand was about US$320 billion in 2010 and has been expanding annually at 4.3 % over the 10 years since 2000. It holds about US$4,600 of GDP per capita, which is the second highest, next to Malaysia, among the four ASEAN member countries.

Table 8.1 Basic indicators: Indonesia, Malaysia, Philippines, and Thailand

	Indonesia	Malaysia	Philippines	Thailand
Land area (2010, 1,000 km^2)	1,812	329	298	511
Population (2010, million people)	239.9	28.4	93.3	69.1
GDP (2010, US\$ millions)	706,558	237,797	199,589	318,522
GDP average annual growth rate (2000–2010, %)	5.2	4.6	4.8	4.3
GDP per capita (2010, US\$)	2,946	8,373	2,140	4,608

Source: World Bank 2012, *World Development Indicators & Global Development Finance* (online)

3 Industrial Structures of ASEAN Countries

Table 8.2 shows that secondary industries in Indonesia accounted for nearly 50 % of GDP in 2010, while tertiary industries accounted for more than 35 % of GDP. This represents Indonesia's transformation from an agricultural-centered economy to an industrial- and service-oriented economy. As stated above, value added is large in the mining and manufacturing industry. Value added to the manufacturing industry is particularly significant and accounts for 25 % of the total value added. According to 2007 United Nations Industrial Development Organization (UNIDO) data, the Indonesian manufacturing industry comprises, on a GDP basis, light industries of 40 % and heavy and chemical industries of nearly 60 %, where the share of the latter exceeds that of the former. While food and textile/apparel industries classified as light industries are large in the manufacturing industry, the machinery industry classified as heavy and chemical industries has also become a sector capable of generating more than 20 % of the manufacturing GDP. Among the machinery industry, electrical and electronics industries and automobile and other transport machinery industries, which are typical processing and assembly industries and have an established international production and distribution network, account for a total of nearly 20 % of the manufacturing GDP and their economic influence has been growing.

In terms of the sectoral composition of Malaysia's GDP, the secondary and tertiary industries each account for roughly 45 %, which illustrates a shift from an agriculture-based to a manufacturing- and service-based economy. While the mining and energy sectors that extract and/or produce oil, natural gas, tin, etc. have a strong presence in the economy, the manufacturing industry has developed and occupied nearly 60 % of GDP of the secondary industry, as well as over 25 % of the total GDP. In the manufacturing industry, the proportion of heavy and chemical industries is overwhelmingly significant (more than 80 %). Within this, the chemical industry, including petroleum refining and basic chemicals, accounts for nearly 50 %; the machinery industry accounts for the other 50 %. Over two-thirds of the machinery industry or more than a quarter of the overall manufacturing industry is accounted for by the electrical and electronics industry, one of the most active sectors in Malaysia.

Table 8.2 Indicators for industrial structures: Indonesia, Malaysia, Philippines, and Thailand

	Indonesia	Malaysia	Philippines	Thailand
A. Sectoral composition of overall GDP (2010, %)				
1. Primary industry	15.3	10.6	12.3	12.4
2. Secondary industry	47.1	44.4	32.6	44.6
2.1 Manufacturing industry	24.8	26.1	21.4	35.6
3. Tertiary industry	37.6	45.0	55.1	43.0
Total (1 + 2 + 3)	100.0	100.0	100.0	100.0
B. Sectoral composition of manufacturing GDP (2007, %)[a, b]				
1. Light industry	43.0	16.6	30.4	29.3
1.1 Food industry	25.6	9.1	22.3	15.7
1.2 Textile/apparel industry	10.1	1.8	4.4	7.2
2. Heavy and chemical industry	57.0	83.4	69.6	70.7
2.1 Machinery industry	22.5	38.0	40.4	45.3
2.1.1 Electric/electronics industry	5.3	27.2	31.3	20.2
2.1.2 Automobile/transport machinery industry	13.2	4.3	3.9	14.2
Total (1 + 2 + 3)	100.0	100.0	100.0	100.0

[a]Based on the UN ISIC (International Standard Industrial Classification Rev 3), sectors are classified as follows. Light industry: ISIC 15–20 + 36 + 37; Food: ISIC 15 + 16; Textile/apparel: ISIC 17 + 18, Heavy and chemical industry: ISIC 21–35; Machinery: ISIC 28–35; Electric/electronics: ISIC 30–33; Automobile/transport machine: ISIC 34 + 35
[b]Data for the Philippines and Thailand refer to 2006
Sources: Sectoral composition of overall GDP: World Bank 2012, *World Development Indicators & Global Development Finance* (online). Sectoral composition of manufacturing GDP: Calculated from UNIDO, 2012, *Statistical Country Briefs* (online)

As shown in Table 8.2, in terms of GDP, the economy in the Philippines in 2010 comprises 55 % tertiary industry, 33 % secondary industry, and 12 % primary industry. The contribution of business processing outsourcing (BPO) to a rapid growth of the service industry in the country is becoming more significant. The manufacturing industry in the Philippines, which accounts for only 20 % of GDP, has not played a prominent role compared with the other three ASEAN countries. A breakdown of the manufacturing GDP by sector, based on UNIDO data, indicates that the manufacturing industry consists of light industries at 30 % and heavy and chemical industries at 70 %. In the light industries, the food industry stands out and accounts for more than 20 % of the total manufacturing GDP. The machinery industry accounts for a large proportion of the heavy and chemical industries, at 40 % of the manufacturing value added. Of the machinery industry, the electrical and electronics industry, dominated by the semiconductor industry, accounts for a considerable share of GDP: almost 80 % of the machinery industry and more than 30 % of the manufacturing industry. The automobile and other transport machinery industry is significantly smaller than the electrical and electronics industry in terms of value added and only accounts for 10 % of the machinery industry and 4 % of the manufacturing industry.

In Thailand, the secondary industry and the tertiary industry each account for nearly 45 % of overall GDP, which indicates a shift from 'Thailand, the agricultural country' to 'Thailand is increasingly an industrialization and services-based economy.' In fact, the manufacturing industry generates 35 % of the total GDP in Thailand. In terms of the proportion of manufacturing GDP, Thailand is the most industrialized economy among the four ASEAN member countries.

The sectoral composition of value added in the manufacturing industry shows that great progress has been made with heavy and chemical industrialization in Thailand. Among these industries, which generate more than 70 % of the manufacturing value added, the largest sector is the machinery industry, of which the electrical and electronics industry and the automobile and other transport machinery industry have a large share, accounting for 20 and 15 %, respectively, of the manufacturing value added. Among the four ASEAN member countries, Thailand has the highest proportion of automobile value added to manufacturing. This would indicate that Thailand has been fostering and developing its automobile industry as the Asian Detroit, as a result of active attraction and agglomeration of automobile assembly firms and automotive supporting industries through policy measures for industrial development and investment promotion implemented by the Thai government since the 1980–1990 period.

4 Trade Structure and Trade of Processing and Assembly Production Type Machinery Industry in ASEAN Countries

Table 8.3 shows that, in Indonesia, the ratio of merchandise trade value to GDP (total merchandise exports and merchandise imports divided by GDP) in 2010 is approximately 40 % and the trade surplus is US$26 billion. These figures indicate that (1) Indonesia is relatively less dependent on trade than the other ASEAN countries due to its large-scale national economy; and (2) Indonesia records an excess of merchandise exports over merchandise imports.

In Indonesia, primary commodities account for more than 60 % of merchandise exports, of which the major items are fuel resources such as oil, natural gas, and coal; the rest include agricultural products and non-fuel mineral resources. Although Indonesia has been shifting to a manufacturing- and service-based economy in terms of industrial structure, it is still reliant on primary commodities in terms of trade structure. A little less than 40 % of the merchandise exports are manufactured goods, of which about one-third are machinery-related items. Most of the machinery items are intermediate and final goods for electrical and electronics products and automobiles and other transport machinery, which are produced and distributed under the international network.

Table 8.3 International trade indicators: Indonesia, Malaysia, Philippines, and Thailand

	Indonesia		Malaysia		Philippines		Thailand	
A. Merchandise trade-GDP-ratio (2010, %)	41.0		152.9		55.0		118.6	
B. Trade balance (2010, US$ millions)	26,081		34,067		−6,733		12,919	
C. Composition of merchandise trade items (2010, %)[a]								
1. Export								
1.1 Primary commodities	63.0		32.7		14.9		28.4	
1.2 Manufactured goods	37.0		67.3		85.1		71.6	
1.2.1 Textile/clothing	7.3		3.0		3.8		4.5	
1.2.2 Machinery	12.4		44.1		70.1		42.2	
1.2.2.1 Electric/electronics	7.6		39.2		63.9		24.4	
1.2.2.2 Automobile/transport machinery	2.5		1.5		4.9		10.3	
Total (1.1 + 1.2)	100.0		100.0		100.0		100.0	
2. Import								
2.1 Primary commodities	34.1		26.4		33.2		33.5	
2.2 Manufactured goods	65.9		73.6		66.8		66.5	
2.2.1 Textile/clothing	5.0		1.2		1.6		2.3	
2.2.2 Machinery	36.3		49.8		47.1		35.3	
2.2.2.1 Electric/electronics	13.7		35.9		35.2		20.2	
2.2.2.2 Automobile/transport machinery	8.3		5.4		6.3		4.7	
Total (2.1 + 2.2)	100.0		100.0		100.0		100.0	
D. Top five trade partners (2010, %)[b]								
Export (electric/electronics)								
1st	Singapore	25.0	China	16.4	Singapore	20.6	China	15.3
2nd	USA	12.1	Singapore	14.5	China	12.9	USA	14.8
3rd	Japan	10.7	USA	14.2	USA	12.9	Hong Kong	11.9
4th	Hong Kong	4.8	Hong Kong	10.1	Japan	12.6	Japan	11.7
5th	Philippines	4.3	Japan	7.3	Hong Kong	11.7	Singapore	5.9

(continued)

Table 8.3 (continued)

Import (electric/electronics)								
1st	Singapore	27.7	China	16.3	USA	18.1	China	26.3
2nd	China	27.1	USA	15.6	Japan	16.4	Japan	22.2
3rd	Japan	10.2	Singapore	11.6	Singapore	11.0	Malaysia	9.5
4th	Hong Kong	6.6	Taiwan	11.2	Taiwan	10.7	Taiwan	7.7
5th	Korea	6.4	Hong Kong	7.9	Korea	10.0	USA	7.4
Export (automobile/components)								
1st	Thailand	17.9	Thailand	13.4	Thailand	30.3	Australia	17.4
2nd	Japan	13.9	Indonesia	13.1	Japan	18.7	Indonesia	10.4
3rd	Saudi Arabia	9.3	China	10.7	Germany	13.6	Malaysia	6.7
4th	Malaysia	9.2	Singapore	7.8	Indonesia	6.1	Saudi Arabia	5.9
5th	Philippines	9.0	Taiwan	6.2	USA	5.3	Japan	5.9
			Japan (7th)	4.6				
Import (automobile/components)								
1st	Japan	41.5	Japan	41.1	Thailand	42.7	Japan	59.5
2nd	Thailand	26.3	Thailand	28.1	Japan	25.2	Indonesia	6.6
3rd	Singapore	7.0	Germany	11.1	Indonesia	10.1	Philippines	6.4
4th	China	6.3	China	4.8	Korea	6.6	Germany	4.9
5th	India	3.5	Indonesia	4.5	China	4.0	China	4.5

[a] Based on the UN SITC (Standard International Trade Classification Rev 3), sectors are classified as follows. Primary commodities: SITC $0+1+2+3+4 +667+68+971$; Manufactured goods: SITC $5+6+7+8$ (excluding 667 and 68); Textile/clothing: SITC $26+65+84$; Machinery: SITC 7; Electric/electronics: SITC $75+76+77$; Automobile/components: SITC $78+79$

[b] This represents major trade partners for Indonesia, Malaysia, Philippines, and Thailand in electric/electronics (SITC $75+76+77$) and automobile/components (SITC 78) and the ratio of exports/imports by trade partner to total exports/imports of those products

Sources: Merchandise trade-GDP-ratio and trade balance: World Bank 2012, *World Development Indicators & Global Development Finance* (online). Composition of merchandise trade items and top five trade partners: Calculated from UNCTAD, 2012, *UNCTADstat* (online)

Meanwhile, two-thirds of the merchandise imports are manufactured goods, more than half of which are machinery-related items dominated by electrical and electronics products and automobiles and automotive components. Most of the intermediate and final goods for those items are imported to Indonesia through the international production and distribution network. Prominent export/import partners for Indonesia in international transactions of input and final goods for electrical and electronics products are Japan, Singapore, China and Hong Kong, and the USA, while those for automobiles and automotive components are Japan, Thailand, Malaysia, the Philippines, and Saudi Arabia.

Table 8.4 shows the proportion of completed cars and automotive components to automobile-related trade. Most of the exports to Saudi Arabia and most of the imports from India are finished vehicles. Production bases for automobiles have not been established in Saudi Arabia, and the division of labor among processes cannot function. Therefore, almost all automobile-related exports from Indonesia to Saudi Arabia are completed cars. Also, at this stage, most of the automobile-related imports from India to Indonesia are finished vehicles. However, since the automobile industry already existed in India and the ASEAN-India free trade agreement (FTA) came into effect in 2010, imports of automotive components from India will gradually increase and the inter-process division of labor in the automobile industry between Indonesia and India will become active. Indonesia has the following export and import relationship with its major trade partners, Japan, Thailand, and other neighboring countries, except for Saudi Arabia and India as stated above: about 60 % of automobile-related exports are intermediate goods, while around 20–40 % of automobile-related imports are input goods. This indicates that Indonesia has already built the international fragmentation of processes in the automobile industry to a certain degree in East Asia.

Table 8.3 illustrates that, in Malaysia, the ratio of merchandise trade value to GDP exceeds 150 %, which suggests its reliance on overseas market due to the relatively small scale of the local economy. Malaysia has maintained an excess of merchandise exports over merchandise imports in recent years and achieved a US $34 billion trade surplus in 2010. Approximately two-thirds of the total merchandise exports and almost three-fourths of the total merchandise imports are manufactured products. Of the manufactured goods exports, a little less than two-thirds are machinery products, of which nearly 90 % are electrical and electronics products. Similar to the sectoral proportion of exports stated above, two-thirds of the merchandise imports are machinery items, of which more than 70 % are electrical and electronics goods. Referring to Table 8.4, Malaysia imports intermediate goods of electrical and electronics items from its major trade partners such as China (including Hong Kong), the USA, Japan, and Singapore, processes them into products with higher value added, and exports such processed or assembled goods to almost the same trade partner countries/economies.

Compared with electrical and electronics products, automobiles and automotive components account for only a small portion of the merchandise exports and

Table 8.4 The ratio of completed cars and automotive components to automobile-related trade: Indonesia, Malaysia, Philippines, and Thailand[a]

	Indonesia			Malaysia			Philippines			Thailand		
	Trade partners	Share of completed cars[b] (%)	Share of components[b] (%)	Trade partners	Share of completed cars[b] (%)	Share of components[b] (%)	Trade partners	Share of completed cars[b] (%)	Share of components[b] (%)	Trade partners	Share of completed cars[b] (%)	Share of components[b] (%)
Export (2010)												
1st	Thailand	40.5	59.5	Thailand	48.2	51.8	Thailand	20.0	80.0	Australia	95.0	5.0
2nd	Japan	35.8	64.2	Indonesia	30.1	69.9	Japan	4.9	95.1	Indonesia	72.2	27.8
3rd	Saudi Arabia	99.5	0.5	China	69.7	30.3	Germany	1.1	98.9	Malaysia	57.3	42.7
4th	Malaysia	40.2	59.8	Singapore	34.4	65.6	Indonesia	13.8	86.2	Saudi Arabia	95.5	4.5
5th	Philippines	68.8	31.2	Taiwan	72.4	27.6	USA	1.9	98.1	Japan	45.9	54.1
				Japan (7th)	17.1	82.9						
Export as a whole (average)		57.0	43.0		48.8	51.2		10.2	89.8		77.4	22.6
Import (2010)												
1st	Japan	64.6	35.4	Japan	77.6	22.4	Thailand	95.5	4.5	Japan	18.0	82.0
2nd	Thailand	69.9	30.1	Thailand	62.3	37.7	Japan	72.5	27.5	Indonesia	46.8	53.2
3rd	Singapore	73.3	26.7	Germany	74.4	25.6	Indonesia	80.9	19.1	Philippines	24.6	75.4
4th	China	79.1	20.9	China	61.8	38.2	Korea	95.9	4.1	Germany	52.0	48.0
5th	India	93.9	6.1	Indonesia	41.1	58.9	China	92.1	7.9	China	53.2	46.8
Import as a whole (average)		67.3	32.7		69.8	30.2		86.7	13.3		26.5	73.5

[a]Automobile-related trade in this table indicates exports and imports of items classified as automobiles (road vehicles, including motorcycles) and automotive components (SITC 78), based on the UN SITC (Standard International Trade Classification Rev 3)

[b]In this table, completed cars are items classified as SITC 78 (excluding 784), and automotive components are items classified as SITC 784. This table represents the ratio of completed cars and automotive components to automobile-related exports to and imports from major trade partners as indicated in Table 8.3

Source: Calculated from UNCTAD, 2012, *UNCTADstat* (online)

imports. However, according to Table 8.4, approximately 20–60 % of the automobile-related imports and 30–80 % of the exports are automotive parts/components categorized as intermediate goods. This trade flow indicates that the Malaysian auto industry has been involved in the inter-process division of labor.

According to Table 8.3, the Philippines has a trade-to-GDP ratio of 55 % and a trade deficit of US$6.7 billion. Among the four ASEAN countries, the Philippines is the second most populated country next to Indonesia and has a local economy on a certain scale. Therefore, it seems less dependent on international trade than Malaysia and Thailand.

In the Philippines, manufactured goods account for 85 % of merchandise exports. More than 80 % of exported manufactured goods are machinery products, around 90 % of which are electrical and electronics goods, the stars of manufactured items in the Philippines. Relative to the electrical and electronics sector, the automobile sector looks less remarkable, accounting for around 7 % of machinery exports. Looking at import, two-thirds of merchandise imports are accounted for by manufactured goods, which is almost the same level as that of the other three ASEAN countries. More than 70 % of imported manufactured goods are machinery items, of which 75 and 13 % are accounted for by electrical and electronics products and automobiles and automotive components, respectively.

The presence of an electrical and electronics sector in the Philippines has been significant and contributes hugely to exports. Many of the firms in this sector tend to branch out into export processing zones, import input goods from major trade partners such as the USA, Japan, Singapore, and Taiwan, process them into products under outsourcing contracts, and export such processed or assembled products with further value added to the major import suppliers as stated above. In terms of the automobile industry, as shown in Table 8.4, mutual trades with Thailand, Indonesia, Japan, etc. have occurred. These indicate that both electrical/electronics and automobile sectors in the Philippines have been involved in the international production and distribution network, particularly in Asia and the USA.

While Thailand also has a local economy on a certain scale, its trade-to-GDP ratio stands at about 120 % (Table 8.3), which indicates a relatively high dependence on foreign trade. Thailand's trade surplus amounted to US$13 billion in 2010. This trade surplus appears to continue over the medium term, driven by the export of manufacturing industry. Manufactured goods, of which 50–60 % are machinery goods dominated by electrical and electronics goods and automobiles and automotive parts/components account for around 70 % of merchandise exports and imports. Electrical and electronics products account for 20 % of merchandise imports and 25 % of merchandise exports, while automobile-related products account for 5 % of merchandise imports and 10 % of merchandise exports.

As for electrical and electronics products, the main import partners are China, Malaysia, Japan, Taiwan, and the USA, while the main export partners are China (including Hong Kong), the USA, Japan, and Singapore. Most of them overlap. Imported intermediate goods from these countries/economies are processed or assembled at factories in Thailand, and those products are exported as input or final goods to such trade partners. This suggests that, similar to Malaysia and the

Philippines, the division of labor among processes has taken place in the Thai electrical and electronics sector, and Thailand has also been involved in the international production and distribution network.

Automobile-related items are imported mainly from Japan, Indonesia, and the Philippines and then exported to those countries as well as Australia and Saudi Arabia after processing or assembling. According to the Japan Finance Corporation for Small and Medium Enterprise (JASME) (2007), Thailand has imported (1) functional parts/components (e.g., engine, transmission, clutch, brake, shock absorber, steering, etc.) and the steel for these parts/components from Japan; and (2) standard parts and functional parts/components from neighboring ASEAN member countries such as Indonesia and the Philippines. Meanwhile, Thailand has exported (1) completed cars to Australia and Saudi Arabia; (2) functional parts/components and completed cars to Indonesia, Malaysia, the Philippines, and other ASEAN countries; and (3) parts and completed cars to Japan. These trade patterns of finished cars and parts/components are clearly demonstrated in Table 8.4. We can confirm the large value and high proportion of exports of completed cars to Australia and the active inter-process division of labor between Thailand and its neighboring countries/economies, including other ASEAN member countries and Japan.

5   Foreign Direct Investment in ASEAN Countries: Trends in Firms' Location Selections

As shown in Table 8.5, foreign direct investment (FDI) in Indonesia amounts to US $13.4 billion in 2010, 1.9 % of GDP. Nearly 60 % of FDI in the manufacturing industry is directed to the heavy and chemical industries, of which 50 % goes to the machinery industry. Furthermore, around 40 % of FDI in the machinery industry is directed to the automobile and other transport machinery industry. Japan is the largest source of FDI in Indonesia's manufacturing industry in 2010, and a large proportion of investments from Japan to Indonesia tend to focus on the automobile industry (JETRO 2010). This kind of FDI appears to have a strong impact on structural changes in Indonesia's economy, industry and trade, intensifying the automobile and automotive parts/components industry, and promoting the development of an international production and distribution network between Indonesia and its neighboring countries, including Japan and other ASEAN member countries.

According to Table 8.5, Malaysia had FDI inflows of US$9.1 billion in 2010 (about 3.9 % of GDP). More than 90 % of FDI in the manufacturing industry is directed to the heavy and chemical industries, of which almost two-thirds go toward the machinery industry. Of the machinery industry, nearly 70 % flows into the electrical and electronics industry. Such direct investments in Malaysia have been made by investors such as Japan, China (including Hong Kong) and the USA, which are almost the same countries/economies as its main trade partners. It can be

Table 8.5 Inward direct investment: Indonesia, Malaysia, and Thailand

	Indonesia	Malaysia	Philippines	Thailand
A. Inward direct investment, net inflow (2010, US$ millions)	13,371	9,167	1,713	9,679
B. Inward direct investment, the ratio to GDP (2010, %)	1.9	3.9	0.9	3.0
C. Sectoral composition of inward direct investment in manufacturing (2010, %)[a, b]				
1. Light industry	41.5	8.9	NA	47.2
1.1 Food	30.6	4.2	NA	13.6
1.2 Textile/clothing	4.6	1.7	NA	1.5
2. Heavy and chemical industry	58.5	91.1	NA	52.8
2.1 Machinery	29.3	59.6	NA	31.2
2.1.1 Electric/electronics	NA	40.8	NA	15.6
2.1.2 Automobile/transport machinery	11.7	2.6	NA	15.6
Total (1 + 2)	100.0	100.0	NA	100.0
D. Top three investment partners (2010, %)[c, d]				
1st	Japan	USA	Japan	Japan
	(66.7)	(40.4)	(29.8)	(21.9)
2nd	ASEAN	Japan	Netherlands	Netherlands
	(34.6)	(13.9)	(18.8)	(13.7)
3rd		China and Hong Kong	Korea	USA
		(11.7)	(15.9)	(10.4)

[a]NA indicates that data are not available. Automobile/transport machinery in Thailand includes general machinery except for electric/electronics
[b]Indonesia and Thailand are on an implementation basis, while Malaysia and the Philippines are on an approval basis
[c]Figures in parentheses are the ratio to total inward direct investment in each country
[d]Indonesia: Data are only manufacturing and on an implementation basis. Philippines: Data are whole industry and on an approval basis. Malaysia: Data are only manufacturing and on an approval basis. Thailand: Data are whole industry and on an implementation basis
Sources: Inward direct investment, net inflow, and inward direct investment, the ratio to GDP: Based on World Bank 2012, *World Development Indicators & Global Development Finance* (online)
Sectoral composition of inward direct investment in manufacturing: Indonesia and Malaysia: Based on JETRO (2011). Thailand: Based on Bank of Thailand, (http://www2.bot.or.th/statistics/ReportPage.aspx?reportID=77&language=eng)
Top three investment partners: Indonesia. Based on Bank Indonesia (http://www.bi.go.id/web/en/Statistik/Statistik+Ekonomi+dan+Keuangan+Indonesia/Versi+HTML/Sektor+Eksternal/) Malaysia and Philippines: Based on JETRO (2011). Thailand: Based on Bank of Thailand (http://www2.bot.or.th/statistics/BOTWEBSTAT.aspx?reportID=75&language=ENG)

imagined that FDI has had a great influence on how Malaysia is involved in the international production and distribution network, taking into account both items and partners of trade and sectoral composition and partners of inward direct investment together.

FDI in the Philippines amounted to US$1.7 billion in 2010 (0.9 % of GDP), the lowest level of the four ASEAN countries. This suggests that, as described below, the Philippines is less attractive as an investment target for foreign countries than Thailand, Indonesia, and Malaysia. The Japan External Trade Organization (JETRO) (2011) points out that in 2010 more than 80 % of FDI in the Philippines was directed to the manufacturing industry and that, although there are no accurate data, Japan, the Netherlands, and South Korea, the top three investors, invested in new and expanded facilities mainly for electronic apparatus, including semiconductors. Most of FDI in the Philippines is considered to focus on the electrical and electronics sector, which has led the manufacturing industry in the country.

Table 8.5 shows that Thailand attracted US$9.7 billion in inward direct investment in 2010, 3 % as a percentage of GDP. It can be said that the effect of FDI on the national economy seems relatively large in light of its economic scale. More than 50 % of FDI in manufacturing is directed to the heavy and chemical industries, of which almost 60 % flows into the machinery industry. Of the machinery industry, 50 % is directed toward the automobile and other transport equipment industry. Japan, which is the largest investment partner and accounts for more than 20 % of inward investment in Thailand, appears to allocate a large part of its FDI to the automobile and automotive parts/components sector in Thailand (JETRO 2010).

6   Industrial and Trade Policies and Business Environments in ASEAN Countries

This section discusses the recent changes in the economy, trade, and investments in the four ASEAN member countries. In Indonesia, during the second term of the former president Yudhoyono regime starting from 2009, the target economic growth rate was set at an average of 6–7 % per year in the National Medium-Term Development Plan between 2010 and 2014. To achieve this target, the Indonesian government implemented various programs and projects. One of the landmark programs is the Metropolitan Priority Area (MPA), which was developed as a core part of the Indonesia Economic Development Corridors (IEDCs) and has been conducted with the cooperation of the Japanese government with the aim of improving investment environments by upgrading soft and hard infrastructure in the metropolitan Jakarta area. As shown in Tables 8.6 and 8.7, there is a large possibility that the development of infrastructure would attract more inward direct investment in Indonesia, because the lack of infrastructure has been one of the major bottlenecks in the country. A large population of more than 200 million people, as well as the possibility of continuing economic growth at 6–7 % per annum will expand the middle-income class and enhance the attractiveness as a market. These investment climates will give Indonesia more opportunities to participate in the international production and distribution network.

Table 8.6 Efficiency of international logistics performance in 2010: Indonesia, Malaysia, Philippines, and Thailand

	Indonesia	Malaysia	Philippines	Thailand
Overall logistics performance	75	29	44	35
	(2.76)	(3.44)	(3.14)	(3.29)
1. Customs	72	36	54	39
	(2.43)	(3.11)	(2.67)	(3.02)
2. Infrastructure	69	28	64	36
	(2.54)	(3.50)	(2.57)	(3.16)
3. International shipments	80	13	20	30
	(2.82)	(3.50)	(3.40)	(3.27)
4. Logistics quality and competence	92	31	47	39
	(2.47)	(3.34)	(2.95)	(3.16)
5. Tracking and tracing	80	41	44	37
	(2.77)	(3.32)	(3.29)	(3.41)
6. Timeliness	69	37	42	48
	(3.46)	(3.86)	(3.83)	(3.73)

Note: The upper row represents rankings among 155 countries/economies, while the lower row with parenthesis denotes the rating between one (worst) and five (best)
Source: World Bank (2010)

Table 8.7 Assessment of business climates in 2011: Indonesia, Malaysia, Philippines, and Thailand

	Indonesia	Malaysia	Philippines	Thailand
Overall efficiency of doing business	129	18	136	17
1. Starting a business	155	50	158	78
2. Dealing with construction permits	71	113	102	14
3. Getting electricity	161	59	54	9
4. Registering property	99	59	117	28
5. Getting credit	126	1	126	67
6. Protecting investors	46	4	133	13
7. Paying taxes	131	41	136	100
8. Trading across borders	39	29	51	17
9. Enforcing contracts	156	31	112	24
10. Resolving insolvency	146	47	163	51

Note: Figures in this table represent rankings among 183 countries/economies
Source: World Bank (2012)

On the other hand, since the world financial crisis in the latter half of 2008, the Indonesian government has adopted protectionist policies unfavorable to foreign investment, such as import restrictions on seven specific sectors (electronics, clothing, etc.) and obligation of investors to follow the Indonesian National Standards (*Standar Nasional Indonesia*; SNIs) in the field of steel products. Although the Japan-Indonesia Economic Partnership Agreement (JIEPA) enacted in July 2008 has stimulated the division of labor between Indonesia and Japan, it has

also caused various problems and interrupted trade transactions. Such movements to place restrictions on investment and trade would negatively affect the establishment of the international industrial location and the international spatial linkages for industries.

As shown in Table 8.6, Indonesia ranked 75 out of 155 countries/economies in the 2010 Logistics Performance Index (LPI) reported in World Bank (2010), which presents the results of a multidimensional assessment of logistics performance, rated on a scale from one (worst) to five (best).[2] Thus, Indonesia has received poor evaluations for overall logistics performance, together with individual assessment areas including logistics infrastructure, logistics services, border procedures and time, and supply chain reliability. Table 8.7, which is based on the *Doing Business 2012* report (World Bank 2012), illustrates that Indonesia stands at 129 out of 183 countries/economies in the overall 'ease of doing business' ranking.[3] While Indonesia has performed well to some extent on procedures for international trade and protection of investors, problems that deteriorate the mindset of foreign capitals toward FDI have existed in its business climates; these include procedures for starting a business, access to electricity, and enforcement of contracts.

The 10th Malaysia Plan (Malaysia's Economic Development Plan) has targeted an annual economic growth of 6.0 % during 2011–2015 to increase per capita gross national income (GNI) to more than US$12,000 by 2015. To achieve this goal, the Malaysian government identified the electrical and electronics sector, the information and communication technology (ICT) sector, and several others as 11 key economic sectors and Greater Kuala Lumpur as a strategic geographical area. Malaysia has implemented a series of liberalizations and deregulations, particularly in the non-manufacturing sector (financial sector, retail/distribution sector, etc.) through the removal of government controls for Bumiputera, and has opened the domestic market for foreign capital in stages. Preferential treatments, including reductions or exemptions of taxes and deregulations have been granted to foreign capitals with specific functions such as operational headquarters (OHQs), international procurement centers (IPCs), and regional distribution centers (RDCs). In addition, Malaysia has also made effective use of FTAs and economic partnership agreements (EPAs).

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[2] According to the World Bank (2010), this LPI summarizes the performance of countries in six areas that depict important aspects of recent logistics climates and encompass (1) efficiency of customs clearance process; (2) quality of trade and transport-related infrastructure; (3) ease of arranging competitively priced shipments; (4) competence and quality of logistics services; (5) ability to track and trace consignments; and (6) frequency with which shipments reach the consignee within the scheduled or expected time.

[3] The World Bank's *Doing Business 2012* is the ninth report examining the regulations that promote or constrain business activities (World Bank 2012). It ranks 183 countries/economies on the basis of ten areas of regulations: (1) starting a business; (2) dealing with construction permits; (3) getting electricity; (4) registering property; (5) getting credit; (6) protecting investors; (7) paying taxes; (8) trading across borders; (9) enforcing contracts; and (10) resolving insolvency.

Such efforts by Malaysia are reflected in Tables 8.6 and 8.7. Concerning the efficiency of logistics, Malaysia has an overall LPI score of 3.4, ranking 29 out of 155 countries/economies. As well as achieving high rankings on average, all six assessment areas, from customs clearance procedures to timeliness in reaching a destination, also received high ratings. These ratings and rankings (including those for the overall LPI) are almost the highest of the four ASEAN countries in our study. In terms of the ease of doing business, while there are difficulties with procedures for dealing with construction permits, other disaggregate indicators and the aggregate indicator show better performance with, on average, high rankings and ratings. Malaysia stands at 18 out of 183 countries/economies in the overall 'ease of doing business' ranking. In particular, its ranking is number 1 for the ease of obtaining credit. Therefore, it can be said that Malaysia has developed business environments favorable to foreign investments.

The unstable political, social, and macro-economic situations in the Philippines have led to the country long being seen as less attractive as an investment destination for foreign capitals. However, since the inauguration of the Aquino administration in June 2010, those situations have tended to stabilize, and the future of the Philippine economy seems to be promising. Macroeconomic indicators such as the budget deficit, external debt, and foreign currency reserve have pointed to a gradual recovery. In recent years, the Philippines have enacted the following FTAs/EPAs: FTA between Australia/New Zealand and ASEAN in January 2010; EPA between Japan and ASEAN in July 2010; and FTA between India and ASEAN in May 2011. It is expected that those FTAs/EPAs will function and yield substantial benefits to the Philippines.

As shown in Table 8.6, assessment against the Philippines on the efficiency of international logistics, which is one of the main factors for investment decisions, is not so bad. The LPI rankings and ratings of the Philippines are lower than those of Thailand and Malaysia, but higher than those of Indonesia. In particular, better access to international shipments was evaluated as high, and other criteria or areas in assessing logistics performance are also not so bad. Thus, the Philippines ranked 44th out of 155 countries/economies in the 2010 LPI. On the other hand, the results of *Doing Business 2012* (Table 8.7), which more comprehensively assessed business climates, the Philippines' rankings and ratings are not so bad on the ease of both getting electricity and trading across borders. However, it received considerably poor evaluations on the ease of getting credit, protecting investors, and paying taxes. The rankings on, in particular, the ease of starting a business and resolving insolvency stand at one of the lowest positions in *Doing Business 2012*. As a result, the Philippines ranks low on the overall ease of doing business, at 136 out of 183 countries/economies.

As already illustrated in Table 8.5, in 2010, inward direct investment in the Philippines in terms of both the ratio to GDP and the amount of capital inflow is at the lowest level of rank in the four ASEAN countries. This could result from insufficient progress in the improvement of business climates observed above. It seems necessary for the Philippines to improve investment and business environments in order to attract more foreign capitals and play an active role in the

international production and distribution network in the processing and assembly industry.

Thailand has problems with investment environments, as suggested by the political and economic turmoil caused by the 2011 Thai floods and the problems with the former Thai Prime Minister, Thaksin. However, Thailand has had advantages in its investment climates. The Thai government has sought to attract FDI in the automobile/automotive components sector and other preferable sectors through the introduction of policy instruments such as preferential treatments for investments in the environment, energy conservation, and high-technology sectors and regional operating headquarters (ROH) system that provides both tax and non-tax incentives to investors on the condition that several requirements are satisfied. It has also promoted the acceleration of investment and trade procedures by establishing a 'One Start One Stop Investment Center' (OSOS) enabling investors to execute all investment application procedures at only one office, introducing a paperless e-import system, and establishing customs clinics as consulting desks for export and import procedures.

Furthermore, the active involvement of Thailand in FTAs/EPAs has given the country advantages in investment climates. Thailand has entered into FTAs/EPAs, either as Thailand or as ASEAN, with Japan, China, South Korea, India, and Australia/New Zealand, in addition to the ASEAN Free Trade Area (AFTA). Such FTAs/EPAs have enabled Thailand to have access to large markets like China, India, and Indonesia. Thailand's many production plants have further enhanced its advantages in the automobile/automotive components, electrical/electronics, and food processing industries. In recent years, exports of completed cars from Thailand to Australia have increased dramatically, because FTAs between the two countries eliminated tariffs on automobiles. Thus, preferential treatments for investments and regional trade agreements (RTAs) have attracted FDIs to Thailand, encouraged the industry agglomeration, and stimulated Thailand to participate in the inter-process division of labor and the international production and distribution network.

These efforts made by Thailand to attract inward direct investment are reflected in Tables 8.6 and 8.7. Table 8.6 shows that Thailand stands at 35 out of 155 countries/economies in the overall efficiency of international logistics, which represents a high evaluation on the development of its logistics sector. Its rankings are also around 30–40 on almost all the disaggregate logistics areas. According to Table 8.7, Thailand has also received a high evaluation on access to electricity, protection of investors, acquisition of construction permits, and procedures for export/import, although there are problems with procedures for starting a business and payment of taxes. Its aggregate ranking on the ease of doing business is 17 out of 183 countries/economies. These favorable investment and business environments, including logistics have induced Japanese automobile manufacturers as well as automotive parts supplier firms to advance into Thailand. This would enable Thailand to become a major production base for automobiles/automotive components and to function well as a center of the international production and distribution network in the ASEAN region.

7 Concluding Remarks: Features of Industrial and Economic Structure and Their Roles in Firms' Location Selections in ASEAN Countries

Features of industry, trade, and investment in the four ASEAN member countries observed above can be summarized as follows.

Through its industrial, trade, and investment policies, Thailand has promoted the largest automobile industry agglomeration in the ASEAN region, and has developed as a production base for the regional supply and international export of completed cars and as a center of the inter-process division of labor in input and intermediate goods. Indonesia has had great potential as a market, thanks to a large population and recent high growth, while it has developed the automobile industry and become a production base for the regional supply of completed cars and auto parts/components, with an advantage of FDI. Through inward direct investment, Malaysia has developed electrical/electronics industry agglomeration, enhanced its competitiveness, and played an important role as a regional and global consumer and supplier. The past political, economic, and social instability in the Philippines has resulted in a smaller FDI inflow than seen in Thailand, Indonesia, and Malaysia. However, political and macroeconomic stability in recent years has promoted the agglomeration of electrical/electronics industries centering on semiconductors and has enabled the Philippines to participate in the international production and distribution network in the Asia–Pacific region. The Philippines has also tended to be involved in the inter-process division of labor in the automobile industry in the Asian region.

As stated above, geographically adjacent countries/economies have individual and distinctive economic features. These features appear to play an important role in the location decision processes of firms at an earlier stage, that is, the selection of optimal locations from a spatially wide range (step 1) and the selection of a particular country from among optimal locations (step 2). Thus, this kind of comparison work could help in determining possible firm locations during the first stage of the location decision process.

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Part III
Regional Economic Policies in Global Economy

Chapter 9
The Role of Cities in Nordic Regional Development Policy

Lars Westin and Martin Eriksson

Abstract 'Modern regional policy,' the territorially directed policies developed after WWII represent only a subset of the measures a central power may use to direct development in its territory. The larger set of policies we denote 'Classical regional policy.' The policies developed in Nordic countries after 1950 could not promote a limited set of cities, although 'growth center policies' had been attempted with some success in France and the UK. Instead, tax and subsidy structures, support for investments, and transport subsidies directed towards less populated areas were favored. We argue that this choice was a result of the political processes in the Nordic welfare states. The attempts to implement growth pole strategies in the Nordic countries are discussed and analyzed in a context where unbalanced growth between regions is generic and the alternatives available to a national power in order not to lose control over its territory are made explicit. The attempts to implement a city-based growth pole-oriented regional policy in Norway, Sweden, and Finland are summarized. We find that such an explicit policy mostly is impossible within 'modern regional policy', but that the pitfalls of this policy in the 1980s led to the 'broad regional policy.' This policy has much in common with the classical policy. However, we also found that such a policy was, to some extent, actually formulated when the location of public facilities was decided.

1 Introduction: The Control of Territory

A glance into the history of the location of human beings reveals that regional mobility of people and assets, changing structures of production, and new patterns of trade are generic parts of human life. The history of the Nordic countries is no exception. After the end of the ice age around 10,000 years ago, most of Scandinavia

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and Finland were slowly colonized by Sami people and by people arriving from Middle Europe and Western Asia. Denmark, with its close connections with central Europe along the coast and through land, was settled from the south early on. In the North, sea-based transportation was most efficient, and sites with harbors along the coast around the Baltic and Atlantic seas attracted population. In Finland, the Finnish people, with their specific roots, settled around the central lakes of the area.

Colonization of the Nordic area continued with a slight delay relative to Central and Eastern Europe. A first wave of city founding may be observed from the thirteenth and fourteenth centuries in places that often were initially populated and established as small villages during the ninth or tenth centuries. However, Oslo became the capital of Norway around 1300. Stockholm is also from the thirteenth century but became the capital later, in 1436. Copenhagen became the capital of Denmark in 1536, but had already had a university in 1479 and before this was the location of a castle. This reflects the dispersed settlement structure and lack of strong administration in the Nordic area before the sixteenth century.

In the seventeenth century, a second wave of city establishment in the northern territories could be seen, when cities like Umeå, Sundsvall, Luleå, Oulu, and Vaasa (the last two now in Finland, but previously parts of Sweden) were established by King Gustav II Adolf.[1] The city Tromsö in northern Norway was established in 1794 by the Danish King Christian VII at a time when Norway was still part of Denmark. Altogether, this marked a period when both Sweden and Denmark were strong players in the region and could press Russian interest to the east and back from the Baltic Sea area.

This second wave of founding of cities and colonization was correlated with improved cartographic methods that showed the more exact extension of land and coast lines with their transport distances. This was followed by the first expeditions aiming to explore the area. Indications of natural resources were found, and, with this, competition between the three powers (Russia, Sweden, and Denmark-Norway) over the military and political dominance of the Nordic area intensified. From those ambitions to control territory, and the first attempts to establish national states with associated taxation structures and definite and defendable borders, the roots of regional policy in the Nordic territory may be found.

Successful rulers have long held the knowledge of how to control territory in order to sustain power. Territorial control is the combined result of military dominance, terror against populations, 'neutralization' of local elites, attempts to assimilate populations (e.g., through schools and culture), investments in infrastructure to reduce costs of transportation towards the centre and important sub-centers, and various incentives to improve the daily life of inhabitants in order to gain their trust.

As Machiavelli observed in 'Il Principe' c. 1506, if you want to control a state that used to be free, the easiest way is through its own inhabitants. According to

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[1] Gustav II Adolf (1594–1632), also known as Gustavus Adolphus, was King of Sweden from 1611 until he was killed in 1632. With him started what is known as the period of the Swedish Empire.

him, the best fortress a prince could possess was the affection of his people. Machiavelli also noted that this then had to be combined with control over the forces of violence within the territory, its armies, and its police.

In Scandinavia, examples of this policy of dominance through culture could be seen during the period of the Swedish Empire (1611–1721) when the universities in Tartu and Lund were established in 1632 and 1666. In order to secure control, the Swedish army conquered 'Swedish Livonia' and 'Scania' from Poland and Denmark, respectively. Later, the founding in 1786 of the city of Östersund in the northern region Jämtland, localization of military regiments to this town, and the construction of a railway from this city in the northwest of Sweden to its capital in Stockholm in 1879 clearly signaled that the central powers of Sweden aimed to establish long-term control over Jämtland. Thus, Jämtland became a county within Sweden. Before and during the eighteenth century, Jämtland had been relatively independent or part of the Denmark-Norway area of interest.

Policies against the indigenous population in the area, the Sami people (or Laplanders), varied but were generally characterized by a combination of trade and repression. The Sami had their own cultural region, Sápmi, covering the northern parts of Scandinavia, Finland, and the Kola Peninsula (part of Russia) but never managed to establish a state.

In the case of the Swedish state, colonization in order to preserve territorial power in the north was moreover connected with restrictions on trade, whereby internationally oriented trade from North Sweden had to pass through the capital, Stockholm.[2] Restrictions were also set on trade on land in order to redirect tradesmen to cities, where their exchange could be taxed. These types of policies were developed in parallel with the establishment of cities, knowledge institutions, an efficient tax system, and infrastructure. Thus, they were central parts of the policies of a center that had the ambition to preserve its territorial dominance over areas colonized or gained through wars. Moreover, once a comprehensive tax system was established, reduced tax rates or subsidies directed towards specific territories or for some activities could be used as incentives to promote further colonization or to stabilize territories. In the following, we call this form of territorially oriented policy from a center towards its own center, as well as all its sub-centers and other areas under its control a 'classical regional policy.'

Classical regional policy is thus a collective notion for all the measures a central power may use to balance an unbalanced growth within its territory and the

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[2] This restriction on trade in the Gulf of Bothnia, 'Bottniska handelstvånget', lasted until 1765. It has been seen as a constraint on development on both sides of the Gulf of Bothnia and gave a sort of monopoly profit to tradesmen located in Stockholm. It has, on the other hand, also been considered as a way for the weak Swedish state to prohibit various other nations with large fleets from penetrating and exploiting the resources on both sides of the Gulf of Botnia before the Swedish state became strong enough to lead such exploitation. The strongest opposition against the system, an opposition that also finally ended the restrictions on trade, came from the well-known liberal economist Anders Chydenius living in the city of Kokkola, between the cities Vaasa and Oulu on the eastern 'Finnish' side of the Gulf.

measures it may take to redistribute wealth to preserve territorial coherence and dominance. Beside Machiavelli, authors dealing with this 'art' of territorial dominance contain military theory writers such as Von Clausewitz and Sun Tzu, authors who have clearly focused on the use of violence to obtain goals for territorial dominance.

From the eighteenth century, those policies of violence had to be combined, to a larger degree than previously, with various non-violent measures, more focused on the development of national wealth through efficient use of resources in territories controlled or in territories gained control over. From the middle of the nineteenth century, it thus became increasingly important to consider the welfare of populations in different parts of the territory in order to avoid uprisings and movements in search for separation.

In the academic literature of the history of regional policy, this connection with the history of territorial dominance and resource mobilization is seldom, if ever, made or highlighted. Instead, in this literature, regional policy seems to be born after WWII. At most, regional policy is in some cases seen as an extension of the development of urban planning with 'garden towns,' health-motivated sewage systems, and 'risk of fire'-motivated restrictions on housing construction during the late nineteenth century and the beginning of the twentieth century.

We argue that the policy arena concerning territorially directed policies that in this respect were developed from around and after WWII until the late 1980s only represent a subset of the measures a central power has at hand. Those policies will here be denoted as the 'Modern regional policy'; policies that consist of the measures that we argue could also be and were implemented as elements in the policies of a modern welfare state. The rest of the measures for territorial control and resource mobilisation, that we previously denoted 'classical regional policy' were kept within other policy areas such as transport policy, policies directed towards the location of military forces or educational, research, and health service policies. Finally, classical policy has always contained a 'silent' policy related to measures taken to retain territorial power discussed and decided about behind closed doors in the center.

As we will return to, it may come as no surprise that modern regional policies developed in Nordic countries after 1950 did not focus on the active promotion of a limited set of specific cities, although 'growth centre policies' were attempted in both France and the UK with some success. Instead, policy measures associated with tax and subsidy structures, support for factory investments, and transport subsidies directed towards less populated areas, generally outside stronger cities, became the main activities within the policy arena called 'regional policy.'

In this chapter we discuss how this came to be and argue that this choice of policy content was a result of the nature of political processes in Nordic welfare states in the 1970s. In Eriksson and Westin (2013), we discussed in more detail the attempts during the 1960s and 1970s to implement growth pole strategies in Nordic countries. Here, our aim is to analyse those processes in a slightly wider context, where unbalanced growth between regions is generic and the alternatives available to a national power in order to not lose control over its territory are discussed more

explicitly. This opens up for a discussion of the political risks and conflicts associated with urban-oriented regional policies in relation to spatially distributed political and economic interests.

The chapter proceeds as follows. After a section where the birth of the modern regional policy, contrary to its classical counterpart, is discussed further, we summarize attempts to implement a city-based growth pole-oriented regional policy in Norway, Sweden, and Finland. In Sect. 4, we then find that this is almost impossible within the narrow modern regional policy, but that in the 1980s it led to a so-called broad regional policy. This broad policy has more in common with classical policies that elites of states have used for a long time. In Sect 5, the impossibility of developing an explicit city-oriented regional policy is discussed further, interestingly enough we find that such a policy was actually implicitly formulated to some extent within the policies that had to decide where public facilities should be located. Finally, we make some conclusions and give suggestions for further studies.

2   From 'Classical' to 'Modern Regional Policy'

If regional incentives through establishment of cities (with army caserns, trade restrictions, infrastructure investments, and knowledge institutions) could be a policy used by a seventeenth century absolute monarchy in order to control territory, the democratic societies of the twentieth century faced a completely different situation. In a fully developed democratic society, each person has a vote and hence formal political power is distributed in relation to the location of population in space. In nineteenth century societies with young parliaments and more or less democratic elections, this conflict between different parts of a nation was already visible. But since fewer people had the right to vote, negotiations between those spatially based elites on agreements over how rents should be distributed were facilitated, if not always resolved peacefully. External threats and nationalistic movements then also would be part of the repertoire to keep nations together or to form new nations by mergers of smaller city states, independent duchies, etc.

After WWII, more elaborate elections, based on one vote per adult, independent of assets, sex, etc., slowly came to dominate in many western societies. Policies then had to take care of and handle patterns of localization in a more direct manner than the solitaire Prince Machiavelli wrote for had to. However, the message Machiavelli was teaching was valid; in order to gain respect, central politicians had to maintain at least respect, if not full agreement, for their policies from people or dominant elites all over the territory of the nation.[3]

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[3] In recent developments within Egypt, the risk for destabilisation of a country when the ruling elite with a weak majority based on the country side does not heed the opinions held by the minority with strongholds in the cities became clear. Ukraine also provides recent examples on the

The period from the end of the nineteenth century also meant formation of national states with distinct borders and centralised national administrations. However, many of those were, to some degree, federal constructions where principles of subsidiarity and territorial systems for redistribution were necessary to gain cohesion in policy and public decision making.

The birth of modern regional policy, with its roots in the USA, Great Britain, the Netherlands, and France, as well as in the Nordic countries, thus was the combined result of the industrial crises hitting specific geographical areas dependent on some obsolete asset, the technical development during and after WWII that made it possible for industries pressed by increased wages to substitute labour for capital and finally the democratic revolution during the twentieth century.

Technical development after WWII implied that, within a decennium, the newly invented and improved tractor, truck, and chain saw fundamentally changed the production functions of many industries; production functions that had often been almost unchanged since the Neolithic revolution. The industrial revolution now both made steel and new tools affordable for a broad set of actors. If, previously, human labor had been a low-cost and thus dominating part of production, the increased pace of mechanization, especially within the primary sector, now definitively shifted the spatial pattern of demand for labor from the agriculture sector outside cites into the cities, with their industries and services.

Hence, and also in the Nordic countries, small farms, fisheries, and other forms of agrarian production, which traditionally had provided the main means of subsistence and employment no longer attracted labor as it had previously. On the other hand, the non-agrarian sectors, such as industry and services, were often less developed outside larger cities. Exceptions from this were the industries located in smaller villages around Sweden that focused on steel, paper, energy, pulp, and the various engineering products based on them.

In the northern part of the Nordic countries, cities were still smaller, industrial entrepreneurs still fewer, and the financial sector less developed. As a result, industry and services in the north could not grow at a pace sufficient to employ the rich amount of manpower released from agriculture. Thus, new economic and social imbalances between regions emerged in Nordic countries. Compared with the forerunners within modern regional policy such as Great Britain and France, the populations of the often territorially large Nordic countries were small. However, after WWII, income differences and imbalances in the labor markets between the Nordic countries instead became large and flows of migrants between the countries increased. Initially, the regional policy of the Nordic area thus became multinational. The Nordic council was initiated in 1952, and a common labor market with free movement without passports was created in the Nordic area. This could of course also be seen as a step towards a Nordic federation of nations. However, the final step towards a union was never taken. Instead, it became clear that the

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dynamics that may result from lack of support for the central government when this, through the dynamics of the political process, moves away from the opinions hold by strong spatially concentrated groups in the country.

movements of labor within and between countries also increased tensions within each country. One alternative would then obviously have been to allow for federal development with more independent regions inside each country, in a way similar to the Swiss, or a new joint Nordic federative state including all Nordic countries and based on subnational regions. However, first of all, this was difficult because of the different relations each Nordic country had with the Soviet Union and with the North Atlantic Treaty Organization (NATO). Second, it would have needed even harder negotiations between the political and financial elites from each of the countries that had been hurt or favored by the war to a different extent. Instead, the looser collaboration within the Nordic council continued while each nation initiated the development of what later came to be the concept of a 'Nordic welfare state.' In theory, this should have provided not only equal opportunities for everyone independent of their situation at birth but also, later, and which is even more demanding, 'independent of location within the territory of the nation.'

Although both debate and initial policy measures regarding the post-war imbalances had begun and had already been conducted during the 1950s, the question of a more active policy against growing internal imbalances became an urgent issue for policy makers in the 1960s. Norway, in its constitution, had already included special favors for its countryside and for the north. This could be seen as an alternative to the development of an explicit federation based on regions within the nation.

In countries that are already federal, like the USA and to some extent also Great Britain, regional policy had a more explicit focus on the increased urbanisation and on the city–countryside divide within each state. In the USA, this gave birth to state-based regional location policies, where backward areas of states, often with a history of mining or agriculture, were considered. Those areas generally did not have enough strength on their own to consider the alternative of breaking out of an existing state to create their own state. Since individual mobility was traditionally high, people often did choose a private solution and migrated instead. In the UK, a similar movement from backward areas, but also international migration into London, gave rise to policies that attempted to control and direct the development of greater London. Green belts and new towns outside London inspired by growth center theory became central parts of this policy.

France used an alternative structure: a strong national state, weak regions, and many small and relatively independent municipalities. France also supported growth centers as alternatives to Paris. In France, as the theory suggested, the most support was given to cities that were already large, far away from Paris; in the UK, the 'new towns' instead, as the name indicates, were often established as new smaller cities.[4]

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[4] In Japan, inspired by the 'new towns' in the UK, some 30 new towns were built all over the country, mostly during the period of rapid growth in the 1960s but also continuing into the 1980s. Many are located near Tokyo and in the Kansai region. Japan has also developed a variant of the 'new towns' called 'Technopolis.' These cities are largely modelled after Tsukuba Academic New

3   The Modern Nordic Regional Policy

In Nordic countries, post-war development gave rise to a demand for policies that could stimulate development and retain population in weak, sparsely populated areas of the countries with an industry based on the export of natural resources. Such a policy met several challenges. One challenge was concerned with the extent to which a territorially based policy directed towards parts, but not the whole, of a country should be co-ordinated with the ambitions and institutions that were already developed as part of the national welfare, business cycle, and growth policies. How should elements within more macro-oriented policies, such as industrial, employment, and social policies, be incorporated into a new territorially oriented policy?

A territorial policy had to follow existing policies to some extent, while it was also necessary to take new international experiences into account. Around 1960, regional science as a scientific discipline entered Europe from the USA. Regional science had its roots in traditional location and urban system theory and was more concerned with the interaction between cities and their surroundings, by location of industries and industrial complexes, and by the relations between different cities than the already existing planning tradition had been. Thus, ambitions to develop new regional policies also gained a stronger theoretical fundament. Nordic scientists and policy makers were not late to participate in this new debate on how regional development and associated policies should be developed.

As already noted, in central Europe and the UK, the 'growth centre policy' had emerged as at least an initially popular strategy for promoting growth in backward or under-developed regions. The idea came from Perroux (1955). It was based on theories of unbalanced growth, divergence, and economic convergence developed in the 1950s by economists such as Hirschman and Myrdal but now combined with spatial theories of central places, e.g. as developed by geographer Walter Christaller. From strong investments in propulsive industries in cities acting as growth poles, cumulative causations should be created, as those industries send growth impulses through backward and forward linkages to other sectors of the economy. The growth poles were defined as towns possessing a critical mass of propulsive industries that, through their linkages, could induce further development of economic activity in other industries within their zones of influence (Myrdal 1957; Hirschman 1958; Perroux 1955; Christaller 1966). A regional growth policy should thus aim at concentrated investments and other development efforts directed towards a limited number of cities and their industries in a region with negative or lagging growth. According to the theory, this would give a critical density that could stimulate internal competition, internal interaction, and attractiveness on movable resources to such an extent that the negative spiral of feedback could be

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Town in that they attempt to agglomerate high-tech resources together in a campus-like environment.

turned into a positive spiral of growth around a regional center of gravity (Richardson 1976).

However, even if the concept of growth centers was widely accepted among researchers and policy makers, the more abstract theories presented had not developed into a general definition and identification of propulsive industries, the character and qualities of the appropriate cities, or a set of basic blueprints for investment efforts that could form the basis of a policy-oriented program. But two reports from a working group on regional policy within the European Free Trade Association (EFTA) published in 1968 and 1970, respectively, presented the Nordic countries with a more concrete set of advice that could be transformed into actual policies (EFTA 1968, 1970).

The background to the EFTA studies was that EFTA, in addition to focusing on the establishment of free trade between member states, also had other aims and purposes. One of these was to co-operate on macroeconomic policy in order to promote economic activities with full employment and a rational use of resources among its member states. EFTA thus had an interest in addressing the emerging regional imbalances in terms of unemployment and under-utilized factories among member countries. In 1964, a general review of the issues in relation to regional development in the member states was carried out. Here, it was concluded that there was a considerable degree of common ground between the member countries, both with regard to the problems facing them and policies they preferred to adopt to combat those problems. It was decided that EFTA should attempt a joint in-depth examination of one specific development problem. This should be so advanced that not only officials but also independent experts had to be involved.

After a proposal from the Norwegian government, EFTA decided in 1965 that this in-depth examination should focus on growth center policies. A group with delegates from Norway, Sweden, and Finland was appointed (EFTA 1968, pp. 9–17). The group concluded that policies based on economic interventions and spatial planning were necessary to correct forces that caused imbalances of economic growth between regions. Moreover, they found that the propulsive industries generally were located in cities that were in the higher end of the urban hierarchy. It was therefore necessary to formulate a policy where development resources were concentrated to a limited number of already relatively large growth centers in the top of the central-place system in order to successfully attract assets and transmit impulses of growth over to lagging regions. Those should come from the few even larger or the largest growth pole at the national level.

The growth center concept heavily depended on the notion of economies of agglomeration. A well-managed city could be seen as a place where various forces and externalities created returns to scale far beyond those gained from returns to scale within its individual factories or organizations. Cities were seen as spatial integrators and transforming forces for their surroundings. The larger a growth center, the greater the potential benefits for the industries and other actors of the city. Benefits would be observed as higher rates of growth and a positive feedback that was likely to make the center even more attractive for new industrial development.

Large centers could offer more specialized services and a more diverse labor market than small centers. Hence, a growth pole that should change the spatial structure of the national economic system had to be strong enough and far enough away from already growing centers to be able to compete with them. Thus, it should be an already strong center of a regional labor market; a major retail, wholesale, and service center as well as a natural node for communication, administration, and flows of information of a region.

Nations therefore were strongly discouraged by EFTA to identify growth centers among already weak cities. Instead, the EFTA report recommended that a center should be built up from cities with a population above a threshold level of 30,000 inhabitants. Cities with a population above this and those already endowed with basic infrastructure and sufficient economies from scale and diversity should be selected as growth centers for regions.

The second report discussed the "industrial estate" as part of such a growth center policy. An industrial estate is an area of land controlled by a development agency that constructs industrial buildings and produces services that tenants might need. Within such an industrial estate, a set of firms are located and they thus share the premises and benefits from proximity and the joint services produced by the agency (EFTA 1970). Hence, industrial estates were a way to create internal benefits of agglomeration for a set of factories alone—a sort of small-scale growth agglomeration. The arguments for industrial estates also followed those for growth poles but focused on labor mobility and learning between firms located adjacent to each other. It could, in a weak environment, be advantageous for a firm to locate in a place where it could buy services per hour from the industrial estate instead of housing all sort of services in-house. This was a way for a smaller economy to mimic the sharing possibilities of joint resources available in larger cities.

The report recommended that industrial estates should be located inside or near a city already identified as a growth center. The industries in the estate would thus also give support to the selected city. The report explicitly argued against giving into pressure from local and regional authorities to build industrial estates in cities with no obvious long-term future as initiators of growth. A poorly located estate would take longer to fill with factories. It clearly was a risk that they would not be filled at all.

Norway was the initiator of the EFTA report and the first of the Nordic countries to discuss the concept of growth centers. In the regional policy act from 1963, the government, led by the social democratic party, wanted to avoid further concentration of industries and services in existing larger agglomerations in the areas around Oslo and Östland. The argument was that this might lead to negative impacts from traffic-related congestion in a time when a car was becoming attainable for every family. Instead, the government had the ambition to redirect growth from those areas to regional centers in other parts of the country. Hence, the overall situation was exactly that for which the growth pole concept had been developed. In 1965, committees in each county in Norway were asked to identify the place that had the best conditions for becoming growth centers. As we can see, Norwegian practice

was already starting to deviate from the suggestions that later came in the published EFTA reports.

However, 1965 was also an election year. The social democratic government was voted out of office in favor of a center-right coalition. Nevertheless, the efforts of the social democrats towards regional planning were continued, albeit with a slight change in direction. Parallel with growth centers, so-called 'development areas' were also introduced. These areas consisted of many smaller settlements that together should offer a substantial enough number of people to make it equivalent to a growth center.

This shows how the Norwegian institutional and geographical context directly and significantly affected Norwegian policy. The 'development area' arrangement made it possible, for example, to sum up all the small settlements in the 'Lofoten' region into a single region. This gave the Lofoten development area a total population of around 28,000 inhabitants. This was lower but came relatively close to the EFTA threshold value. However, the Alta area further to the north only had around 10,000 inhabitants, while the population of Skervöy was even lower, around 5,000 inhabitants. Hence, those areas had a substantially lower population than the threshold of 30,000 inhabitants that soon would be recommended by EFTA. But when the EFTA recommendations were published and widely available, it did not launch any attempts to change the selected areas. In 1970, by which time the recommendations from the first EFTA report had been available for 2 years, the government instead signaled that it intended to continue with its original ambitions for the selection of growth poles and analogous development areas.

From an institutional perspective, the main reason for this could be found in a more general change within regional policy during the latter part of the 1960s and the first part of the 1970s. Until then, governments had tried to modernize the economy of northern Norway. This was part of a national ambition during the post-war period to stimulate growth through a "small open economy" strategy. Northern Norway was considered to be vulnerable to the increased international competition caused by the liberalized European and international trade regimes after WWII. The solution was a set of regional programs to make the economy in northern Norway more adaptive to international price changes and thus more competitive. The region should rapidly be industrialized and incomes should then converge towards those of the rest of Norway (Hersoug 1988). Of course, this would cause reduced employment in agriculture and fishing with a stronger movement of people into the cities of the region, obviously assuming that they could welcome everyone.

However, as expected, this bottom-up perspective in Norwegian growth center planning where counties themselves decided where centers and development areas should be located made the whole policy sensitive to local interests. As mentioned, rural interests in Norway enjoy a relatively strong position in parliament. This is because the Norwegian Constitution of 1814 was designed to protect rural districts. Even if the electoral system had been reformed as a result of the urbanization during the twentieth century, rural districts would still hold an over-representation in parliament (Helland and Sörensen 2009).

This arrangement affected the policies of the center-right coalition government that came into power in 1965. The coalition, and primarily the rural-oriented Center party, opposed the growth-oriented regional policy of the social democrats. Instead, it favored a regional policy based on even stronger decentralization, taking the rural interests in northern Norway into account. By the time the social democrats returned to power in 1971, the political arena had changed completely and they could not gain consensus for their previous regional policy. In order to follow the emerging rural mobilization in northern Norway, they also changed the direction of their regional policy to a more decentralized approach (Aarsäther 1991). Norwegian regional policy had thus shifted focus from ambitions to develop a concentrated settlement pattern in growth poles combined with a small open economy strategy into a policy that aimed to maintain the existing settlement pattern. In fact, all parties in Norway now expressed the wish to give each citizen a realistic chance to stay and live in any location in the country.

Although specific funds could still be allocated for growth centers and development areas, during the new regime, such funds were not entirely concentrated to those cities and areas. The government even stated that funding allocated to growth centers should not be so substantial that it crowded out the needs of other places (Stortingsmelding nr. 6 1970–71; Hersoug 1988). This new principle also affected the locations of industrial estates. In 1968, a corporation for the raising and administration of industrial estates (*Selskapet for industrivekstanlegg*) was established. Of the places identified as growth centers or development areas by the counties, Alta was the only place in which an industrial estate was also located. The remaining industrial estates in northern Norway were placed in other towns outside the originally designated growth centers. Thus, the industrial estates were used to support smaller municipalities against the risk of a further spatial concentration to the growth centers of each region.

Norway was early in trying to develop a modern regional policy. This could be seen as a response to the specific geographical structure in Norway and the strong position of its counties. In Sweden, the regional policy also initially focused on increased competitive performance, a small open economy approach, labor mobility, and improved internal markets. However, also in Sweden the EFTA growth pole discussion shone light on the national urban system. A plan for a policy towards the Swedish urban system was prepared in 1971. The purpose was to identify 'a more optimal' rank-size-based hierarchy of the Christaller type. From this, one could identify cities, towns and places suited for various regionally differentiated subsidies and grants towards industries and an allocation of resources and facilities within the public sector that would be dependent on the place a city or village occupied in the rank-size distribution.

Four categories of places were considered. The three largest cities (Stockholm, Gothenburg, and Malmö) were at the top of the hierarchy and were not to be a part of the new regional policy. In the middle of the hierarchy, larger towns with a population above 100,000 inhabitants were identified. One such town in each county should be the location of institutions for higher education and government agencies. It was anticipated that the public sector should be an increased part of the

Swedish economy. The public facility location problem thus became a central and important problem for governments on different spatial levels.

In the national hierarchy, below the county-level growth centers, the town hierarchy *within* each county was identified, and a town with a population of over 30,000 inhabitants should be assigned as a county-based growth center. Finally, places with a population threshold of about 3,000 inhabitants were given the role of 'service centers' (Inrikesdepartementet 1971; Regeringens proposition 1972, p. 111).

It soon became evident that the national town-hierarchy plan could not be uniformly implemented in all counties. For example, the settlement structure in northern Sweden had become so dispersed that it was often not possible to find cities with a population above the threshold of 30,000. It was then questioned whether the social democratic government, who had already faced harsh criticism for the focus on labour mobility in their post-war employment policy, could continue with a concentrated growth center policy, where cities and economies of agglomeration were emphasized even further (Elander 1978).

In the face of such pressures, the first growth center policy proposition was modified. In the implemented policy, a set of industrial estates based on manufacturing industries were included in the policy. Those would be established gradually in eight towns with populations from 25,000 down to around 8,000 during the period 1973–1982.

As in Norway, the 'industrial center' policy in Sweden during the 1970s became part of a regional policy that, with increasing speed, shifted its approach from a competitive small open economy strategy towards a more redistributive strategy. During the 1960s, the ambition had been to combine economic growth with some regional redistribution. During the first part of the 1970s, redistribution and support of welfare services began to dominate the agenda.

The regional policy established during the first part of the 1970s also continued after 1976, when the social democrats were voted out of office and replaced by a center-right coalition. Claims from the rurally oriented center party rapidly began to dictate the spatial policies of this government. It became a priority for the government to try to guarantee an 'even' distribution of employment between Swedish regions and cities. However, since the government could not completely counteract urbanization, and still wanted to support a dispersion of population and resources, it embarked on a policy of so-called 'concentrated decentralization'. This policy was primarily directed towards smaller villages that were also centers of municipalities in the interior of northern Sweden and had often also been targeted as locations for industrial centers. Given those changes in relation to the lower levels of the urban system, the regional policy originally outlined by the social democrats became, in practice but not in rhetoric, unchanged.

In Finland also, it was initially difficult to decide upon principles for the allocation of regional support and the location of public facilities. On two occasions, reports in which categories for rank-size hierarchies with strong similarities to the Swedish urban system were published. In 1969, the classification of towns in 'development areas' into three groups was suggested: large centers, middle-sized

centers, and small centers. In 1974, a more complete national central place-based rank-size hierarchy with four categories (congested areas, growth areas, growth centers, and growth points) was elaborated (Statsrådets Kansli 1974).

As in Norway and Sweden, these proposals caused intense political debate. Since, in Finland, the establishment of new small shareholder farms had continued until the 1960s, the settlement structure had become strongly dispersed. This meant that groups of quite newly established farmers in the development areas would be at risk of losing their ground if a policy of concentration was implemented. Consequently, the proposals were rejected by the center party, who favored measures directed towards agrarian interests and a continued dispersed settlement structure. In contrast, the proposals were supported by the social democrats, who preferred a location pattern that favored urban wage-earning groups. In a compromise, it was decided that the central place system would be used in the planning process, but it should not be used systematically for the allocation of regional support. On the other hand, a policy focused on a sustained dispersed distribution of population was also rejected.

In practice, this meant that the Finnish policy differed little from the Swedish and Norwegian policies. Industrial estates were built in a number of Finnish municipalities, each with funding from a joint stock company controlled by the Fund for Development Areas (*KERA*). Regional policy in Finland, as in Norway and Sweden, had also become more egalitarian and redistributive. The regional policy act from 1975 thus stated that an important goal for regional policy was to target geographical imbalances of living conditions and incomes. The responsibility of the government to strive towards national cohesion was therefore stated more strongly than previously. The early ambition to support only a limited number of growth centers based on analyses of market areas and forces of agglomeration was therefore abandoned. The principles outlined by the EFTA reports were not followed. Instead, towns or areas with inhabitants numbering between 10,000 and 25,000 were usually identified as growth centers and locations for industrial estates.

The growth center policies in the three Nordic countries were not isolated national projects. Instead the policies had a distinct international anchorage, as the involvement in and reports from EFTA indicate. The analytical and technical methods used to identify rank-size hierarchies and threshold values during the development of the growth center policies corresponded well with the techniques developed by researchers within the international community of regional science.

Not only its specific form of growth center policy but also many of the other instruments within the 'narrow' Nordic regional policy, such as development areas, investment grants, and employment premiums, had originally been introduced in Great Britain. Together with the Nordic countries and some other more peripheral countries located around the core of the six European countries in the EEC, which later became the EU, Great Britain was a member of EFTA. Thus, that the Nordic regional policy was so influenced by development in Great Britain should come as no surprise.

The implementation of growth centre policies in the three Nordic countries was also influenced by the same types of changes in fundamental policy elements.

During the introduction there occurred a shift of view among broad groups in society from a promotion of concentrated regional growth to an accommodating redistribution, egalitarianism, and national cohesion. This was at the same time as the Nordic countries came to the end of a very strong period after WWII and when the beginning of a more uncertain global situation and the return of South East Asia into the international economic arena came to be.

There were also a number of similarities between the Nordic countries regarding how elements within macro policy such as economic policy and social policy were now also targeted as regional problems. For instance, regional convergence of employment and per capita income rates became explicit goals of those macro policies (Mjöset 1987). Accordingly, the government intervened in the economy through income transfers, benefits, and taxation programs with the aim of ensuring that the population that lived in certain places would be guaranteed a basic standard of living and a certain level of public services (Tervo 2005; Korpi and Palme 1998).

The general similarities between the Nordic countries in terms of political and economic institutions as well as societal organization thus produced relatively common national outcomes in the formulation of their respective growth center policies. What then was the outcome of the growth center policies? This is obviously very difficult to evaluate. Previous evaluations of the Nordic growth center policies are limited to evaluations of Norwegian and Swedish policies. From a quantitative perspective, these studies conclude that the policies resulted in some positive effects as they created new jobs in the towns in which industries were located (Olsen 1986; Liljenäs 1984; Liljenäs and Sundin 1982). However, since then, the non-metropolitan regions in those countries have lost relative population shares towards their larger city regions. Thus, the unanswered question is what impact would an even stronger focus on a limited number of growth poles have had on the spatial distribution of people in the countries?

4   The Return of Classical Regional Policy: The 'Broad' Regional Policy

Against the egalitarian and redistributive policies thus put in action, a regional growth policy oriented more towards urbanity based on theories of policies for cities, urban economics, and economics of agglomeration obviously became less suitable since it implied an outspoken change of the existing settlement pattern. Instead of being a policy aiming to seriously improve fundamentals for economic growth in lagging regions, the Nordic growth center policies aimed to balance the locational outcome of often large-scale and indivisible public facilities such as hospitals and universities in the expanding welfare state.

In an international comparative perspective, those ambitions within regional policy were unique. The regional economist Hannu Tervo observed that the Nordic regional policy became a spatial dimension of the welfare state policy. Then, the

view of what defined 'the regional policy' was also discussed. In the 1980s, the regional policy was found to have had positive impacts but it had not changed the overall settlement structure in a way many had hoped. Instead, interest was now lifted to policies in general with impacts on the development of regions. This gave birth to what became the 'broad regional policy.' The more specific efforts that so far had been directed at specific regions such as the Nordic modest variant of a growth center policy, industrial estates, regionally diversified subsidies or grants were then termed the 'narrow regional policy' (Tervo 2005). The broad regional policy instead included not only the universal transfer and benefit schemes of the welfare state but all services produced and especially investments in infrastructure and public facilities that had impacts on the only slowly changing time scales of national settlement patterns. The broad regional policy thus included all aspects of the welfare state that had an impact on location (Esping Andersen 1993; Korpi and Palme 1998).

Thus, from our perspective in this chapter, this marked the end of the modern regional policy and a return to the central elements of classical regional policy. The narrow policy was the effort to relocate industries and labor while the broad and thus classical policies were more focused on fundamental structures and thus on how to dominate a territory. This focus on territorial control was of course not made explicit at that time. The public sector-oriented policy with its healthcare and university locations and its construction of railway networks, information technology, and other policies to increase interaction and size of labor markets had not, when applied to larger areas, initially been seen as part of a regional policy. In practice it of course was a public sector-oriented growth center policy of almost classical type that had been developed side by side with the modern regional policy but based on a set of large-scale public facilities focused on a limited number of strong growth centers that to some extent really could stand up against the strong concentrations of assets into the capitals of the Nordic countries.

The impossibility of introducing such a traditional outspoken growth center policy focused on industries in the 1970s could thus be seen as a sign of a weakened central state in each of the Nordic countries. In parallel with the less successful attempts to gain results from the 'narrow' policy, the public sector with its large indivisible facilities was thus expanded. Cities chosen for those locations by time obviously had a locational advantage compared with other cities in the new era of culture and human capital. This policy was mainly focused on the location of public sector facilities and not explicitly on integrated private and public sector investments in a coordinated way as modern growth pole policy could have suggested.

5 Why a City-Oriented Regional Policy Became Impossible

During the years from 1960 until 1980, the public sector expanded substantially in the Nordic countries, and central-place theories were used by the elites to determine population threshold values in order to optimize land use and markets for private

services, and, foremost as was mentioned above, determine the location of public sector facilities over a set of municipalities. Through this, public sector services in the lower end of the central place system, such as medical and elderly care and education, were systematically planned and located among municipalities. In response to this, a wave of merging of municipalities into stronger units was also accomplished in 1971. The new municipalities should consist of a larger center surrounded by country-side villages within commuting distance. By this, a political structure at the municipality level was created that made it politically possible to locate services into the core of a municipality where the majority of voters were living without too much organized opposition from the peripheral parts of the municipality.

With this new structure based on fewer municipalities, it also became possible to implement a 'down–sized' growth center policy directed towards the most sparsely populated parts of the country with declining population. Thus, the reason for this was a question of relative political power in space. Since each municipality generally only had a single strong center and this center was larger or in practice more united than the aggregate of the peripheral parts of the municipality, the political problems with many relatively strong sub-centers that could unite themselves against the center, a fact that often could arise at the national level, only in exceptional cases now were realised at the municipality level. When this happened, two strong centers often had been merged into one new municipality – a fact that often also led to a split of the municipality again.

At the national level, the central elites in the capitals so far did not have the same relative power in relation to the strong sub-centers of the nations. Hence, a growth center-oriented policy directed towards a limited number of cities became difficult if not impossible to introduce. In France, where the size of Paris and its concentration of national elites had been strong in relation to the very dispersed and weak regional structures, this was possible. In the Nordic countries, influential political groups also in the center wanted to retain the existing settlement structure as much as possible. This was partly a reaction to the substantial out-migration from peripheral counties in the post-war period and especially after the rapid mechanisation of agriculture and forestry. During the end of the 1950s and beginning of the 1960s, this decline in population in the inland areas of Northern Sweden, Finland, and the central eastern part of Norway at the borders towards Sweden and further up to Northern Norway became too visible to be acceptable for a large group of voters.

Second, the international setting was drastically changing. New information channels and media brought information from a world of wars and of poverty into each home at the same time as man took the first step on the moon. As so often in times of major change, people sought their roots and wanted to return to a more non-urban self-sufficient life. The rapid development of private car ownership had also started to transform or even destroy central parts of larger cities, while the interest in environmental questions now dramatically increased. A period followed where both the centers of the largest cities and the most remote and dispersed areas were depopulated. Suburbs and medium-sized cities were newly attractive.

Finally, there was also a high level of trust in the general capacity of Nordic societies to rationally solve spatial problems through political intervention and social engineering. Growth, it was argued, could equally well be promoted in relatively dispersed as in denser urban areas. This trust in location-oriented policies did not only include the rural groups that were the core followers of the Nordic center parties. The center parties also captured many voters who embraced the new ideas regarding the positive life in the countryside and increased their political power in that respect. Furthermore, those views were also shared by a majority of the politicians within the parliaments, regardless of their ideological background. For instance, in Sweden, not only the social democratic and communist parties, but also the market-oriented liberal and conservative parties expressed that it was an obligation for the government to make provision for people in the countryside in terms of incomes, employment, and public services. Accordingly, no significant opposition was raised against the Swedish 1972 regional policy act. Symptomatically, this act was informally called 'the plan for Sweden' (*Sverigeplanen*), which signaled a commitment to and thrust in planning and to the modern regional policy that dominated domestic politics at the time.

In this setting, a growth pole strategy introduced as a central element in a regional policy that pointed at a limited number of already growing cities in order to make them even stronger was unacceptable for many politicians. If a well-developed growth center policy were to be introduced, it could not be part of the narrow modern regional policy. Instead, but not in a language with almost any relation to the discourse of regional policy, the sort of growth center policy came into use where expansion of universities, university hospitals, and road infrastructure were dominating the measures taken by this policy.

When it came to the location of universities, local politicians at the municipality level initially also had some difficulties in making this an important question in their own campaigns. Instead, regional and local politicians found it easier to involve themselves in national and regional infrastructure policies and the outcome from this for their own municipalities. Higher education and research were not generally part of their own experiences, while roads and car driving were central in their lives and those of many of their voters.

Hence, while they argued against a concentrated urban growth policy, they were in favor of substantial infrastructure investments with the hope that they would gain a dispersed settlement structure. Before WWII, such a policy had, particularly in the northern parts of the countries, been instrumental in developing municipalities since new land for agriculture, forestry, and minerals became accessible, attracted labor, and increased the voting base of the politicians. As discussed earlier, after the strong mechanization with chainsaws and tractors, in combination with greater affordability of private cars, in the 1970s, infrastructure investments instead further concentrated population. Initially, this migration was directed into the regional centers. Later, centers that also had well-developed universities experienced the strongest growth. Hence, the policy focused on a limited number of cities that not could be reached within the modern 'narrow' regional policy to some extent became fulfilled within the educational and infrastructure policies that later became

included in the 'broad' regional policy, a policy that actually had its roots in the classical territorial policies of central elites.

6 Conclusions and Suggestions for Further Studies

Above, was claimed that 'modern narrow regional policy' is the regional policy that became the spatial aspect of the policies of the welfare state. The development of growth center policies in Norway, Sweden, and Finland started with a strong belief that society could find solutions that brought welfare to a broad set of the population. The modern regional policy came to develop in a direction that promised this welfare to take place independent of the chosen location of the individual. As expected, this promise became and still is difficult to fulfil.

The history of modern regional policy also reflects how it developed through a process of institutional change. The measures taken and developed in relation to regional policy and especially policies for growth centers were developed in close collaboration with development within international regional science. In the Nordic countries, the results of those efforts were published by EFTA in their two reports. During this process, the main factors that came to affect the actual implementation of the EFTA concept and actually reduced much of its strength were the strengthened priorities related to the egalitarian part of the welfare state. However, the renewed positive attitudes towards dispersed rural development that came about as a response to the destructive impact of cars in larger cities and the new international order with changes in comparative advantages between the Nordic countries and a large part of the 'third world' were also important. As a result, cities, their scale and the benefits of agglomeration in the regional development process, were not and could not be acknowledged. Instead, smaller cities and towns were developed in order to take the role of 'growth centers' for their surrounding areas.[5]

We argued initially that there is a classical regional policy with its roots in the ancient demand by rulers to control territory. Thus, regional policy in this respect has close connections with the policy of warfare and territorial control.[6] The modern regional policy developed after WWII obviously did not make this connection with territorial control; instead, the policy was increasingly presented as a spatially egalitarian policy. Such a policy could not be developed as part of a classical regional policy where the establishments of cities as concentrated strongholds are central; instead it became reduced to a system of redistribution and adjustment of relative prices through taxes and subsidies. It could be seen as a

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[5] In Eriksson and Westin (2013) *Regional Policy as Interaction between National Institutions and Regional Science*, we found both the policy outcomes and the underlying institutional framework so similar among the examined countries that a common 'Nordic model' of growth center policy might be said to have emerged.

[6] Eriksson et al. (2013) *Regional Policy as Interaction between National Institutions and Regional Science* was the first paper to develop ideas in this direction.

weakness of central governments. Thus, they compensated a part of its national territory for its lack of own currency and its own "central" bank. The outcome of such a policy in the region to which it was aimed was like becoming an independent country, but a country without its own elite dominating and developing its own urban policy. Obviously, this solution could be seen as a compromise between a weaker central elite and strengthened regional elites. But the outcome of such a non-urban policy could not in the long run have a strong impact on the development process for a specific non-capital region.

Although a more precise evaluation remains to be made, it seems clear that, by the end of the 1980s, attempts to renew the modern regional policy were also at an end. However, since attempts to massively support a limited number of cities outside the capitals in order to establish stronger urban alternatives for some regions to the national capitals were turned down, most of the strength and growth of assets may now also be found in the capitals of Norway, Sweden, and Finland. A description and analysis of this process that followed the area of modern regional policy, together with the difficult but necessary evaluation of the success and shortcomings of this policy, must be made. But also various simulations of the probability for success of alternative policies where growth centers and a strong focus on cities would have been in the core is of interest in order to understand the problems regions must tackle when they are not in charge of the capital of the nation they are parts of nation.

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Chapter 10
Regional Development Policies in the Philippines: From Diffusion to Integration

Arianne Dela Rosa Dumayas

Abstract After periods of lost decades, the Philippines is seemingly on the path of revival as the economy remains strong in the midst of global economic slowdown. Looking deeply into the 'boom–bust' growth record reveals a wide spatial disparity in growth and development. This uneven distribution of wealth and economic activities across geographic space exists everywhere, but is particularly evident in developing countries like the Philippines. While the capital and its neighboring regions have been achieving relative affluence, regions in Visayas and Mindanao remain mired in poor local conditions. Various development policies and strategies have been implemented and undertaken to address this spatial disparity. This study surveys the various development strategies undertaken in the Philippines and analyses the transformation in development thinking. This study also presents facts and figures about the economic geography of the Philippines and examines the influence of development strategies in the economic geography, particularly focusing on decentralization and economic liberalization efforts.

Keywords Regional development • Spatial disparity • Industrialization • Decentralization

1 Introduction

Development policy thinking that takes into consideration the importance of geographical space in development has undergone significant transformation over past decades: from neo-classical economics thinking to new economic geography and to institutional economics. However, while great strides have been made in theoretical and empirical analysis, policy implementation remains reliant on neo-classical models of growth poles and the trickle-down approach (Barca et al. 2012). Top-down decision making, state-led industrialization, and inward investments have dominated the development strategies of many countries.

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Development strategies in the Philippines have also adopted this neo-classical and trickle-down approach. Some have argued that this has resulted in wide spatial disparities in the country. While the capital Metro Manila and the nearby regions are flourishing, the remote areas continue to flounder. In 2012, the National Statistical Coordination Board (NSCB) reported that cities in Metro Manila dominated list of the top ten richest cities, with only two cities outside of Metro Manila: Cebu (Visayas) and Davao (Mindanao). Consequently, the National Capital Region (NCR) is the least poor region in the country, with a poverty incidence rate of only 2.6 % among families in 2009, a huge deviation from the national average of 20.9 %. Meanwhile, the Autonomous Region in Muslim Mindanao (ARMM) and CARAGA regions have the lowest incomes but the highest rates of poverty: 38.1 and 39.8 %, respectively.

The advent of globalization serves as an impetus to rethink the relevance of physical space in growth and development. Globalization has reconfigured how economies operate through the increased mobility of goods, people, and factors of production as well as cross-border cooperation and competition. Globalization also presents both opportunities and challenges in which some places are successfully thriving and reaping the benefits, while some places are left behind.

Some researchers argue that this spatial inequality is inevitable in the course of development; however, this does not warrant the neglect of the lagging regions. The World Development Report 2009 asserts "no places should be left behind mired in poverty," thus, efforts should be made to integrate or facilitate the catch-up of lagging regions (World Bank 2009). As an archipelago composed of 7,107 islands, diffusion of economic activities or integration of economic activities is a daunting task. With the recent stellar economic performance of the Philippines, which brings both opportunities to achieve inclusive development and the perils of widening inequalities, it is opportune to examine the various development policies, particularly those that are aimed to address the spatial disparities. This study presents facts and figures concerning the economic geography of the Philippines. This study analyzes how the concepts and practice of regional development have changed over past years. We also examine the possible influence of development policies in shaping the economic geography of the provinces, specifically focusing on decentralization and economic liberalization. In particular, this study aims to answer the following questions:

1. How do regions/provinces in the Philippines differ in terms of growth and development?
2. How have regional development policies evolved during past decades?
3. How do development policies pursued in recent years influence the spatial pattern of growth and development?

This chapter is organized as follows: Sect. 2 provides a survey of dominant regional development theories and the framework of analysis; Sect. 3 introduces the economic geography of the provinces; Sect. 4 analyzes the transformation of regional development policies and examines the impact of decentralization and economic liberalization in economic geography; Sect. 5 concludes the study.

2   Development and Geographical Space

2.1   Major Regional Development Theories

Neo-classical growth theory explains that regional disparities would naturally occur in the process, but that growth and development would eventually even out given the increase in mobility and accessibility of economic activities and factor productions. Therefore, growth in the leading regions should be fostered as well as migration from lagging regions. In sync with neo-classical growth theory are the growth-pole theory and trickle-down approach pioneered by Perroux (1950), Myrdal (1957), and Hirschman (1958). Proponents of the trickle-down approach assert that development can only start in selected areas or in a growth center and it is expected to transmit growth and development to the areas around it. These growth centers are often synonymous with cities or highly urbanized regions. This trickle-down and growth-center approach has been the primary basis of development policies for 30 years until the 1980s and 1990s (Barca et al. 2012). However, this trickle-down approach failed to deliver in many countries, and these frustrations have prompted theoretical transformations that led to the emergence of endogenous growth theory and new economic geography.

Endogenous growth theory explains that growth comes from endogenous factors such as physical and human capital, technology, and innovation. It emphasizes the role of technological spillovers in the uneven rates of regional convergence and the clustering of high- and slow-growth regions. Technological spillovers are said to be geographically bound and tend to decay with this distance (Jaffe et al. 1993). Development policies adopting this theory have focused their efforts in investing in the above-mentioned factors.

New economic geography explains the existence of agglomeration in a geographical space as a result of interaction between first-nature geography (endowments or the geo-physical characteristics and available natural resources) and second-nature geography (interaction among economic agents) (Krugman 1999).

2.2   Spatial Disparity and Policy Responses

The rise of globalization has sparked debates about the relevance of geographical space in growth and development. Some researchers argue that globalization marks the 'death of geography' as people, goods, and ideas have become more mobile and travel across space easily (O'Brien 1992; Cairncross 1997; Friedman 2005, cited in Barca et al. 2012). On the other hand, some researchers still argue that geography has become more important than ever given that, while globalization enhances mobility, the economic activities and factors of production still tend to cluster in specific areas (Markusen 1996; McCann 2008; Rodriguez-Pose and Crescenzi 2008; cited in Barca et al. 2012).

In parallel with these opposing views about geographic space and development is polarized development strategy: neutral-based and place-based development

thinking. Neutral-based thinking emphasizes that mobility and people or factors of production should be located wherever they are productive. Meanwhile, place-based development argues that context should be considered in development policies, as interaction between geography and institutions are important.

The World Bank advanced this debate on neutral-based or place-based development thinking with the publication of the *World Development Report 2009: Reshaping Economic Geography*. The report is one of the few publications by an international development agency that addresses the importance of geographical space in development. The report presents stylized facts about economic geography in three spatial dimensions (density, distance, and division) and policy frameworks that take into account these three spatial dimensions. The report presents "an instrument per dimension" policy framework that highlights the appropriate policy interventions for each spatial dimension. Institutions or spatially blind policies have universal coverage and include the provision of basic services, education, healthcare, and correction of land market distortion. Infrastructure or spatially connective policies enable the mobility of goods, services, people, and ideas such as roads, ports, railways, and communication facilities. Interventions or spatially targeted policies are commonly discussed in policy debates and include slum clearance programs, manufacturing incentives, and preferential treatment of each country.

This chapter adopts the policy framework put forward by the World Bank in analyzing regional development policies. The policy framework will be valuable in understanding the nature of regional development polices and strategies in the Philippines.

3   Economic Geography of the Philippines

The Philippines is an archipelago located in Southeast Asia. It comprises 7,107 islands, which total 300,000 km^2, the second biggest archipelagic country in the world. The topography of these islands varies from mountains to hills and plains. The country is in the humid tropics, but temperature and precipitation differ. The 95 million strong population comprises diverse ethnic groups speaking around 170 languages, including agalog, Cebuano, Ilocano, Moro, Ivatan, Bicolano, Igorots, Mangyan, etc. English and Tagalog are the official languages.

The Philippines is one of the newly industrialized economies and, in recent years, its economy has proven resilient to the global economic slowdown as it has grown at an average of 7 %. This growth was mainly fueled by the expansion of the services sector, particularly business processing outsourcing (BPO). The Philippines is divided into three main islands: Luzon, Visayas, Mindanao. The country is further divided into 17 regions, 80 provinces, 138 cities, 1,496 municipalities, and 42,025 barangays.[1]

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[1] Barangay, the smallest administrative unit, is derived from the Malay word, *Balangay*, which means sailboat. Early inhabitants are said to have reached the islands via these sailboats.

Table 10.1 Regional demography

Regions	Land area	Population	GRDP (%)	GRDP per capita
NCR	636	11,553	35.73	183.75
CAR	18,294	1,521	1.95	73.57
R1-Ilocos	12,840	4,546	3.07	39.81
R2-Cagayan Valley	26,875	3,051	1.81	34.36
R3-Central Luzon	21,470	9,721	9.21	55.07
R4A-Calabarzon	16,229	11,743	17.39	82.39
R4B-MIMAROPA	27,456	2,560	1.73	38.51
R5-Bicol	17,632	5,110	1.97	22.31
R6-Western Visayas	20,223	6,844	4.11	35.56
R7-Central Visayas	14,891	6,399	6.30	56.51
R8-Eastern Visayas	21,432	3,913	2.29	34.31
R9-Zamboanga Region	15,997	3,230	2.09	37.28
R10- Northern Mindanao	14,056	3,952	3.80	53.63
R11-Davao Region	27,141	4,157	3.84	52.20
R12-SOCCKSARAGEN	14,373	3,829	2.73	40.04
CARAGA	18,847	2,293	1.23	30.95
ARMM	11,608	4,121	0.76	14.32

Source: National Statistical Office (NSO)
Land area (km^2), population (2007) in thousands, GRDP (2012), GRDP per capita (2012) in thousand pesos

In terms of land area, Region IV-B (MIMAROPA) is the biggest region. Although the NCR is the smallest region, it is the most populated, with 11.5 million packed within 636 km. CARAGA and Region II (Cagayan Valley) are the least populated regions.

In terms of contribution to the country's total output, the NCR is the biggest contributor, with 36 % in 2012, followed by Region IV-A CALABARZON with 17 %, and Region III (Central Luzon) with 9 %. Central Visayas is the main contributor in the Visayas area, while the Northern Mindanao and Davao regions are the main sources of economic output in Mindanao. The NCR also has the highest gross regional domestic product (GRDP) per capita, with 183,747 pesos in 2012; ARMM has the lowest, with only 14,321 pesos in 2012 (Table 10.1).

There is also a stark disparity among regions in terms of social development. Poverty is relatively high at the national level. NCR (4.0 %) had the lowest poverty incidence in 2009, followed by Calabarzon (13.90 %) and Central Luzon (15.30 %).

Meanwhile, Bicol (45.10 %), CARAGA (47.80 %), and ARMM (45.90 %) have the highest poverty incidence. Income inequality as measured with the Gini ratio is comparatively high, at 0.42. Interestingly, ARMM is the poorest region, but it had the lowest gini ratio (0.29) in 2009. Income inequality is highest in Eastern Visayas

Table 10.2 Social indicators

Regions	Poverty (%)	Gini Ratio	Unemployment (%)	HDI
NCR	4.00	0.40	10.88	0.81
CAR	22.90	0.42	5.53	0.63
R1-Ilocos	23.30	0.41	8.23	0.62
R2-Cagayan Valley	18.80	0.44	2.70	0.69
R3-Central Luzon	15.30	0.37	9.05	0.65
R4A-Calabarzon	13.90	0.41	8.98	0.68
R4B-MIMAROPA	35.00	0.40	4.13	0.51
R5-Bicol	45.10	0.42	6.05	0.51
R6-Western Visayas	31.20	0.42	6.55	0.54
R7-Central Visayas	35.50	0.46	7.08	0.54
R8-Eastern Visayas	41.40	0.48	5.10	0.52
R9-Zamboanga Region	43.10	0.47	3.75	0.46
R10- Northern Mindanao	39.60	0.47	4.58	0.55
R11-Davao Region	31.30	0.43	5.95	0.50
R12-SOCCKSARAGEN	35.70	0.44	4.23	0.50
CARAGA	47.80	0.46	5.65	0.47
ARMM	45.90	0.29	3.43	0.36

Source: National Statistical Office (NSO)
Poverty Rate (2009), Gini ratio (2009), Unemployment Rate (2012), HDI (2009)

(0.48), Zamboanga (0.47), and Northern Mindanao (0.47).Unemployment is seemingly prevalent in the more advanced regions of NCR (10.88), Central Luzon (9.05), and Calabarzon (8.98). The unemployment rate is found to be the lowest in the Cagayan Valley (2.7) and Zamboanga regions (3.75). The human development index[2] (HDI) in 2009 was remarkably high in the NCR (0.81) and found to be the lowest in ARMM (0.36) (Table 10.2).

4 Regional Development in the Philippines

4.1 Regional Development Policies: Historical Perspective

4.1.1 Colonization Period

The Philippines was held by foreign powers for more than 400 years. The Spanish conquest lasted from 1521 to 1898, the American conquest from 1901 to 1946, and the Japanese occupation from 1942 to 1945. However, prior to the coming of the Spanish in 1521, the Philippines was composed of independent kingdoms or states,

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[2] Measured based on the following indicators: life expectancy at birth, mean years of schooling, expected years of schooling, and gross national income per capita.

often referred to as barangays. These independent states had long-established relations with other kingdoms in China, India, Japan, Vietnam, and Indonesia.

In 1565, the Spanish formally colonized the Philippines[3] with the arrival of Miguel Lopez de Legazpi in Cebu.[4] In 1571, Manila was established as the capital of the colonial government. As typical of any colony, the Philippines served primarily as a source of raw materials and thus, cultivation of agricultural lands was rapid. The Spanish open the Manila port to the international market in the late sixteenth century via the Galleon Trade and it lasted until the late nineteenth century. After a short-lived independence in 1898, Spain ceded the Philippines to the USA at the Treaty of Paris for US$20 million. The Philippines experienced socioeconomic progress during this period. The passage of the Payne-Aldrich Act, which provided for a duty-free agreement between the USA and the Philippines resulted in significant expansion of foreign trade, mainly exports of agricultural products. These resulted in the rapid growth of regions that are the source of agricultural products, e.g., rice (Central Luzon), sugar (Central Luzon, Southern Tagalog, Western Visayas), hemp (Bicol), coconut (Southern Tagalog and Visayas), and tobacco (Ilocos and Cagayan Valley). The mortality rate decreased significantly, and education, with English as a medium of instruction, was provided for all. The Japanese occupation during WWII left the Philippines with extensive damage; vast agricultural lands were laid to waste and the sprouting factories and industries were destroyed.

4.1.2   Post-Independence to Martial Law Period (1947–1986)

During the post-war period (1947–1960s), the Philippines found itself pursuing import-substitution-industrialization (ISI) in response to a balance of payment crisis and the depletion of foreign exchange reserves. Another factor that led the country to adopt an ISI strategy was the budding economic nationalism sentiment in the administration, most notable of which is the 'Filipino First Policy' of President Carlos P. Garcia, which gives preferential treatment to locals over foreigners. The early years of ISI was remarkable, and the manufacturing sector grew at 13.55 % from 1949 to 1955 (Tecson 2007). ISI favored capital-intensive industries over resource-based industries and, as a result, capital-rich regions of Metro Manila and Southern Luzon significantly prospered (Sicat 1968, cited in (Mercado 2002)).

However, growth was not sustained, which led the Philippines to remove all controls and venture on economic liberalization. Various policies have been undertaken to facilitate this transition. The Agricultural Land Reform of 1963 was implemented to abolish the shared tenancy system in the hopes of revitalizing the agricultural sectors and addressing the rural–urban gaps. The Republic Act

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[3] Spain was not successful in subjugating the whole archipelago, particularly the Muslim-areas in Mindanao.

[4] Cebu is located in Region VII(Central Visayas)

No.5186, or Investment Incentives Act of 1968, was enacted to provide incentives and guarantees to investments and to create the Board of Investments (BOI), the lead government agency for promotion of investments. The Republic Act No.6135, or Export Incentives Act of 1970, was ratified to provide fiscal incentives to export-oriented sectors. The first export processing zone (EPZ) was established in the province of Bataan[5] in 1972. A National Physical Framework Plan, which espoused the growth center approach to infrastructure development was conceived in 1970. The government prohibited the establishment of new factories or plants within a 50-km radius of Manila in 1973.

Mercado (2002) argued that it was during this period (late 1960s-onwards) that the government started to pay attention to the spatial aspects of development. Improvement of rural areas and dispersion of industries away from the capital surfaced as the one of the main goals of the export-oriented economy. The government installed Regional Development Authorities (RDAs)/Provincial Development Authorities (PDAs) to manage and improve local development. In addition to these, integrated area development (IAD) projects were implemented as part of a regional public investment program. A regional development framework was included for the first time in the National Development Plan of 1978–1982, and each region was guided by the Regional Development Plan of 1978–1982. The Five-Year Development Plan of 1983–1987 continued to address the spatial disparities between rural and urban areas, with the Movement for Livelihood and Progress (Kilusang Kabuhayan at Kaunlaran; KKK) as the main economic–social development strategy. The KKK program aims to induce development to the least developed regions through livelihood projects owned and managed by community residents. The program also proposed the national hierarchy of human settlements strategy to disperse the population from congested areas. Significant improvements geared towards the incorporation of local concerns were made in regional development planning, investment, and budgeting. Prior to these improvements, development planning and budgeting were still decided by the national office, although implementation was undertaken by regional offices.

The industrial sector grew at an average of 7.9 %, and gross domestic product (GDP) at an average of 6 % from 1970 to 1980. It should be noted that these developments were pursued under the Martial Law regime that Marcos declared in 1972.

4.1.3 Post-EDSA–Present (1986–Present)

The Marcos regime was overthrown by the Epifanio Delos Santos Avenue (EDSA)[6] People Power Revolution in 1986 that eventually installed Corazon Aquino[7] as the

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[5] Bataan is located in Region III (Central Luzon).

[6] EDSA is one of the major highways in Metro Manila, where massive protests against the Marcos dictatorship were staged.

[7] The wife of former Senator and staunch Marcos opponent, Benigno Aquino Sr.

new President. Agro-industrialization, decentralization, and structural reforms were the prevailing strategies in this period. In addition to the five existing export-processing zones (Baguio, Bataan, Cavite, Mactan, and the PHIVIDEC Industrial Estate), 18 Regional Industrial Centers (RICs) and People Industrial Enterprises (PIEs) were established in provinces. These RICs and PIEs aimed to develop agro-industrialization and the dispersion of growth. To further discourage industries from locating in the Metro Manila, tax holidays and duty-free importation were no longer provided for those locating in the capital in 1988. Former US military bases were converted into business centers through the Republic Act 7227, or Bases Conversion and Development Act of 1992. The effort towards rural development has continued with the enactment of the Comprehensive Agrarian Reform Program (CARP), which aims to achieve equitable distribution and ownership of the land. Two new regions were also created in this period: the ARMM and the Cordillera Administrative Region (CAR). To improve the coordination between central and local government in development planning and budgeting, the Synchronized Planning and Programming and Budgeting System (SPPBS) was adopted. In terms of physical planning, the National Physical Framework Plan 1990–2000, with its corresponding Regional Physical Framework Plan 1990–2020 was formulated for all regions.

Two decades of Marcos dictatorship and disappointment over the 'trickle-down' development strategy prompted the government to shift the power closer to the people and allow them greater participation in the development process through the enactment of the Local Government Code (LGC) of (Gonzales 1997). The code devolves functions and responsibilities, particularly the delivery of basic services, to the local government units (LGUs). The code increased the share of the LGUs in the national taxes or the internal revenue allotment (IRA) from 11 to 40 %.

The Ramos administration continued the economic liberalization under the banner of 'Philippines 2000', which aimed to achieve newly industrialized country (NIC) status by the year 2000. Massive economic reforms, such as trade liberalization, privatization, deregulation, and build-operate-transfer (BOT) arrangements were pursued. The country experienced a series of energy crises in the early 1990s, which prompted the government to deregulate the power sector and issue licenses to independent power producers (IPPs). Public utilities such as water and telecommunications sectors were privatized. Improvement of infrastructure was undertaken through BOT schemes. The Philippines also actively participated in inter-regional associations and economic partnerships such as the Asia-Pacific Economic Cooperation (APEC) and Brunei-Indonesia-Malaysia-Philippines-East Asia Growth Area (BIMP-EAGA). In 1995, the Philippines joined the World Trade Organization. In the aim of spreading economic activities to other areas of the country, the Republic Act 7916, or Special Economic Zones Act of 1995, was signed into law. This allows the participation of the private sector in the management of industrial estates. The same law also created the Philippines Export Processing Zone Authority (PEZA), which is mandated to oversee the development of the economic zones. To address the long-standing problem of poverty, the Social Reform Agenda (SRA) was implemented. A series of poverty-alleviating projects were implemented at

21 selected provinces and six urban areas, including Metro Manila, Baguio City, and Cebu City. The Moro National Liberation Front (MNLF), one of the secessionist movements in Mindanao, signed a peace agreement in 1996. The Philippines was quite successful in achieving significant growth during this period, but momentum was halted by the Asian Financial Crisis in 1997.

The transitory Estrada Administration cites poverty as its main priority, with its "*Erap para sa Mahirap*" program. The Gloria Macapagal-Arroyo (GMA) administration followed the same path of her predecessors when it came to trade and industrial policy. For investment and infrastructure planning purposes, the existing regions were clustered into four 'super regions': North Luzon Agribusiness Quadrangle, Metro Luzon Urban Beltway, Central Visayas Prime Tourism Area, and Mindanao Southern Agribusiness Area. Moreover, the Strong Republic Nautical Highway (SNRH), an integrated network of roads and ports connecting the archipelago, opened in 2003. The network adopted a roll-on-roll-off (RORO) system, wherein motor vehicles can drive on and off the cargo ships or ferries. The Philippines Cyber Corridor program, aiming to boost the information and communication technology (ICT) sector was implemented and, in line with this, 'next wave cities' or those cities with the potential to host BPO industries were identified. The BPO industry has boomed since 2006 and is now worth $9 billion. The leading cities of Metro Manila and Cebu have absorbed the majority of these BPO-related investments. The Japan–Philippines Economic Partnership Agreement (JPEPA), which aims to facilitate the free trade of goods, services, and capital between Japan[8] and the Philippines, was ratified on 2008.

The economic policies of the Aquino administration underpin an 'inclusive growth' strategy. The main aims of the administration include sustaining economic growth at 7–8 % for the next 6 years, generating mass employment, and achieving the Millennium Development Goals (MDGs). The 4P (Pantawid Pantaong Pamilyang Pilipino) program is the centerpiece strategy to alleviate poverty. The 4P program is a conditional cash-transfer program wherein the poor in the poorest areas were given money or incentives on the condition that they empower themselves. The administration also adopted an industrial Cluster Strategy to promote industrial clusters; they take into account the industrial activity and infrastructural facilities of the domestic area.

4.2 Evolution of Regional Development Policies: From Diffusion to Integration

Borrowing the classification of policies from the World Development Report 2009, it would seem that policy makers and decision makers in the Philippines are well aware of the complex nature of spatial policies, as evident with the mix of

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[8] After the USA, Japan is the second-biggest trading partner of the Philippines.

Table 10.3 Metropolitan areas in the Philippines

Rank	Metropolitan areas	Population	Island Group
1	Metro Manila	11,553,427	Luzon
2	Metro Cebu	2,314,897	Visayas
3	Metro Davao	2,046,181	Mindanao
4	Metro Cagayan de Oro	1,121,561	Mindanao
5	Metro Angeles	970,807	Luzon
6	Metro Bacolod	954,558	Visayas
7	Metro Iloilo	789,080	Visayas
8	Metro Naga	741,635	Luzon
9	Metro Baguio	499,412	Luzon
10	Metro Batangas	432,262	Luzon
11	Metro Dagupan	325,364	Luzon
12	Metro Olongapo	304,388	Luzon

Source: NEDA

development efforts pursued. Post-war efforts were mainly focused on macro-economic policies, and it was not until the 1970s that spatial disparity was given the proper attention in policy making. As mentioned earlier, it was the Five-Year Development Framework 1978–1982 that included the very first Five-Year Regional Development Plan 1978–1982. The theme of spatially blind policies pursued has varied over the years from export-oriented growth to agro-industrial balanced growth strategy to inclusive growth strategy.

Meanwhile, many spatially focused policies have emerged since the late 1970s. These spatially focused policies also vary greatly in their focus, but the trickle-down approaches through the development of urban centers have been the preferred approach. These urban centers have later incorporated the surrounding areas and were organized as metropolitan areas. The National Economic Development Authority (NEDA) identifies 12 major metropolitan areas in the Philippines. Metro Manila is the biggest metropolitan area, followed by Metro Cebu and Metro Davao. Seven of the 12 metropolitan areas are located in the main island of Luzon (Tables 10.3 and 10.4).

In recognition of the fact that poverty has been synonymous with agriculture, policies dedicated to impoverished regions, mainly through agricultural development, have also been pursued. Land redistribution has been the main theme of agricultural reforms and rural development starting from the post-war period. The Agricultural Land Reform of 1963 under the Macapagal administration is one of the landmark pieces of legislation that abolished the shared tenancy system. The CARP of 1987 under the Aquino administration has been the main basis for land-share and social equity reforms for more than two decades now.

On the surface, it would seem that the Philippines have well thought out strategies to address spatial disparities, particularly the urban–rural divide. However, many of these spatially focused policies are 'well-intended' but some are 'internally inconsistent' and poorly implemented. In theory, local governments are

Table 10.4 Regional development policies and historical event

Period	Significant events	Spatially focused (intervention)	Spatially connective (infrastructure)	Spatially blind (institutions)
Post-war to late 1960s	Post-war recovery	Agricultural Land Reform of 1963		Filipino First Policy, Import-substitution-industrialization (ISI)
1960s to 1970s	Lifting of Controls; Peso Devaluation,	Regional Development Authorities (RDA)	National Physical Framework of 1970	Export-oriented-industrialization (EOI)
1972–1976	Martial Law Period; Oil Crisis of 1973; Structural Adjustment by IMF, Economic Liberalization	Integrated Area Development (IAD), Dispersal of factories away from Manila		Four-Year Development Plan (1972–1975) mentioned the importance of regional development to economic growth
1976–1982		Five-Year Regional Development Plan, 1978–1982		Inclusion of Regional Development Framework in the Five-Year Development Plan, 1978–1982
1983–1987	Martial Law (1972–1986); People Power Movement (1986); Constitution Change (1987)	National Hierarchy of Human Settlements; Reforms in Regional Programming and Budgeting, Regional Project Monitoring, I		KKK Program
1987–1992		RICS, PIEs, Fiscal Incentives for locating outside Manila, CARP, Synchronized Planning and Budgeting (SPPBS), 1991 Local Government Code	Regional Physical Framework Plans (RPFPS)	Countryside Agri-industrial Development Strategy (CAIDS)
1993–1998	WTO Membership, Asian Crisis, AFTA, APEC	Growth Networks, National Urban Policy Agenda, MMDA	Infrastructure improvement via market liberalization, privatization, built-operate-transfer	

Table 10.4 (continued)

Period	Significant events	Spatially focused (intervention)	Spatially connective (infrastructure)	Spatially blind (institutions)
1999–2010	Digitalization, 9/11 Terrorist Attacks, Impeachment of Estrada	Super Regions, Next Wave Cities	Strong Nautical Highway, Philippine Cyber Corridor	Poverty Reduction
2010–present		Priority Industry Clustering(2011–2016), Pantawid Pamilyang Pilipino	Public–Private Partnership for infrastructure project	Inclusive Growth

Source: Author's own construction

more knowledgeable about the local conditions and thus in a better position to craft development policies (Capuno 2005, 2013). However, there seems to be improper coordination between local government and national government in terms of planning and implementation. Many of the concerns of the local government authorities were not incorporated in national development planning or vice versa due to mismatches in priorities. Cariño et al. (2004) argue that many of these investment proposals of the provinces were not implemented when they do not demonstrate "concrete and reliable connections to national sectoral policy concerns and priorities."

Furthermore, many of these spatially focused policies were geared towards diffusion of economic activities, as evident with the number of airports and seaports, special economic zones, and state universities (Medalla et al. 2007), cited in (Human Development Network 2013). These attempts to disperse economic activities across the regions were not successful, mainly due to disregarding economies of scale and a lack of development significance.

With the discontent in dispersion strategy abound, the focus has shifted to integration strategy. Given the archipelagic nature of the country, a special approach is needed to induce connectivity and domestic integration (Asian Development Bank 2010). As stipulated in the World Development Report 2009, spatially connective policies are mainly through infrastructure development. Based on the survey, spatially connective policies through infrastructure development have not been given explicit attention in the development agenda through the years. Infrastructure projects are well-documented to bring development and integrate lagging areas. In particular, good-quality local roads can induce local growth and development (Llanto 2007). Unfortunately, the Philippines as a whole is underinvesting in infrastructure and lags significantly behind its East Asian neighbors (Balisacan et al. 2008). In the recent Global Competitiveness Report 2013, the Philippines fare very poorly in terms of quality, ranking 98 out of 144 countries. The fact that infrastructure is often tied to votes, especially at the local level, further complicates infrastructure development. Many local politicians deliberately construct projects with no developmental significance simply to win votes.

On the other hand, a few bright spots in infrastructure development manifested with the 2003 RORO policy reforms. The RORO system is designed to improve inter-island systems of trade and tourism. This has resulted in significantly decreased sea transport costs, enhanced mobility of goods and people, and flourishing domestic tourism. This RORO system was also adopted in some Association of Southeast Asian Nations (ASEAN) countries.

4.3 Regional Development Policies and Economic Geography: Decentralization and Economic Liberalization

4.3.1 Decentralization

The LGC of 1991 is a landmark piece of legislation in local development. The Code aims to infuse growth and development to the local government units by shifting power to local government officials, given the assumption that, due to proximity and familiarity, these local officials know what is best for their constituencies. The code also aims to improve the fiscal conditions of local government through the increased automatic appropriation of 40 % of national revenue to the local government or the IRA. The code also devolves the responsibility for delivering basic services to the LGUs. In theory, decentralization could enhance efficiency in the provision of public goods, which would in turn lead to increased welfare. However, this is based on the assumption that improving the welfare of their constituency is in the best interests of the leaders (Fig. 10.1).

The impact of decentralization on regional development is varied; however, this section only focuses on the role of the IRA in redistributing wealth and enhancing fiscal autonomy as well as its unintended effects. The issue of the IRA as an effective tool for improving fiscal conditions has been widely questioned (Llanto 2009, 2012; Manasan 2007; Uchimura and Suzuki 2009). First, as the computation[9] for IRA is largely based on population and land area, local governments with larger populations and land area receive a bigger share. Figure 10.2 shows that the local governments in the NCR acquired the greatest IRA share at 18 %, with the local governments in CALABARZON at 9 %, and Central Luzon at 8 %. The rest of the regions were allocated 4–5 %. Incidentally, these regions are the wealthiest regions, and population tends to concentrate in these regions (Fig. 10.2).

Many authors such as Manasan (2007) lament the IRA's "lack of equalizing feature." Various attempts have been made to revise the current formula and to include additional criteria such as the performance index and the poverty index to guarantee equitable distribution. Meanwhile, on the issue of fiscal autonomy, the

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[9] The amount of IRA to be distributed is calculated using the following formula: 50 % on population, 25 % on land area, and 25 % equal sharing.
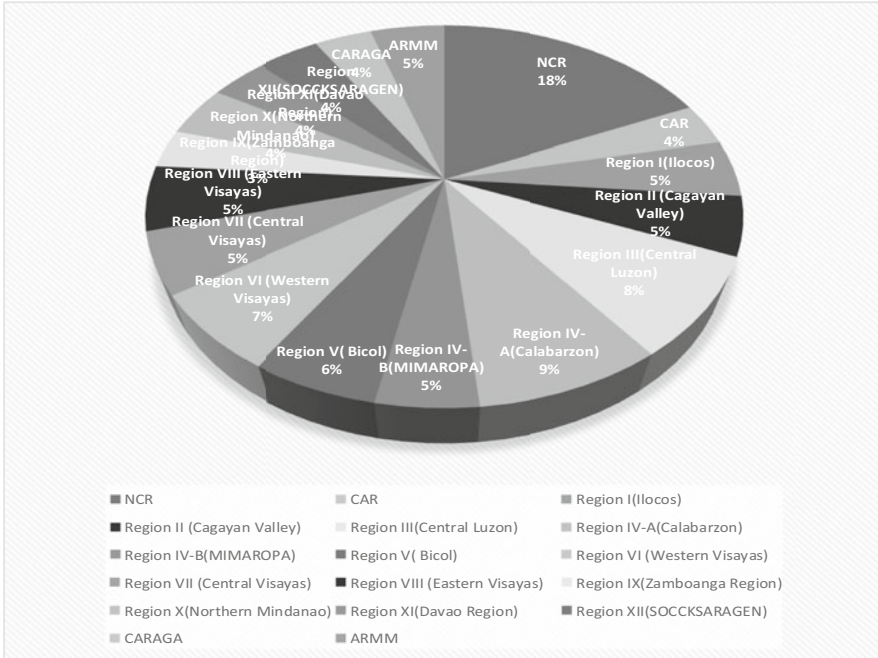
Fig. 10.1 Internal revenue allotment (IRA) share by region (2003–2008) (*Source*: Bureau of Internal Revenue)

Fig. 10.2 Sources of income (2012) (*Source*: Bureau of Local Government Finance (BLGF))

IRA is somehow counter-productive, as it encouraged the dependency of the different levels of local government. Provinces are the most highly dependent, with more than 80 % of its income coming from the IRA. This could be attributed to the mismatch in tax assignment and devolution of roles and responsibilities.

Table 10.5 Administrative units

Administrative units	1990	1995	2000	2005	2013	Increase/decrease
Regions	15	16	16	17	17	2
Provinces	73	77	78	79	81	8
Cities	60	65	96	117	144	84
Municipalities	1,537	1,452	1,513	1,501	1,490	−47
Barangays	41,502	41,929	41,943	41,980	42,028	526

Source: NSCB

Meanwhile, this system of intergovernmental transfer has brought about the inadvertent gerrymandering[10] or political mitosis (Manalo 2013) as seen with the growing number of cities and provinces. During the post-independence era in 1956, the country was originally divided into eight regions, and additional regions were created thereafter: Metro Manila or NCR in 1975; ARMM[11] and CAR in 1989; CARAGA in 1995; and reorganization of Region IV (Southern Tagalog) to Region IV-A (CALABARZON) and Region IV-B (MIMAROPA). The number of provinces has increased from 73 in 1990 to 81 in 2013; some provinces were originally congressional districts and carved out from their home provinces. The number of cities multiplied significantly from only 60 cities in 1990 to 144 cities at present. In contrast, the number of municipalities has decreased from 1,537 in 1990 to 1,490 in 2013, as many of them were converted into cities. The number of barangays has also been increasing, from 41,502 in 1990 to 42,028 in 2013.

This rampant upgrade of administrative units, particularly with the cities, is attributable to the IRA allocation formula (HDR 2012/2013). Under the code, the IRA will be distributed among administrations with the following percentages: provinces 23 %; cities 23 %, municipalities 34 %, and barangays 20 %. In this case, converting a congressional district into a province guarantees a fixed share of revenue, and upgrading a municipality into a city makes sense because cities receive a higher share of IRA in absolute terms (Table 10.5).

Meanwhile, this gerrymandering reflects the strong influence of local powers, specifically the political clans. Almost 90 % of the provinces have entrenched political clans, and gerrymandering is one of the mechanisms used to further acquire more power and political seats for the family. The incumbent President Aquino is part of the Cojuangco-Aquino dynasty, which traces its roots in the province of Tarlac.[12] Mendoza et al. (2013) argue that the presence of these political dynasties is strongly linked to poverty in the provinces; either poverty encourages political dynasties or political dynasties worsen poverty levels.

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[10] An act of dividing jurisdictions to gain political advantage.

[11] All regions are administrative except for ARMM, which has political power.

[12] Tarlac is a province in Central Luzon.

4.3.2   Economic Liberalization

The Philippines was driven to massive economic liberalization during the Ramos administration. At the forefront of the economic liberalization are the special economic zones (SEZs). SEZs are a significant economic strategy to attract foreign investments, boost exports, and create employment. EPZs, the predecessors of SEZs have existed since 1969, but these are state run and dedicated primarily to export promotion. The SEZs veer away from the traditional state-run industrial zones as they allow private participation in the development and management of the economic zones (Makabenta 2002). Furthermore, limits on the type of industry and market orientation were lifted to attract more firms. Previously, incentives were only given to export-oriented firms within the identified priority industries. These SEZs can be further classified into Agri-industrial Economic Zones, information technology (IT) parks and Centers, Manufacturing Economic Zones, Medical Tourism Zones, and Tourism Economic Zones. As of 2013, there are 300 operating SEZs with 5,945 enterprise locators. The majority of these SEZs are located within Metro Manila and its nearby provinces of Laguna and Batangas (Fig. 10.3).

In the Visayas group of islands, only four provinces host these SEZs, but they are clumped within the province of Cebu. In Mindanao, SEZs are located in seven provinces, and 36 % percent of them are located in Davao del Sur and Misamis Oriental (Fig. 10.4).

With further liberalization of SEZs, the number of enterprises has surged significantly from the year 2000 onwards. More than 2,500 firms have located in SEZs in 2000–2009, and this upward trend has continued from 2010 to the present day. The majority of these firms are involved in exporting and IT-related products and services (Fig. 10.5).
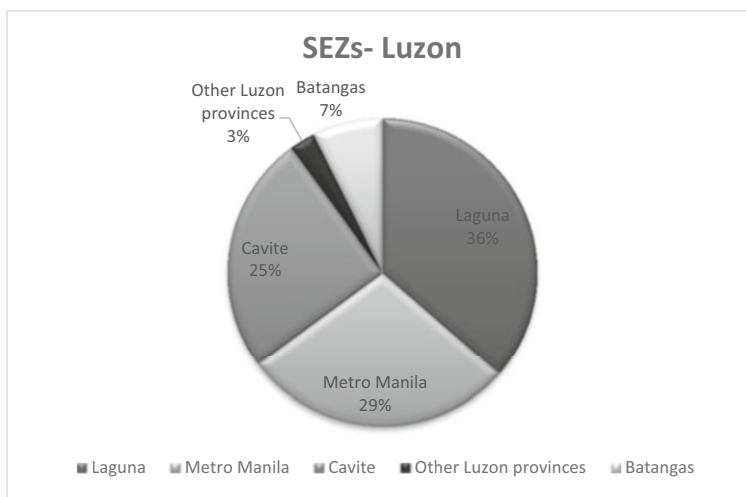

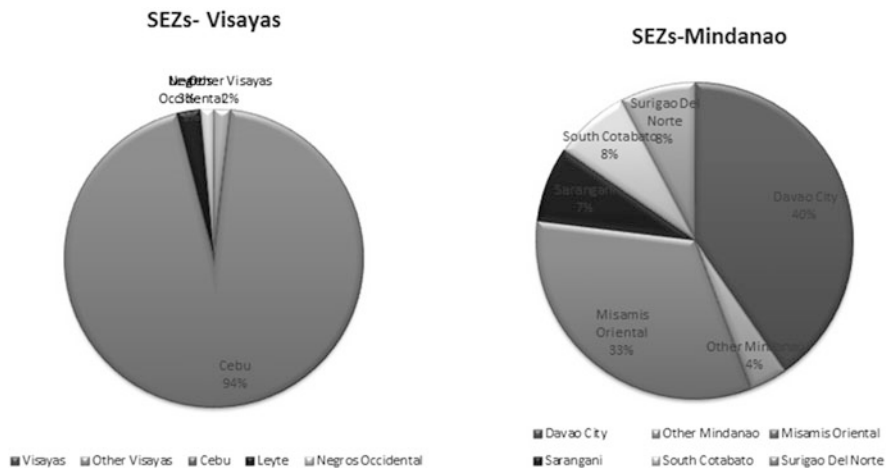**Fig. 10.3** Special economic zones–Luzon (*Source*: Philippines Economic Zone Authority (PEZA))

Fig. 10.4 Special economic firms in Visayas and Mindanao (*Source*: Philippines Economic Zone Authority (PEZA))
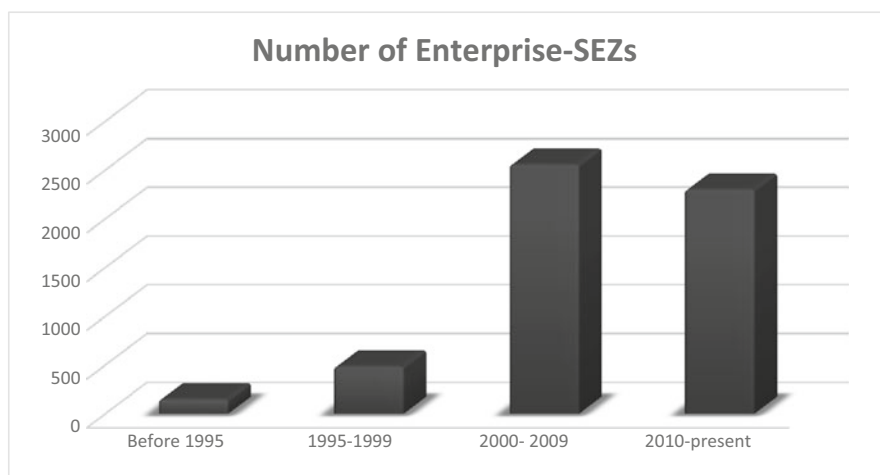

Fig. 10.5 Number of enterprises (*Source*: Philippines Economic Zone Authority (PEZA))

Experiences in SEZs have met with mixed results. SEZs are quite successful in attracting foreign investments, increasing exports, and generating employment. PEZAs have achieved a 23 % increase in FDI in 2006–2010; exports from PEZA-administered SEZs increased 5 % yearly in 2001–2009, and a 10 % increase in the number of direct workers hired was observed (Manasan 2013). SEZs are also intended to disperse industry and economic activities; unfortunately, this attempt is futile as many firms still chose to settle in areas where agglomerations are firmly embedded (Pernia and Quising 2003). This only demonstrates the ineffectiveness of incentives to influence investment patterns in the country.

SEZs as a tool of regional development have failed in many countries. Farole (2011), cited in Manasan (2013), explains that economic density and proximity still matters in SEZs for it to be effective in lagging regions.

5   Summary and Conclusion

This study has reviewed how thinking with regards to the importance of geographical areas has evolved. The study also presented the spatial dimensions of growth and development in the Philippines and has shown the evident concentration of growth and development in a few areas in the country. The study also surveyed the regional development policies from post-war until recent times. Although the trickle-down approach has been the dominant strategy, it could be said that as policy makers and decision makers acknowledged the complex nature of spatial disparity as it pursued a mix of spatially blind, spatially connective, and spatially focused policies. On the other hand, these policies failed to deliver due to inconsistency, improper coordination, and poor implementation. This study also attempted to analyze the influence of two regional development strategies, decentralization and economic liberalization through SEZs, in shaping the economic geography. Decentralization is found to have had a profound impact on the economic geography as it promotes the conversion of administrative units to secure larger or fixed shares in the national income. SEZs have done well in promoting investments and exports as well as employment but they fall short of dispersing economic activities away from traditional economic centers.

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Part IV
Economic Vitalization Strategies of Cities

Chapter 11
The Spatial Distribution of Wealth: A Search for Hot Spots

Johan Lundberg

Abstract This chapter gives an exploratory description of the spatial distribution of relative local tax bases and private wealth as well as the growth rate in these variables across Swedish municipalities during the period 1992–2013. The main aim is to test the hypothesis that municipalities with relatively high tax bases and high private wealth, such as relative capital incomes or private property values and changes in these variables, are more spatially clustered than could be caused by pure chance. The chapter is purely descriptive where we make use of two frequently used statistical tests for spatial correlation, the global Moran's I and the local $G_i^*(d)$-statistic, as well as maps to identify what we refer to as regional 'hot spots'. That is, clusters of municipalities with high local tax bases and private wealth in combination with high growth rates in these variables. This chapter also serves as a guide to how the global Moran's I and the local $G_i^*(d)$-statistic could be used with application to the spatial distribution of local tax bases and private wealth across Swedish municipalities. Even though this paper focuses on local tax bases and private wealth, the method applied could of course be used to identify other types of clusters such as industrial clusters, clusters of individuals and/or industries with specific human capital and knowledge, different types of crimes, etc.

Keywords Regional growth • Spatial autocorrelation • Moran's I • $G_i^*(d)$-statistic

1 Introduction

This chapter concerns spatial clusters of high local tax bases and private wealth and the growth rate of these variables at the local government level in Sweden during the period 1992–2013. The main purpose is to identify what we refer to as regional 'hot spots.' That is, to test the hypothesis that municipalities with relatively high local tax bases and high relative private wealth in combination with high growth

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rates in these variables are more spatially clustered than would be expected from mere coincidence. The analysis focuses on local tax bases, private capital incomes, and private property values. The focus on the local tax base is motivated from a local public finance perspective, as local income taxes constitute the major source of funds for Swedish municipalities. Hence, the local tax base affects the local public sector's ability to provide services required of them by the central government and to undertake necessary investments. Clusters of municipalities with, for instance, low tax bases may induce strategic interactions in the provision of local public goods across municipalities. Accumulation of private wealth, such as private capital incomes and private property values, is important for private investments in new business and (local) private projects. For instance, access to (local) private capital is often an important factor for the local business environment and is sometimes a necessity for investments in new and existing businesses and for the development of other types of local private initiatives. Even though capital is highly mobile, regions characterized by clusters of high capital incomes and private property values often have better conditions for investments in order to utilize and develop (local) private ideas and initiatives.

The analysis is based on two commonly used test statistics for spatial clusters, the global Moran's I and the $G_i^*(d)$-statistic proposed by Getis and Ord (1992). These two test statistics complement each other and are, according to Getis and Ord, preferably used in combination. The global Moran's I is a global test for spatial correlation and tells us whether high or low values are more clustered than would be expected by pure chance (positive spatial correlation). If the global Moran's I reveals a negative spatial correlation, the data are organized as a checkerboard pattern. The $G_i^*(d)$-statistic, which is a local test for spatial correlation, complements the Moran's I in at least two ways: (1) it reveals whether there is a cluster of high or low values, not only that there is a cluster of similar values, and (2) it reveals where these clusters are located. Hence, the combination of these two tests may deepen the analysis in that the $G_i^*(d)$-statistic may show local patterns that are not detected by the Moran's I.

Before we proceed, let us discuss some stylized facts regarding the spatial distribution of local tax bases, private capital incomes, and private property values in Sweden. During the last decades, the local public sector, which is mainly financed through local personal income tax, has expanded quite dramatically in terms of both expenditures per capita and local income tax rates. This expansion has mainly been driven by decisions made at the national level of government as it has, to an increasing extent, delegated and also imposed new obligations on local public authorities. Today, the local public sector is the main provider of childcare, primary and secondary schooling, and elderly care. At the same time, there has been a tendency for younger individuals and individuals with high endowments of human capital to move from the sparsely populated areas in the northern and middle-western parts of the country to more densely populated areas, preferably the major cities and university towns.

   The combination of a receding population base, lower average education, and an expanding local public sector may put economic stress on local governments in these areas. Moreover, as younger individuals and those with high endowments of human capital migrate from areas with already high out migration, the private sector is also affected. It becomes more difficult to find employees with adequate education/skills, and private investments may decrease as private wealth and property values decrease as a consequence of out migration and thin housing markets. This might have a negative or at least a dampening effect on the local business environment and climate and, consequently, the regional ability to capitalize on new ideas and to develop the local private business sector. In this chapter, we formally test for clusters of municipalities with relative high or low tax bases, private capital incomes, and/or private property values and relative changes in these variables.

   This chapter complements previous studies of wealth accumulation and economic growth using Swedish data such as Persson (1997), Aronsson et al. (2001), and Lundberg (2003, 2006) in that we do not try to explain the causes of regional wealth accumulation or economic growth. Instead, this paper focuses attention on the regions that have experienced a relatively high or low accumulation of wealth and the extent to which these regions are more spatially clustered than could be expected from pure chance. Moreover, this paper also looks closely at the spatial distribution of relative local tax bases, relative private capital incomes, and relative private property values, which was not done in the papers mentioned above. The importance of the specification of neighbors, an issue often neglected, or at least not sufficiently discussed in previous papers is highlighted. This paper also serves as a guide to how the global Moran's I and the local $G_i^*(d)$-statistic could be used with an application to the spatial distribution of local tax bases and private wealth across Swedish municipalities.

   The main findings are that clusters of relatively high private capital incomes in combination with high growth in private capital incomes are found for municipalities in the major city areas, Stockholm and Gothenburg, while clusters of relatively high private property values and growth in private property values are found for municipalities in Skåne, in the southern part of the country.

   The remainder of this paper is organized as follows. The two test statistics used, the Moran's I and the $G_i^*(d)$-statistic, are described in the next section. The data set used and definitions of the concept 'neighbors,' e.g., the definition of the different weights matrices, are discussed in the following section. This section is followed by the empirical results. Summary and concluding remarks are given in the final section.

2 Statistical Tests for Spatial Correlation

2.1 The Global Moran's I

The global Moran's I, which builds on the work by Moran (1948), is probably the most frequently used test for spatial correlation. This test statistic has been generalized by Cliff and Ord (1972) in order to derive a test for spatial correlation in linear regression models. Burridge (1980) demonstrated that the Moran's I test statistic is equivalent to a Lagrange multiplier test statistic derived from a linear regression model without a spatial lag. Its large sample properties and asymptotics have been analyzed by Pinkse (1999) and Keleijan and Prucha (2001). See also Anselin (1988, Chap. 8).

Consider a variable y covering n Swedish municipalities. Assume $\mathbf{W}$ to be a weighting matrix of dimension $(n \times n)$ whose elements assigns neighbors to each municipality.[1] The weighting matrices used here can be characterized as $\mathbf{W} = \{w_{ij}\}$ such that $0 < w_{ij} \leq 1$ for all $i \neq j \forall$ if i and j are defined as neighbors, otherwise $w_{ij} = 0$. Note that $w_{ii} = 0$. Using row-standardized weights, which is the preferable way of interpreting this test, $\sum W_i = 1$, then, Moran's I is calculated as

$$I = \sum_i \sum_j w_{ij}(y_i - \mu)\left(y_j - \mu\right) \times \frac{1}{\sum_i (y_i - \mu)^2} \tag{11.1}$$

where y_i and y_j are observations for locations i and j with mean μ. The test statistic is compared with its theoretical mean, $E(I) = -1/(n-1)$, where $E(I) \to \infty$ as $n \to \infty$. The null hypothesis $H_0 : I = -1/(n-1)$ is tested against the alternative $H_a : I \neq -1/(n-1)$. If H_0 is rejected, there are two alternative interpretations depending on whether the test statistic I is significantly higher or lower than its expected value. If H_0 is rejected and $I > -1/(n-1)$, this indicates a positive spatial correlation, meaning that municipalities with similar values are more spatially clustered than could be caused by chance. If H_0 is rejected and $I < -1/(n-1)$, this indicates a negative spatial correlation, municipalities with high and low values are mixed together. A perfect negative spatial correlation is characterized by a checkerboard pattern of high and low values. As the test statistic is to be compared to its theoretical mean, inferences is often based on the z-statistic

$$z = \frac{[I - E(I)]}{SD(I)} \tag{11.2}$$

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[1] A more in-depth discussion and description of the spatial weights matrices used in this paper is given in the section *Definition of Neighbors* below.

Where $SD(I)$ is the theoretical standard deviation of I.[2] If $z > |1.98|$, I is at the 95 % level of significance different from $-1/(n-1)$, indicating either a negative or a positive spatial correlation.[3]

2.1.1   The $G_i^*(d)$-statistic

The other test for spatial correlation to be used here is the $G_i^*(d)$-statistic developed by Getis and Ord (1992). Like the Moran's I, the basic idea behind this test is to define a set of neighbors for each municipality, i.e. municipalities that fall within a specified geographic distance, d, from the municipality in which we are interested. The $G_i^*(d)$-statistic then indicates whether a particular municipality is surrounded by a cluster of other municipalities with equivalent y-values. Hence, a test statistic is computed for each location, in our case for each municipality. In contrast to the global Moran's I, the $G_i^*(d)$-statistic requires a symmetric and binary weights matrix. That is, $w_{ij} = 1$ for $i \neq j$ and if i and j are defined as neighbors, otherwise $w_{ij} = 0$. Moreover, the $G_i^*(d)$-statistic differs from the $G_i(d)$-statistic in that y_i is included in the calculation of the $G_i^*(d)$-statistic while not in the $G_i(d)$-statistic. In addition, Ord and Getis (1995) developed a new $G_i^*(d)$-statistic that departs from the 'old' $G_i^*(d)$-statistic in that the new allows for non-binary and non-symmetric weights matrices. In most cases, the new and the old versions of the $G_i^*(d)$-statistic produces the same qualitative results, and, in the following, we concentrate on the old version of the $G_i^*(d)$-statistic.

To be more specific, the $G_i^*(d)$-statistic is calculated as

$$G_i^*(d) = \frac{\sum_{j=1}^{n} w_{ij}(d) y_j}{\sum_{j=1}^{n} y_j}, \tag{11.3}$$

for all j, j may equal i

With $E[G_i^*] = W_i^*/n$ and $W_i^* = \sum_{j=1}^{n} w_{ij}(d)$, $H_0 : G_i^*(d) = E[G_i^*(d)]$ is tested against the alternative $H_a : G_i^*(d) \neq E[G_i^*(d)]$ where H_0 is the absence of spatial

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[2] $SD(I) = \sqrt{E[I]^2 - E[I]^2}$ where $E[I]^2 = \frac{A-B}{C}$; $A = n[(n^2 - 3n + 3)S_1 - nS_2 + 3S_0^2]$;

$B = D[(n^2 - n)S_1 - 2nS_2 + 6S_0^2]$; $C = (n-1)(n-2)(n-3)S_0^2$; $D = \frac{\sum_{i=1}^{n} z_i^4}{\left(\sum_{i=1}^{n} z_i^2\right)^2}$; $S_0 = \sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}$; $S_1 = \frac{1}{2}\sum_{i=1}^{n}\sum_{j=1}^{n}(w_{ij} + w_{ji})^2$; and $S_2 = \sum_{i=1}^{n}\left(\sum_{j=1}^{n} w_{ij} + \sum_{i=1}^{n} w_{ji}\right)^2$.

[3] Most commonly, the 95 % level of significance is used to evaluate the significance of econometric test statistics. However, as we will later use the 99 % level of significance when calculating the $G_i^*(d)$ -statistics in order to single out the most significant regions, we use the same level of significance when evaluating the Moran's I.

clustering. Assuming that $G_i^*(d)$ is approximately normally distributed, inferences are often based on the z_i-statistic.[4]

$$z_i = \frac{G_i^*(d) - E\big[G_i^*(d)\big]}{SD\big[G_i^*(d)\big]} \tag{11.4}$$

If H_0 is rejected, two possible interpretations arise. A positive and significant test statistic indicates that other municipalities with y values surround the municipality, and a negative and significant test statistic indicates the opposite, while $G_i^*(d) = E\big[G_i^*(d)\big]$ indicates no spatial correlation. If $z > |1.98|$, the particular municipality i is at the 95 % level of significance surrounded by other municipalities with either high ($z > 0$) or low ($z < 0$) y values.[5]

3 Data and Definition of Neighbors

3.1 Data

The data used originate from Statistics Sweden (SCB) and covers all Swedish municipalities from 1992 to 2013. During this period, the number of municipalities varied between 286 in 1992 and 290 in 2013. SCB have re-calculated values for those municipalities whose borders have been changed during this period, making it possible to use the geographical classification of 2013 with 290 municipalities for the whole period. However, this re-calculation has only been carried out for the local tax base between 1995 and 2013. Consequently, the analysis of the local tax base is based on the period 1995–2013. Due to the reformation of the property tax system in 2009, comparable data on private property values are only available for the period 1992–2008.

The local tax base (*tb*) for year 1995 and 2013 is measured as the local tax base in Swedish krona (SEK) per capita and deflated by the Consumer Price Index (CPI) using 1980 as the base year.[6] The relative tax base of 1995 and 2013 for municipality i is calculated as $rtb_{i,1995} = tb_{i,1995}/min(tb_{1995})$ and $rtb_{i,1995} = tb_{i,2013}/min(tb_{2013})$, respectively, and the growth in the local tax base is calculated as $tbg_{i,1995-2013} = tb_{i,2013}/tb_{i,1995}$. Incomes from the federal tax on private capital

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[4] Here $\quad SD\big[G_i^*(d)\big] = \sqrt{V\big[G_i^*(d)\big]} = \sqrt{\dfrac{W_i^*(n-W_i^*)Y_{i2}^*}{n^2(n-1)(Y_{i1}^*)^2}} \quad$ where $\quad Y_{i1}^* = \dfrac{\sum_{j=1}^{n} y_j}{n} \quad$ and

$Y_{i2}^* = \dfrac{\sum_{j=1}^{n}\sum_{i=1}^{n}(y_i y_j)^2}{n} - (Y_{i1}^*)^2.$

[5] $E\big[G_i^*(d)\big] = \dfrac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}}{n(n-1)}; \; V\big[G_i^*(d)\big] = E\Big[(G_i^*(d))^2\Big] - E\big[G_i^*(d)\big]^2.$

[6] The local tax base is in principle the sum of all inhabitants' income from work.

incomes collected in municipality i, here denoted $cti_{i,.}$, are used as an approximation of local private capital incomes. As our main interest is in relative differences in private capital incomes and not absolute values, this should give a reasonable approximation. By using a relative measure, difficulties associated with changes in the capital tax rate are also avoided. Relative incomes from the federal tax on private capital incomes for 1992 and 2013 are calculated as $rcti_{i,1992} = cti_{i,1992}/min(cti_{1992})$ and $rcti_{i,2013} = cti_{i,2013}/min(cti_{2013})$, respectively, where cti is the income from the federal tax on private capital incomes in thousand Swedish Kronor (SEK).[7] The growth rate is then calculated as $ctig_{i,1992-2013} = cti_{i,2013}/cti_{i,1992}$. Incomes from the federal tax on private property values collected in municipality i are used as an approximation of private property values. Again, using relative measures, this should give a reasonable approximation. Incomes from federal tax on private property values in years 1992 and 2008 are denoted as $pti_{i,1992}$ and $pti_{i,2008}$, respectively, the relative incomes from the private property tax is calculated as $rpti_{i,1992} = pti_{i,1992}/min(pti_{1992})$ and $rpti_{i,2008} = pti_{i,2008}/min(pti_{2008})$.[8] In the following text, $rcti$ and $ctig$ are referred to as relative private capital incomes and growth in private capital incomes, respectively, and $rpti$ and $ptig$ are referred to as relative private property values and growth in private property values, respectively. Descriptive statistics for all variables are presented in Table 11.1 below.

The figures displayed in Table 11.1 suggest an unequal distribution of both local tax bases and private wealth across Swedish municipalities. For instance, in 1995, the gap between the lowest and the highest tax base per capita was a factor of 2.30. Even though the average and standard deviation slightly decreases between 1995 and 2013, the gap between the lowest and highest tax base per capita raised to a factor of 2.47 in 2013. The growth rate in local tax bases varies between 7.4 and 115.1 % over the period 1995–2013, which suggests that all municipalities have experienced growing tax bases during this period.

Table 11.1 Descriptive statistics

Variable	Mean	Standard deviation	Minimum	Maximum
rtb_{1995}	1.320	0.167	1.000	2.297
rtb_{2013}	1.299	0.162	1.000	2.467
$tbg_{1995-2013}$	1.636	0.246	1.074	2.151
$rcti_{1992}$	2.055	1.130	1.000	15.155
$rcti_{2013}$	2.382	1.832	1.000	26.526
$ctig_{1992-2013}$	1.577	0.359	0.590	3.211
$rpti_{1992}$	1.950	0.826	1.000	10.198
$rpti_{2008}$	2.820	1.361	1.000	17.438
$ptig_{1992-2008}$	1.214	0.443	0.694	7.945

[7] The federal capital tax income comes from a 30 % tax on personal incomes from interest rates, dividends, and net profits from property sales.

[8] The private property tax is a federal tax on an estimated market price on private housing and private apartments.

Turning to the relative measures of private wealth, relative capital incomes, and relative private property values, the disparities are substantial. The disparities between the lowest and highest values of the two variables, *rcti* and *ctig*, and their standard deviation has increased between 1992 and 2013. Maybe more interesting and in contrast with the local tax base, which also reflect private incomes, some municipalities have experienced a period of decreases in their inhabitants' capital incomes and private property values. The largest decrease in capital incomes and private property values during this period is about 40 and 30 %, respectively, which is a substantial decrease, especially as these are average values within each municipality. The main conclusion from Table 11.1 is that the inequalities in the spatial distribution of private property values and private capital incomes have increased during this period, while inequalities in local tax bases has remained the same.

3.2   Definition of Neighbors

One of the more crucial and delicate problems in many empirical studies applying spatial econometric tools is the specification of the weights matrix $\mathbf{W}$. The definition of the elements in $\mathbf{W}$ is of great importance as $\mathbf{W}$ may affect the results. As $\mathbf{W}$ is an $(n \times n)$ matrix, it is not possible, or at least in most cases very difficult, to estimate its elements, especially if $\mathbf{W}$ is non-symmetric (if $w_{ij} \neq w_{ji}$). That is, with a data set containing n observations, in our case municipalities, it is not possible to estimate the connectedness between all n municipalities. This means that $\mathbf{W}$ has to be specified a priori from some criteria, preferably on an underlying theoretical model.[9]

As our focus is on geographical clusters, it seems natural to base the definition of neighbors on some geographical criteria, even though closeness or connectedness could of course also be based on criteria such as closeness in population size, population density, political preferences, political representation in the local parliament, local public expenditures, and local income taxes, etc.[10] To define closeness or connectedness based on, for instance, population density could be a reasonable definition for analysis of political decision making and priorities. That is, local politicians in the three major city areas in Sweden (Stockholm, Gothenburg, and Malmö) might find inspiration and learn from each other to a larger extent than they do from local politicians in smaller neighboring municipalities. Local politicians from different municipalities but representing the same political party

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[9] See Lundberg (2014) for a discussion regarding the definition of $\mathbf{W}$ when testing for yardstick competition.

[10] See Qu and Lee (2015) for estimation of spatial autoregressive models with an endogenous spatial weights matrix.

may for instance influence each other to a larger extent than local politicians representing different political parties.

In our case, leaning on Tobblers first law of geography, which suggests that geographical distance matters, makes municipalities that share a common border one obvious definition of neighbors. It is also reasonable to base the criterion of connectedness on the geographical distance between municipality centers, where municipalities located nearby are assumed to have closer connections than those located further away from each other. Another frequently used measure is to define the k nearest municipalities as neighbors, which implies that all municipalities have the same number of neighbors, irrespective on the geographic distance between them. In the Swedish case, for instance, such a definition suggests that the municipality of Kiruna, which is a very large municipality located in the very north and bordering only two other municipalities, will be assigned k neighbors, the same number of neighbors as a small municipality like Ljungby located in the south. If, for instance, $k = 8$, which is exactly the number of municipalities who share a common border with Ljungby in the south, such a definition will probably assign to many (or overestimate the number of) neighbors to Kiruna, while underestimating the number of neighbors connected to Ljungby. In this specific example, Kiruna will be connected with municipalities located as far as 250 km away, while the most distant neighbor to Ljungby will be located only 75 km away. It is suggested to use this type of weights matrix with some caution and only when it is theoretically motivated. However, weights matrices based on geographical characteristics have the nice feature of being exogenous.

In most cases, it is recommended to use many alternative definitions of neighbors for either sensitivity tests or to rule out alternative hypothesis regarding the spatial dependence. However, in order to save space, in the following we only use two definitions of the elements in the spatial weights matrix, both based on the criteria that neighbors share a common border:

- **Ws**: Neighbors are defined as those municipalities that share a common border. Row-standardized weights matrix. This matrix is used to calculate Moran's I.
- **Wb**: Neighbors are defined as those municipalities that share a common border. Binary weights, non-rowstandardized. This matrix is used to calculate the $G_i^*(d)$-statistic.

Descriptive statistics of the elements in the different weights matrices are presented in Table 11.2.

The descriptives displayed in Table 11.2 suggest that, on average, each municipality border 5.2 other municipalities, with a maximum number of 11 neighbors, and that all municipalities have at least one neighbor.

Table 11.2 Descriptive statistics of the elements in the **W** matrices

Weights matrix	Mean	Minimum	Minimum> 0	Maximum
Ws	0.003	0.000	0.091	1.000
Wb	0.018	0.000	1.000	1.000

4   Results

4.1   Moran's I

If the variable that is to be tested follows a normal distribution, the Moran's I-statistic is compared with its theoretical mean, $-1/(n-1)$. However, if this is not the case, the reference distribution for the Moran's I should be generated empirically. This is done by randomly reshuffling the observed values over all locations. Applying a Wald test on the variables analyzed here reveals non-normality in all of them, and consequently the reference distribution of the Moran's I is generated using the permutation approach. The z-value for the Moran's I for the different variables are presented in Table 11.3 below.

From the results presented in Table 11.3 above, we conclude that there exists a positive spatial correlation, indicating that municipalities with similar tax bases, private capital incomes, and private property values, as well as the growth rates in these variables, are more spatially clustered than could be expected from pure chance. However, the Moran's I gives no guidance regarding whether these clusters consist of municipalities with high or low values or where these clusters are located. Therefore, to be able to make further conclusions regarding the spatial distribution of these variables we turn to the $G_i^*(d)$-statistic.

4.2   The $G_i^*(d)$-Statistic

In order to make the results from the $G_i^*(d)$-statistic easier to overview and interpret, they are presented in map form. It should be empathized that a significant $G_i^*(d)$-statistic for municipality i can be driven by extreme values of its neighbors. Consider the situation where the highest value is found for municipality k, and that k is assigned only one neighbor, i. Even though the value for municipality i is the lowest in the sample, the $G_i^*(d)$-statistic could still be significant, making municipality i part of a cluster of municipalities with high average income growth rates.

Table 11.3 Moran's I, weights matrix **Ws**

Variable	Moran's I	z-value
rtb_{1995}	0.566	15.85
rtb_{2013}	0.607	17.19
$tbg_{1995-2013}$	0.428	11.87
$rcti_{1992}$	0.380	12.08
$rcti_{2013}$	0.389	13.61
$ctig_{1992-2013}$	0.115	3.28
$rpti_{1992}$	0.505	15.01
$rpti_{2008}$	0.308	9.39
$ptig_{1992-2008}$	0.179	8.33

Therefore, to avoid misinterpretations of the results, it is recommend that signifi-cant values of the $G_i^*(d)$-statistic be complemented by an analysis of the actual values of individual i (in our case, the municipality i) and its neighbors. Therefore, the maps displaying significant $G_i^*(d)$-statistics are complemented by maps displaying the actual values.

Let us first discuss the spatial distribution of local tax bases and its development during the period 1995–2013. The spatial distribution of relative tax bases are displayed in Fig. 11.1a below, where regions with high values, i.e. municipalities with a relative tax base more than two standard deviations higher than the mean of 1.30, are marked in red, and regions with low values, i.e. municipalities with a relative tax base between one and two standard deviations below the average of 1.30, are marked in light blue.

Figure 11.1a shows a concentration of municipalities with a high tax base in the middle-eastern (the Stockholm area) and the southern part of the country and scatters of low values in the middle-north and middle-western parts. In addition, some municipalities with low values are also shown in the southern part. From Fig. 11.1a it is, without any formal tests, reasonable to draw the conclusion that there is a cluster of municipalities with high tax bases in the Stockholm area, while it is more difficult to draw conclusions regarding clusters of municipalities with low tax bases, as these municipalities are more scattered over the country. If we
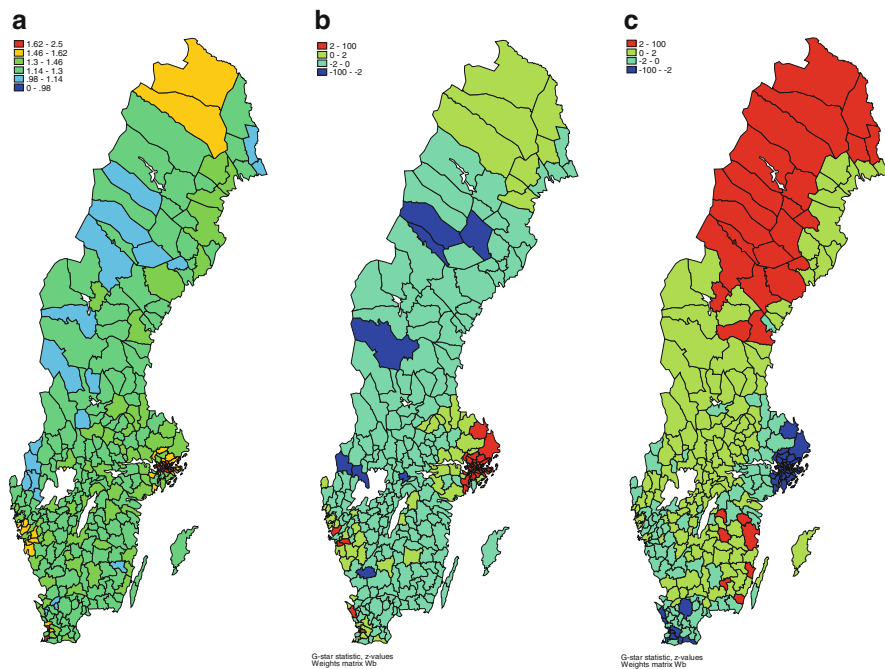

Fig. 11.1 (**a**) Relative tax base, 2013. (**b**) $G^*(d)$-statistic on relative tax base, 2013. (**c**) $G^*(d)$-statistic on tax base growth, 1995–2013

compare Fig. 11.1a with Fig. 11.1b, where municipalities with positive and significant $G_i^*(d)$-statistics are marked in red and municipalities with negative and significant $G_i^*(d)$-statistics are marked in deep blue, a more distinct pattern emerges.

The results displayed in Fig. 11.1b verify the concentration, or a cluster, of municipalities with high tax bases in the Stockholm area. More important is that the results in Fig. 11.1b formally verify that the Stockholm area contains a significant cluster of municipalities with relative high tax bases. Moreover, and in contrast with what could have been concluded from Fig. 11.1a, b shows a significant cluster of municipalities with relatively high tax bases in the very south (Malmö area) and in the south-western part of Sweden (Gothenburg area). In addition, Fig. 11.1b also displays a cluster of low relative tax bases in the middle northern part of the country as well as in the western and south-western part. All regions with significant clusters of relative low tax bases are sparsely populated areas, while clusters of municipalities with relatively high tax bases are found in the major city areas of Stockholm, Gothenburg, and Malmö.

Even though the spatial distribution of relative tax bases is interesting in its own right, it is also interesting to look at changes in the local tax base to see whether there is a tendency of equalization of local tax bases over time. Have municipalities with relatively low tax bases also experienced declining tax bases? Figure 11.1c shows the growth in local tax bases over the period 1995–2013, where municipalities with positive and significant $G_i^*(d)$-statistic (significant clusters of municipalities with high tax base growth) are marked in red and municipalities with negative and significant $G_i^*(d)$-statistic (significant clusters of municipalities with low tax base growth) are marked in blue.

From Fig. 11.1c, it is evident that clusters of municipalities with low growth rates in their local tax base are located in the Stockholm and Malmö area, while clusters of municipalities with high growth rates in their local tax base are clustered in the north and, to some extent, in the south-eastern part of the country. In combination with the results displayed in Fig. 11.1b showing the spatial distribution of relative tax bases, this suggests, even though it is not a formal test of the convergence hypothesis, that regions with relatively low tax bases tend to have a higher growth rate in their local tax base than do regions with relatively high tax bases, which is in line with previous research on regional growth based on Swedish data such as Persson (1997), Aronsson et al. (2001), and Lundberg (2003, 2006). The combination of the results presented in Fig. 11.1b, c also suggests the absence of regional hot spots when it comes to local tax bases. That is, the clusters of municipalities with relatively high local tax bases displayed in red in Fig. 11.1b do not coincide with the clusters of municipalities with high tax base growth displayed in red in Fig. 11.1c. Instead, clusters of municipalities with low tax bases tend to be the same regions that have experienced high growth in their local tax bases during the last decades, while the opposite holds true for regions with high tax bases.

Conducting a similar analysis of federal capital tax incomes, which is assumed to reflect private capital incomes, let us first look at the spatial distribution of the
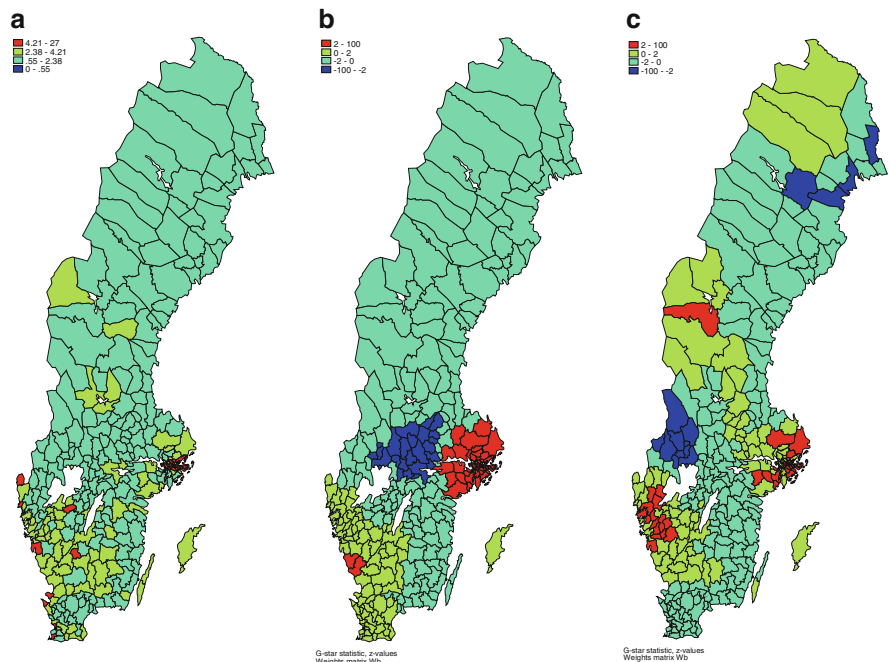
Fig. 11.2 (**a**) Relative incomes from private capital income taxes 2013. (**b**) $G^*(d)$-statistic on relative incomes from private capital taxes, 2013. (**c**) $G^*(d)$-statistic on growth in incomes from private capital income taxes, 1992–2013

relative capital incomes for 2013 displayed in Fig. 11.2a, and then turn to the issue of significant clusters of relative capital incomes and growth in capital incomes displayed in Fig. 11.2b, c, respectively. In Fig. 11.2a, municipalities with a relative capital income two standard deviations above the average of 2.38 are displayed in red, those with a relative capital income between one and two standard deviations above 2.38 are marked in light green, and those with relative capital incomes lower than one standard deviation below 2.38 are marked blue.

As shown in Fig. 11.2a, the highest relative capital incomes are found in the Stockholm area, with a few scattered municipalities in the south western part of the country. In the rest of the country, the relative capital income lies within one standard deviation from its mean. As can be seen from Fig. 11.2b, the extent to which the high values in the south-western part of the country are actually a cluster or whether they are just scattered observations is not obvious. Even less obvious is whether there are any clusters of municipalities with low private capital incomes.

Looking instead at Fig. 11.2b, where, in accordance with Fig. 11.1b, c, significant clusters of relatively high capital incomes are marked in red, significant clusters of relatively low capital incomes are marked in blue, and non-significant values are displayed in turquoise and light green, a more distinct pattern emerges. From Fig. 11.2b, it is evident that municipalities with high relative capital incomes are clustered in the two major city areas, Stockholm and Gothenburg, while a

cluster of municipalities with low relative capital incomes are found in the middle part of the country.

Again, it is interesting to look at the changes in private capital incomes and see the extent to which high relative capital incomes correlate with high growth in capital income.

From Fig. 11.2c, it is evident that the major city areas Stockholm and Gothenburg contain clusters of municipalities with high growth in private capital incomes. In addition, Åre, located in the middle-north of the country are surrounded by municipalities with relatively high growth in capital incomes, while clusters of municipalities with low growth rates are found in the middle-western and northern parts of the country. In combination with the results displayed in Fig. 11.2b, the major city areas Stockholm and Gothenburg qualify as hot spots in terms of private capital incomes. That is, these areas contain clusters of municipalities with inhabitants who, on average, have both high private capital incomes as well as high growth in private capital incomes. On the negative side, clusters of municipalities with relatively low private capital incomes in combination with low growth in private capital incomes are found in the middle and middle-western part of the country.

Finally, we turn to the spatial distribution of private property values displayed in Fig. 11.3a below. In Fig. 11.3a, municipalities with, on average, relative private
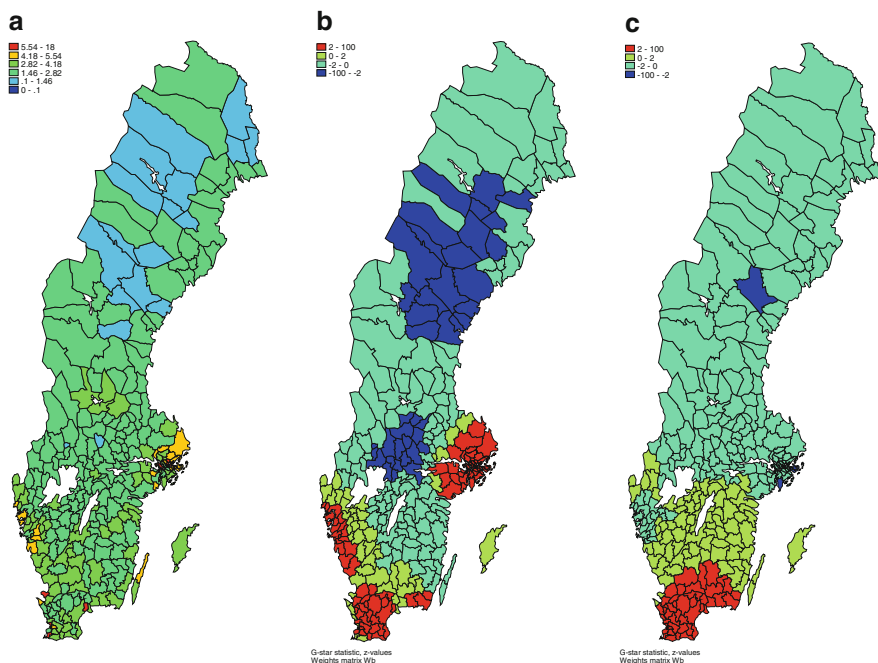

Fig. 11.3 (**a**) Relative incomes from taxes on private property values, 2008. (**b**) $G^*(d)$-statistic on relative incomes from taxes on private property values, 2008. (**c**) $G^*(d)$-statistic on growth in incomes from taxes on private property values, 1992–2008

property values higher than two standard deviations above the average are displayed in red, and municipalities with the lowest private property values are displayed in blue. Note that the highest relative property values are about 17 times higher than the lowest.

$G_i^*(d)$-statistics for relative private property values are displayed in Fig. 11.3b, which gives a more distinct pattern with clusters of municipalities with relatively high private property values in the major city regions of Malmö (the very south), Gothenburg, and Stockholm. The concentration of municipalities with high private property values in the major city areas is expected as these areas have large in-migration. From Fig. 11.3b, it is also evident that clusters of municipalities with relatively low private property values are found in the middle and middle-north of the country, which is also expected based on the fact that these munici-palities have experienced significant out-migration over the last decades. Looking at the growth rate in private property values displayed in Fig. 11.3c below, it is interesting to note that the Stockholm area contains a cluster of municipalities with low growth rates in private property values as the private housing market in this region is often regarded as overheated. Even though this region contains clusters of municipalities with high relative private property values, there is no evidence of clusters of municipalities with high increases in private property values.

So, what have we learned from this? The first lesson is that formal tests are needed in order to verify the existence of clusters, as these are not easily detected by visual inspection of maps displaying the magnitude of the variable of interest. In this respect, both the Moran's I and the $G_i^*(d)$-statistics are useful. Moreover, based on these two test statistics, clusters of municipalities with both high private capital incomes and high growth in private capital incomes are found in the two major city areas Stockholm and Gothenburg, qualifying these two areas as what we refer to as regional hot spots in terms of private capital incomes. Clusters of municipalities with high private property values in combination with high growth in private property values are also found in the County of Skåne, making this region a hot spot in terms of private property values. However, using the definition of hot spots purposed here, a combination of high relative values and high growth rates, no significant clusters of municipalities with both high local tax bases and high growth in the local tax base are found. However, this is in line with previous studies on regional growth using Swedish data.

5   Summary and Concluding Remarks

The main focus of this paper has been to identify what has been referred to as regional hot spots. That is, to find clusters of Swedish municipalities with either high relative local tax bases or high relative private wealth in combination with high growth in the local tax base or private wealth. The focus on local tax bases was motivated from a local public finance perspective, as local income taxes constitute

the major source of funds for Swedish municipalities. The focus on accumulation of private wealth such as private capital incomes and private property values has been motivated by its importance for private investments in new (local) business and (local) private projects. For instance, local access to private capital is often an important factor for the local business environment and a necessity for investments in new and existing businesses and for the development of other types of local private initiatives. Even though capital is highly mobile, regions characterized by clusters of high capital incomes and property values often have better conditions for investments in order to utilize and develop (local) private ideas and initiatives.

The analysis has been based on two frequently used test statistics for spatial clusters, the global Moran's I and the $G_i^*(d)$-statistic. First, the global Moran's I was used to test for global spatial correlation. This test tells us whether high or low values are more clustered than would be expected by pure chance (positive spatial correlation), or whether the data are organized as a checkerboard pattern (negative spatial correlation). Our results suggest a significant positive spatial correlation for all variables, which in turn suggests that municipalities with similar local tax bases and private wealth as well as the growth rate of these variables are more spatially clustered than could be expected from pure chance.

However, based on the Moran's I alone, it is not possible to say where these clusters are located, or whether these clusters consist of high or low values. Therefore, the $G_i^*(d)$-statistic, which is a local test for spatial correlation, is applied. This test complements the Moran's I in at least two ways: (1) it reveals whether there is a cluster of high or low values, not only that there is a cluster of similar values, and (2) it reveals where these clusters are located. Based on the $G_i^*(d)$-statistic, we conclude the two major city areas Stockholm and Gothenburg contain clusters of municipalities with both high private capital incomes and high growth in private capital incomes, qualifying these two areas as what we refer to as regional hot spots in terms of private capital incomes. Clusters of municipalities with high private property values, in combination with high growth in private property values, are found in the County of Skåne, making this area a hot spot in terms of private property values. However, no significant clusters of municipalities with both high local tax bases and high growth in the local tax base are found, which is in line with previous studies on regional growth based on Swedish data.

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Chapter 12
Establishing Urbanity in a Region Abundant with Natural Resources: The Case of Umeå, Sweden

Lars Westin

Abstract When compared with other cities in Northern Sweden, the history of Umeå is exceptional in many aspects. The growth of the city has caused discussion regarding its role in, and impact on, the surrounding region. Given this, the paper initiates a discussion about Umeå but also aims to add to the knowledge and analysis of the dynamics of cities. The story of how a small town in a region rich in natural resources and relatively distant from the national capital, has—at least so far—managed to avoid the curse of natural resources is interesting as a case in the economic history of regions and cities. The roots of the development have not previously been analyzed. This also means that we have to analyze the complex relation between Umeå and its surrounding resource-rich region. It is actually possible to trace much of the complexity in this relationship to unresolved destructive relations between the historical role of the natural resources in the region and its current economic, social, and cultural challenges. We discuss the urban history of northern Sweden and especially how various forms of power during history were distributed between its cities. This leads to the analysis of the importance of natural resources in the creation of wealth in the region, but also the risk of being caught up by the curse that any such region faces. We present three hypothesizes as to why Umeå came to develop in a way that differs from other cities and, finally, we try to identify future threats for the city to tackle.

Keywords Cities • Resource curse • Regional development • Urban development • Umeå

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1 Introduction[1]

In many aspects, the history of Umeå is rather exceptional when compared with other cities in the northern part of Sweden. This has actually made it difficult to discuss the development of the city as such in isolation, without reference to its role in, and impact on, the surrounding region. In this respect, and from a Swedish perspective, the city is also among the few cities with a similar role in relation to their regions. Stockholm, the dominant node in all networks and the capital of Sweden, is often discussed in a similar way in relation to its national context. But Umeå is not a 'capital' for any territory other than, at most, the county of Västerbotten. The repeated reference to the larger territory could, of course, be a sign that Umeå is considered by many to be an informal capital of 'northern Sweden.' However, this would attribute the city with far too large a role in the region. Umeå is an administrative center for the county, rich in human and cultural capital but not large enough and not filled with enough financial and political capital to make it the natural power of a larger region. On the contrary, Umeå is contested by other cities and the countryside of north Sweden. This mix of contest and object for debate builds a fundament for the complex relation between Umeå and the rest of the region. A relation that may have existed for a longer time but became reinforced and more outspoken with the growth of the university in the city. Particularly in the late 1970s, when both the city and the university the facto had reached considerable size, the debate over the role of Umeå in relation to the region intensified. However, here we argue that the understanding of this complex relation between the city and the region has its roots further back in history.

On the other hand, 'northern Sweden,' the diffuse region with which Umeå has this complex relation, is not an easily identified entity. There is no administrative or obvious political arena in which issues in relation to this 'region' are discussed. Northern Sweden is by no means a state within a federative Sweden or a county in itself. In contrast with, for example, Scotland in Great Britain, it has not previously been an independent administrative unit. It is merely a territory with no formal, exact 'border' to the south. Independent of where such a border would be drawn, the region would currently consist of a number of counties, county councils, regional organizations, policy arenas, and municipalities.

Any attempt to identify a southern border as a delimitation against the larger Stockholm region thus must be arbitrary. No definite cultural characteristics, e.g., a language, that would give a simple identification of a dividing line between northern Sweden and the Stockholm area exists. Historically, attempts have been made to identify the region as the territory north of Dalälven, the Dal River, as a

natural border to the south. But this placed the border only 150 km to the north of Stockholm. This could have been meaningful during the sixteenth century, but today this river is within the commuting area of Stockholm by train. With current transport possibilities, no natural border may be found in the form of a river, a mountain, or similar object. To a large extent, Northern Sweden thus is a theoretical region. It could actually be identified as the territory within which Umeå is the city that most people and any regional development process will sooner or later be related to. Instead, south of this 'border,' Stockholm is the city with which such a process is related. Even if this definition is, to a large extent, arbitrary, here we assume that the region consists of the four northernmost counties in Sweden.[2] As such, much of Northern Sweden has a common history in relation to the national capital in Stockholm. However, we are still conscious of the existing and historical differences between the various parts of this geographically large area that may explain why it has not managed to establish itself as a single administrative region.

To the east, north, and west, the country borders of Sweden are more obvious borders for Northern Sweden; however, this does not mean that interactions with the nearest parts of Finland and Norway is non-existent. On the contrary, mutual trade has been, and still is, rather frequent. Besides trade motivated by adjacency in space, this also has historical reasons. Before 1809, Finland was a part of Sweden; from 1814 to 1905, Norway and Sweden were integrated in a two-state union. Nowadays, the three countries are members of the Nordic council, and movements within the common Nordic labor market are without any formal obstacles. However, in practice, the Gulf of Bothnia and the mountain area between Norway and Sweden affect the flow of commodities and people. Depending on historical circumstances, these geographical fundaments have either been negative or positive for the amount of exchange.

Currently, three cities along the coast are slightly larger than other cities and villages in the region.[3] Among those, the labor market of Umeå is growing at the fastest rate, and the municipality of Umeå is the largest and most dense part of the region. However, the labor markets of the three cities are almost similar in size.[4] The absence of a single strong center in this geographically extended area makes it difficult to identify a center of gravity with respect to regional power, and adds to the fact that the border between a northern region and the Greater Stockholm area is fuzzy.

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[2] In Swedish, the name of this area could be "Norrland." In English it roughly may be translated into "Northern Sweden". The area that people have historically associated with this name also covered the county "Gävleborg," including the province "Hälsingland" to the south of the four northern counties. However, we hesitate to include this county in our definition, since the southern parts of this county, as discussed in the text in a functional sense, are nowadays included in the growing Stockholm region. This definition is also probably too large to represent the mental field of influence for Umeå. The municipality of Härjedalen in the south of the county Jämtland, would, in a more detailed analysis, probably also be considered by many as a part of the "Stockholm area." However, some public units use the four northernmost counties as their administrative entity. For example, it is the area for which Umeå is the default university hospital.

[3] The cities are, from the south: Sundsvall, Umeå, and Luleå.

[4] Actually, when the labor market is given by the commuting area, the labor market of Umeå is still slightly smaller than that of the other two cities.

The population in Northern Sweden grew rapidly from the first half of the nineteenth century through until the middle of the twentieth century. While most other cities and the aggregated population of northern Sweden stagnated after 1950, Umeå continued to grow. The city began as a small city in the middle of the rank size system of the region, and has now become the largest municipality in the area.

With around 120,000 inhabitants, Umeå could, from an international perspective, be seen as a rather uninteresting object for the analysis of spatial growth. A tremendous number of cities have grown faster, become larger, or have even collapsed in a much more interesting way to motivate an analysis. But perhaps the small size of the city and its specific surroundings may also justify this study.[5] In social systems, relative scale matters and unique institution and asset structures may give rise to competitive advantages. In a European context, Sweden has a small population and is peripherally located in northern Europe. Together with other Nordic countries and, for example, Japan, Sweden is often positioned at the top of international rankings of livable places.[6] This encourages argument against the idea that only cities that are already large have a potential for growth, as sometimes may be heard in debates over cities.

Although it is thus difficult to discuss Umeå independent of references to the vague region of north Sweden, one of the peculiarities of Umeå is sometimes not considered to be a part of northern Sweden by its inhabitants and people in the rest of the region and in the rest of Sweden. Umeå has thus been seen as an island of 'modernity,' something different, sometimes something strange, and at other times as the hope for change in the same way as New York in the USA, Tokyo city in Japan, Shanghai and Hong Kong in China, albeit both the size and the content of Umeå is beyond any comparison with those cities.[7]

Given this background, the current initiation of a discussion about Umeå, has two objectives. Our more long-term and broader ambition is to add some knowledge to the analysis of the dynamics of urban economies. We are doing this by taking our departure in regional and urban economic history.[8] Our aim in this respect is to identify lessons to be added to the theory of urban development from the story of how a small town in a region rich in natural resources has, at least so far,

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[5] The international academic literature on the long-range economic development in northern Sweden and Umeå is almost non-existent. However, Westin (2006) and Westin (2008) are examples in this direction.

[6] Sweden has a population of 9 billion people in an area of 450,000 km^2, while the population of Japan is 128 billion people in an area of 378,000 km^2.

[7] Over time, Umeå has also had a strong relation with Stockholm. Air travel to Stockholm is quite intensive. When it comes to the leadership of the city, the relation with Stockholm was important during the 1960s and 1970s while Malmö, the third largest city in the south of Sweden, thereafter instead seems to have been more of a discussion partner.

[8] The discipline of Economic history has generally studied the history of empires, nations, or individual companies and organizations. However, important writers such as Heckscher, Innis, Braudel, and Pirenne could not avoid focusing on regions and cities when attempting to explain the economic history of empires and nations. We are following in their tradition and arguing that theories and models within economic history and also urban economics may gain from a deeper and more varied understanding of the dynamics of cities as histories have unfolded.

managed to avoid what has been termed the curse of natural resources.[9] Although the growth of Umeå has been rapid compared with other cities, and definitely compared with other cities in northern Sweden, the roots of this development from the position of regional and urban economic history have previously not been analyzed. Our second aim is to investigate some of the details in the complex relation between Umeå and the surrounding region. As will be seen, much of this complexity may be traced back to the still unsettled relation between the role natural resources have had for the region in its history and the current economic situation in the region.

The paper is outlined as follows. In the next section, we discuss the urban history of northern Sweden. In particular, we observe how power during history was distributed between the cities. This leads us to the subsequent analysis of the importance of natural resources for the creation of wealth in the region, but also the risk of being caught by the curse that any such region rich in resources faces. Thereafter, we analyze the history of Umeå in relation to the rest of the region in search of the *why* of development in Umeå. Finally, we try to look into the future to identify new threats for the city and its surrounding region.

2 The Urban History of Northern Sweden

Sweden, as well as Finland and northern Russia, was colonized relatively late. A continental glacier (an ice sheet) covered land until 10,000 years BC. This, together with the colder and more demanding climate, postponed early colonization and the formation of villages and more dense societies. During the Iron Age, around 800 AD, the trade place Birka was established in the archipelago of Mälaren, to the west of Stockholm. Birka is the earliest known urban formation in Sweden. The urban history of Stockholm is from the thirteenth century, but Stockholm formally became a city as late as 1436. After some turbulence in the union between the Scandinavian people, the city was also soon considered the capital of the core territory that later came to be Sweden.[10] Hence, around the thirteenth century, when many cities where established in central Europe, the areas north of Denmark were still less populated and dominated by smaller settlements based on agriculture, fisheries, and hunting.

Slowly, the land in the north around the coast of the Gulf of Bothnia was colonized from the south and the east. At the end of the sixteenth century, a stronger state had developed in Sweden, with institutions for taxation and some control of its central territory. Still, the territories to the north of Gävle and Åbo were only

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[9] For references, see e.g. Auty (2001), Gylfason (2001), Watkins (1963), and Sachs and Warner (1995, revised 1997, 1999).

[10] Almost at the same time, Gävle, a city 200 km to the north of Stockholm attained city status. Gävle had a good harbor and thus became a central city for trade and fisheries along the west coast of the Gulf of Bothnia up to the north. On the eastern part of the Gulf of Bothnia, the city Åbo, also with a good harbor and established in the thirteenth century, attained a similar position and soon became a center for the Finnish part of Sweden.

loosely under control of the capital. On the other hand, development at the time in scientific fields such as cartography clarified the kind of land and distances the territory to the north consisted of. Various investigations also made clear that this region contained interesting deposits of minerals, large forests, and land with agricultural, hunting, and fishing possibilities. The central powers of Sweden were not the only elites to show interest in the northern territories. Russia, in particular, was also interested. Thus, competition with Russia over land in the upper north began.

This competition gave a signal for the, at that time, strong Swedish King to establish new cities in the north. Starting from Gävle, cities like Hudiksvall and Härnösand were established on the west side of the Gulf of Bothnia. Thereafter, in the beginning of the seventeenth century, the three cities that are now the largest along the coast—Sundsvall, Umeå, and Luleå—were founded, together with Piteå near Luleå. Of those, Umeå became an administrative center for the county Västerbotten and a center for education. Härnösand, located near Sundsvall about 210 km to the south of Umeå, also became a center for both the county and a center for education. In addition, Härnösand also became the residence of the bishop of the Christian church for northern Sweden. Piteå, about 220 km to the north of Umeå, became the third educational center in the north, but this city never became a regional center in an administrative or religious sense.

During this same period, important cities like Vaasa and Oulu were established on the east side of the Gulf of Bothnia. This meant that the coast on both sides of the then Swedish gulf had cities with harbors that could serve as some sort of center for administration, education, trade, and religious services.

It may be noted that in the beginning of the nineteenth century, Luleå became the center for the new county "Norrbotten", established from a division of the county of Västerbotten, where Umeå continued to be the center. In the beginning of the twentieth century, Luleå also became the residence of a new bishop. The northern diocese was cut from the diocese of Härnösand. It included the two northern counties and thus also came to include Umeå. By this, the territories of dominance for both the church and the state were settled for the rest of the century, and in fact until now.

We will return to some important implications of this new landscape of power in the north of Sweden. However, first, we again must step back to the eighteenth century. The Swedish state is weak due to less successful kings and their warfare. A sign of this was that the Russian army managed to burn down cities along the Gulf of Bothnia several times. Although the Swedish Kings were weak, they were still focused on territorial dominance and managed to take control over the county Jämtland in the western part of north Sweden from Denmark–Norway. Jämtland thus became Swedish in the middle of the eighteenth century, and the city of Östersund was founded in the county to manifest Swedish dominance. The city became the residence for a county governor. In spite of this, Jämtland was included in the diocese of the bishop in Härnösand, at the coast.

Nevertheless, Russia continued to challenge the elites of the Swedish kingdom. In a final battle around Umeå in 1809, Sweden lost Finland to Russia, and the

current border of Sweden was settled. Instead, the Swedish elites managed to take hold of and create a new union with Norway, which previously had been in union with Denmark. Hence, the political and administrative structure of what we earlier defined as northern Sweden began to stabilize.

The loss of the eastern part of the kingdom to Russia must have been traumatic for the Finns, the central elites in Stockholm, and for the remaining cities on the Swedish side of the Gulf. The eastern coast of the Gulf of Bothnia and by this the eastern part of what could have been 'a larger' northern Sweden was now part of Russia. Trade over the gulf reduced and became more sensitive to tolls, exchange rates, and custom-related activities, but seems to have continued regardless. Probably more important was that political power and the possibility of taking political initiative by actors in the north was heavily impaired when the eastern part was lost. However, the new situation meant that the Swedish national elites had to radically reconsider the future development of what remained of the Swedish nation.

This task was not easy. The wars had led Sweden to become an extremely poor country. Europe was in an economic depression, while, on the other hand, the first signs of the industrial revolution could be seen in England. Moreover, signals were repeatedly coming from America of the possibility for a better life for 'free men' (and even more importantly – free women). Emigration to America thus began to increase. In Sweden, critique against the monarchy, the state administration, and the state church strengthened.

However, the situation for the poor country changed. The increased demand for forest products in England enhanced interest in trade with Sweden, and the almost untouched natural resources of northern Sweden became of interest. As one of only a few remaining sparsely populated and 'untouched' regions in Europe, the northern parts of Sweden came to be seen as an alternative to emigration to America. The possibility of working in new sawmills or to come over a piece of land in the north seemed attractive. Thus, emigration grew, both to America and to the north of Sweden. The four northern counties, and thus the two dioceses on the Swedish side of the Gulf of Bothnia, witnessed a steadily increasing population during the second half of the nineteenth century, as shown in Fig. 12.1. The county of Västernorrland took the lead in this growth. We return to this figure later, as it also makes clear that, while growth continued for many decades, it also came to an end after WWII.

At the end of the nineteenth century, the city of Sundsvall in Västernorrland came to be a symbol for the boom in forest products from north Sweden. Sundsvall grew rapidly and attracted people and capital from waste areas. The rising demand for sawn timber and minerals increased exports from the region and started a new wave of cities being founded around new sawmills and mines.

Stockholm, the capital of Sweden, could thus surrender from a long, deep depression due to the mismanagement of the country and the city. In combination with investments in its sewage system, a new liberal press that criticized the governance of the old kingdom, development of financial institutions, and the fact that Stockholm came to take the lead in the construction of a national railway system, the city established itself as a strong and growing capital. With its new railway station, Stockholm became the central node of the emerging Swedish
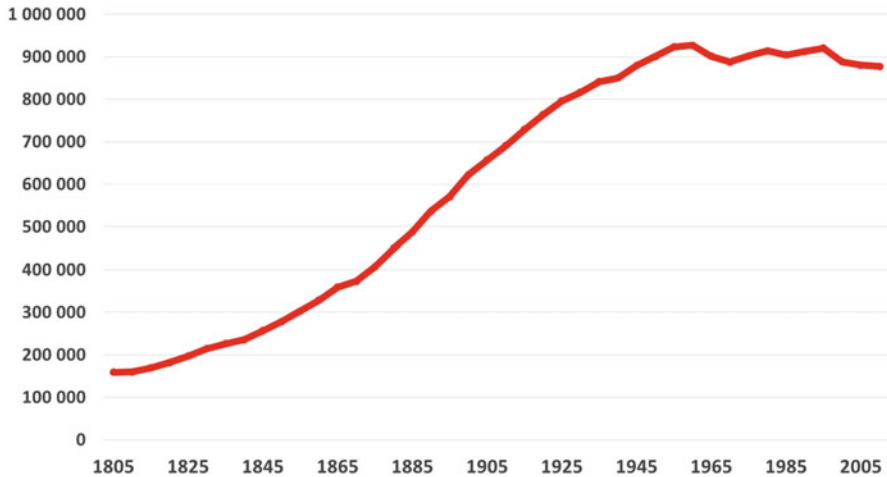
Fig. 12.1 Population in northern Sweden 1805–2010. The region contains the counties Västernorrland, Jämtland, Västerbotten, and Norrbotten (Data from statistics Sweden)

land-based communications network that took over important flows of people and commodities from the previously mainly sea-based routes. It became the capital of a nation that, surprisingly, rapidly developed a set of globally competitive companies based on innovations, engineering competences, and entrepreneurship.

To the north, the new railway integrated old and new cities and reached up to the ore fields around what came to be the mining city Kiruna. This meant that at the same time as the forest industry expanded from Sundsvall to the north, new mines were also opened further up in the north. New cities and small villages grew while the demand for agricultural products also increased in response to the demand from an increasing population. New land was opened for exploitation, which further increased the demand for labor.

Northern Sweden thus had an advantage in natural resource-intensive production relative to cities in England. England had specialized in labor-intensive production, but, with the industrial revolution, capital-intensive factories were developed. Since international freight rates decreased in response to a more secure trade and larger ships, north Sweden continued to develop its advantage with respect to natural resources. Its markets became even more open to the world market. As in the 'frontier lands' of America and Canada, this development attracted human capital and infrastructure but also saw the rise of an emerging financial market with banks and related financial institutions. The cities Sundsvall and Härnösand became centers of this new sector.

As a result, from 1800 until 1950, around ten new cities and a large number of villages and smaller settlements were established in northern Sweden. Most arose to the north of Sundsvall. Although Sundsvall thus continued to grow, much of the initiative in the development of the region could now be found further to the north. However, from a territorial view, this development was more dispersed and none of

the new cities became as dominant as Sundsvall had been in the first stage of the colonization. Instead, colonization often took its direction away from existing cities. New railways brought people out into the untouched forests and mining areas. The outcome was a settlement structure with many small villages. Among the cities, the tendency was towards convergence in population; small cities often grow faster than large.

3   Natural Resources, Elites, and the Resource Curse

The industrial revolution in England and the general growth in Sweden during the late nineteenth century implied that northern Sweden entered the twentieth century with an economy that was among the fastest-growing in northern Europe. As usual, this was not a growth without cycles and immense crises. Much has been written about those cycles and their international reach. Our focus on the dynamics of cities and regions could add analyses of this with a mix of models from regional and urban economic theory: the Samuelson-Takayama-Judge 'back-to-back' model of trade and spatial equilibrium; the Smith-Ricardo-Heckscher-Ohlin models of absolute and comparative advantage; and the dual economy models of agricultural economies near growing cities by Lewis-Harris-Todaro.

Instead, we highlight here the theory of colonization and development of staple economies introduced by economic historian Innis (1923, 1970) as well as the export-base model and the theory of path dependence as suggested by Nobel laureate Douglass C. North (1955, 1966, 1990). This would lead us into the theory of the staple trap as suggested by Watkins and the theory of a 'Dutch decease.' They are all related to what may be called the general theory of the resource curse. The advantage of those theories is that they add notions of spatial dynamics and regional vulnerability to the often too comparative static, smooth, and equilibrium-focused approaches of classical standard non-spatial economic theory. The theories will help us to understand the impacts on regional economies from crises caused by the booms and busts of business cycles, especially in economies dependent on natural resource-oriented industries in the early stages of the value-added chain. Perhaps most importantly, those theories highlight the mistakes with respect to growth often made by the elites in those regions.

Before we continue with an analysis based on such theories, we briefly continue with our objective of understanding the central forces of the economic dynamics in northern Sweden where the urban history of the region is in focus. Figure 12.1 shows that population growth in northern Sweden stagnated around 1950. Jämtland, the county near the Norwegian border, had already started to stagnate around 1930. The reason behind this overall break in the growth of the north of the Swedish economy was the mechanization of agriculture, forestry, and mining that followed after the rapid development of engines and transport facilities during WWII. As an example of this, Fig. 12.2 shows the number of chainsaws introduced in the Swedish forest sector after the war.
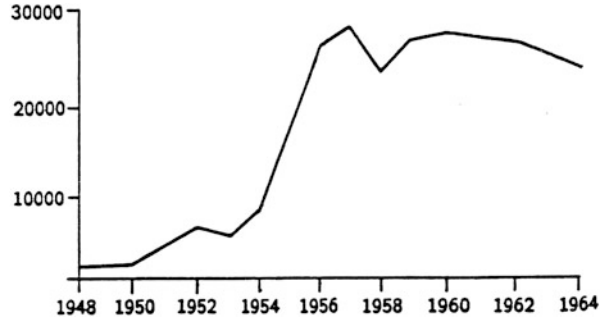
The strong impact of this mechanization on the economy is well known these days. Initially, demand for labor was reduced in agriculture and forestry. Traditionally, peasant families had raised many children; during the summer harvest each person was needed, but many also died young. With improvements in sanitary conditions and healthcare both life expectancy and youth mortality declined. Families became larger. Those large farming families now met drastically changed prerequisites from both push and pull factors. The tractor and the chainsaw pushed young people away from the countryside, while the growing factories within engineering, paper and pulp, facilities, construction, and services drew them into villages and cities.

To some extent, such jobs could be found in the engineering industry of small villages and cities of northern Sweden, but most were found in larger cities in the south. Within a couple of years, the dispersed settlement structure that had developed during the first half of the twentieth century became a strong comparative disadvantage for the region in the middle of the century. Cities offer various forms of economies of scale, information flows, and reduced transportation costs. Such advantages were of course also available in the cities of the north but the faster growing and larger Stockholm area offered an even stronger urban environment, often with a higher share of service content and demand for educated labor. Due to its traditional focus on its natural resources, northern Sweden had not managed to develop competitive diversified cities of sufficient scale. Sundsvall had been the centre of economic activities in the region, with an emerging financial sector. But this sector slowly came to be included in the financial structures of the Stockholm elite instead of being developed into a strong competing center of the north.

Perhaps the most interesting aspect of this process is the response from leading actors at the political and industrial scenes in the region. Instead of suggesting rapid urbanization, regional leaders and representatives of academia favored a policy with the ambition of conserving the existing settlement structure as much as possible. The theory of resource curse gives us one explanation for this behavior. The theory observes that leading actors in a region abundant with natural resources have a tendency to keep the region travelling along its traditional path of comparative advantage.[11]

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[11] Acemoglu and Robinson (2012) continue in this direction when they discuss why nations fail. Earlier, Schumpeter (1934) had noted that creative destruction of obsolete structures was often an important part of a process of change.

The fact that such a region has this initial advantage in natural resource production and is also considered by elites in other regions to be a resource-oriented region add to such a path dependence. Moreover, the theory tells us that this may lead the region into a dangerous situation where the human capital is reduced.

Thus, the curse for the region is that the natural resource-oriented industries may be globally competitive, but due to increasing wage competition from other regions, the industry of the region has a tendency to move from such a resource- and labor-intensive production to resource- and capital-intensive production. The overall outcome is that local employment and thus the total sum of wages spent locally decreases, while rents and amortization payments leave the region. In the framework of an export-based model, this implies that the share of value added from the resource-based industries that feeds back into the local economy decreases. The region moves from being one in which people are consuming and raising children to a region focused on production, logistics, and export; like an oil rig, but placed on land.

What then was the main lesson from the resource curse in Canada? We would argue that the lesson is that a region must meet the resource curse with the development of urban amenities to keep or increase population and local consumption. From the perspective of Douglass C. North, we would say that the region must break out of its historical path. However, we also know how hard it may be for a resource-based region to change its path. Especially when the political and financial elites in favor of such a change lack clear alternatives and an arena that enables them to take leadership in the region. Here, the development of the city of Umeå becomes interesting.

4   Umeå: An Urban Alternative in the North?

In the warm and windy summer of 1888, Umeå was hit by a major fire on the same day as other cities in northern Sweden were also destroyed by fire. Was this, as has been argued, the start of a new development in Umeå and resulted in a university 60 years later, while the fires in other cities did not have the same impact? Yes, we would agree that the fire, in a unique way, became important for the city. The drowsy and poor city seemed to wake up. This was also the second time within 70 years that Umeå became a topic for conversations in the rest of Sweden. The previous time was in 1809, when the battle had been fought around the city against the Russian army. Strong support met Umeå; gifts and resources were given in response to the devastation. The city found a motive to renew and modernize its city center and to establish a new city plan. The city plan was based on new avenues with birch trees, a plan that in this respect is still followed. Thus, the fire is often claimed to be an example of destruction opening possibilities for novelties to arrive. This may be the case, but we argue that there are also reasons to look a little further back in the history of the city. As may be seen in Fig. 12.3, neither the fire in 1888
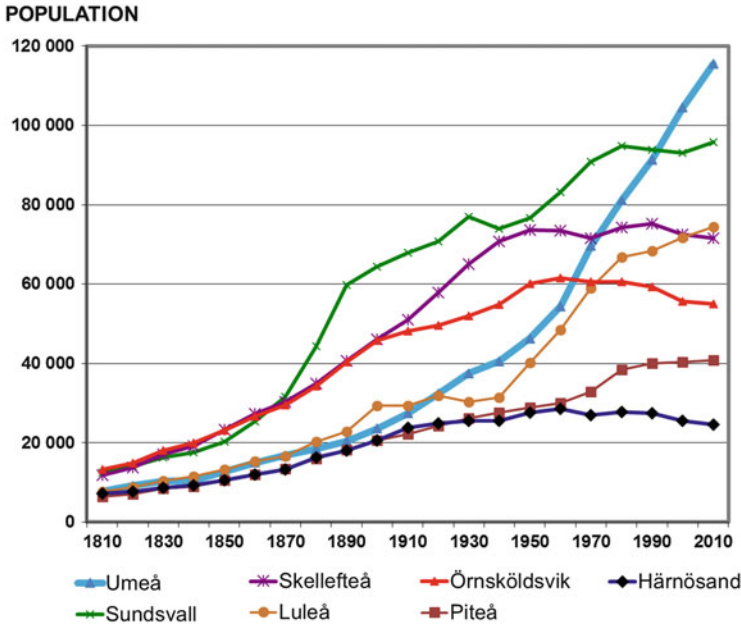
POPULATION

Fig. 12.3 Population in cities in northern Sweden (Data: DDB, Umeå University)

nor the university in the 1960s marks substantial and drastic changes in the population growth of the city. Increased growth from the foundation of the university may be witnessed, but the overall picture is a rather constant rate of growth from the middle of the century. Instead, growth during the period from 1930 to 1950 seems to be a little reduced, as it also was for some of the other cities in the region.

Primarily, the development of Umeå should be contrasted against the development of the other cities. During the second half of the nineteenth century and in the first years of the twentieth century, Umeå was relatively small compared with other cities in the region. As we have seen, compared with Umeå, these were more focused on incomes based on natural resources. In the beginning of the twenty-first century, the municipality of Umeå instead became the largest municipality in the region and, in 2014, it became a Cultural Capital of Europe. In comparison, the natural resource-oriented cities in northern Sweden have, sooner or later, stagnated. Hence, it seems that, even if Umeå not had gained a strong direct momentum from the booms in demand for resources during the nineteenth century, in the twentieth century neither was it hit by the busts to the same extent as other cities. Apparently, the transformation of the labor-intensive resource industry into a capital-intensive business did not have a negative impact on the city. Instead, one may assume that the city gained from a capacity to attract people from other cities.

To understand this development of Umeå in relation to the other cities, we once again return to details of the economic history of the city. What we found earlier, and may highlight even more here, is that Umeå establish early a comparative advantage from schools, administration, and healthcare institutions based on human and social capital. Around 30 years after the establishment of the city in 1622, it had its first school. A hospital was established in 1764. The city at that stage had 800 inhabitants. In 1858, a secondary school financed by the state was located in the city. As we touched upon, not every city in northern Sweden had this sort of secondary school; however, Umeå was not alone. In 1658, the two other main competitors in the market for education in the north, Piteå and particularly Härnösand, already had such schools at the level just before university. In 1879, Umeå obtained a teacher education facility, but Härnösand also already had that. Although strong on education and human capital production, Umeå was still number two in the region.

The railway from Stockholm to Umeå was finalized in 1896 and, in 1910, Umeå had two military regiments (recall the previous war against Russia) and around 5,000 inhabitants. The city invested early in water power plants and electricity, but also here Härnösand was earlier. Umeå had establishments related to agriculture (farms and a school) and various relations to the forest industry. However, Härnösand was located in the middle of the growing sawmill district.

Clearly, there were strong similarities between Umeå and Härnösand at that time. But there were also differences. Härnösand had the Bishop but also a much closer relation with the booming sawmills, the new class of capitalists associated with those, and the small but growing bank system. This is an argument for the case that Härnösand had a premier position relative to Umeå in the beginning of the twentieth century.

But perhaps it is in the cultural sphere that one may find the main differences of importance for the future development of these cities. Without a Bishop in the city and with less of a stable upper class connected with the forest sector, the cultural and social atmosphere in Umeå may have been more 'open minded.' In Umeå, a first attempt to establish a society for music had already been made in 1864, and a first library was opened in 1903. A theatre society took longer time to establish but was founded in 1934, the same year as a 'Folkets Hus' was constructed in the city. The 'Folkets Hus' was a Swedish response to the 'people's houses' that could be found around the world at this time; a sort of meeting, theatre, and dance place for different societies.

The construction of 'people's houses' were often connected with initiatives from various social democratic organizations, labor unions, and their related societies. The construction of 'Folkets Hus' in Umeå during the international crisis in the 1930 was actually rather late compared with other 'people's houses' in Sweden. Those were often established at the end of the nineteenth or the beginning of the twentieth century. This is a sign of how late the labor movement was established in Umeå. It effectively reflects that, contrary to many other cities in northern Sweden, Umeå did not have a comparative advantage in labor and resource-intensive production. Instead, Umeå was governed by liberals and conservatives in coalitions.

The administrative territory of the municipal Umeå was also quite narrow at that time; peasant's parties and social democrats were stronger in surrounding municipalities, with a more articulate focus on agriculture and industries. Compared with the larger cities in the counties to the north and the south along the Gulf of Bothnia, this liberal atmosphere gave the city its specific image.

In the country side of Västerbotten outside Umeå, liberal opinions were often stronger than in the two counties to the north and south. In the county of Västerbotten, the Swedish Evangelical Mission in particular, an independent organization within the state church of Sweden, dominated religious life.[12] Other nonconformist Christian Protestant denominations such as Baptists, Methodists, etc. and the Temperance movement also became relatively strong early in the region.[13]

Taken together, this may give rise to a first hypothesis regarding the difference between Umeå and other cities in northern Sweden. This is that the distance to the two bishops of the church of Sweden; the distance to the larger workplaces of mines, sawmills, and paper and pulp industries; and the fact that households often combined work in forests or sawmills with their own work in the more individualistic farming sector fostered in northern Sweden a relatively unique wish for independence from state authorities and the national state church. This would then also add to the explanation why the large centralized collective organizations formed by different parts of the labor movement only relatively late were established in the county and particularly in Umeå.

A second hypothesis may be, as was also touched upon previously, that Umeå was in quite a unique geographical position compared with the two competing centers focused on human, social, and cultural capital to the north and south of the city. From the position of Umeå, the competition from neighboring cities was only quite modest. In the south, Härnösand had to compete with Sundsvall; in the north the three cities Piteå, Luleå, and Boden were competing. The nearest city to Umeå was actually the Swedish-speaking city of Vaasa in Finland; which thus became a complement rather than a competitor. To the south was the city Örnsköldsvik, a city based on trade and forest industries. But Örnsköldsvik was part of the county to the south, although it was not geographically strongly integrated with Härnösand–Sundsvall. Skellefteå, the city to the north, was, for a long time, the larger city of the two, but this city was based on mining and engineering and was almost without administrative centralities. As a city, Skellefteå was much younger, established late in the nineteenth century and governed by social democrats. However, compared with other cities dominated by the social democratic and communist movements, this city also belonged to the part of Västerbotten with a rather strong nonconformist religious and agricultural tradition. To conclude, in contrast to Härnösand and Piteå—the two other human capital-oriented cities in northern Sweden—Umeå was

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[12] *Evangeliska Fosterlands-Stiftelsen* 'Evangelical Homeland Foundation,' EFS.

[13] It is thus interesting to note that the 'straight edge' music movements and other social movements outside existing larger organisations was strong in Umeå among young people in the beginning of the twenty-first century.

never dominated by other strong industrial cities in its neighborhood or the pronounced worker–capitalist class-oriented polarization those cities could often develop in the process of city development.

A third hypothesis would be that this specialization in human, social, and cultural capital meant that the city was early exposed to new ideas and a flow of information.[14] In particular, it may have been important that the city, through these flows of information, had close relations with the national capital, Stockholm. Although this is not really proven, it may have been that the liberal, culturally interested, and educated Umeå found it easier to communicate with central administrative officers in the state than did competing cities. Härnösand would have had a similar position to begin with, but may have had difficulties in renewing and articulating a new ambition for the future after the reduced growth in the sawmill and paper and pulp industries surrounding it in the beginning of the twentieth century. Härnösand and Umeå thus were of almost similar size until around 1920. Härnösand then began to stagnate while Umeå continued to grow.

This was the situation after WWII. Three cities in northern Sweden had profiles as human capital intensive and education oriented, while the nearest university was in Uppsala. The question of higher education in northern Sweden had been on the agenda for some time; however, after the war, the discussion intensified. In Umeå, representatives from various fields, such as school leaders, municipality leaders, national politicians, heritage administrators, etc., managed to form a group with the goal to work for the localization of a new university to the city. The city had the ambition to develop its comparative advantage even further based on assets within human, social, and cultural capital.[15]

With the initial localization of the faculties of medicine and odontology and later a more complete multi-faculty university to Umeå in 1965, the foundation for further expansion of Umeå as a knowledge city based on state funding was thus laid. The city continued to grow, and its population passed that of other cities in the region, cities mainly focused on industry. However, for many years, the city, in its basic urban structure was, by Swedish standards, a small- to medium-sized town. However, the main change was that it had moved from being a school- and administrative center to become a 'university town.' An important aspect of this was that the flows of information through Umeå drastically changed in intensity, size, and quality.

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[14] In this case we may view the military garrisons as schools in their function as attractors of young men, particularly from northern Sweden but also from the south, giving them an education and sending them further on in life. Military advancement was also connected with movement between different cities in Sweden. The officers' wives may also be assumed to have been engaged in the social life of the new cities and keeping in contact with previous cities and their home towns. Thus, they became part of wide networks for the sharing of information.

[15] Details in the struggle for the university between Härnösand and Umeå as well as some other cities are described by others. However, nothing contradicts our attempt here to contribute a perspective based on asset specialization, comparative advantages, mental structures, and relative positions in the urban structure of the region.

It is interesting to note that, although Umeå became the university town of the north, criticism against the decision came mainly from Härnösand, the school city to the south. Other industry-based cities still seemed to be seen, by themselves, the public, and by politicians, as the real future of the north. One must also remember that the number of staff and students at a university was historically quite small. This thrust in industry was in line with a Swedish tradition with roots in the late nineteenth century. Although the growth of Umeå continued, it seems that it was not until the middle of the 1970s or even the beginning of the 1980s, that Umeå began to be considered the new growing urban alternative for northern Sweden. This also reflects the fact that it took some time for Sweden as a nation to realize that the country had lost its comparative advantage in labor and engineering-intensive production relative to newly industrialized countries in Asia and Latin America.

The debate regarding causes of the growth of Umeå often returns to the time when the university was founded. The general argument has been that the city obtained a university via various decisions from 1950 until 1965. However, we have argued here that the history before those decisions is extremely interesting and instead points in the direction of a city that had been open for and actively trying to locate public facilities for itself. The university in this respect fitted quite well into a tradition and fields in which the city was strong. It represented the sort of facility Umeå had tried to attract previously, it had a focus on human capital development, and the city had shown that it could manage new housing for a growing population.

When the new opera, the 'Norrland opera' (the opera of northern Sweden), was founded in Umeå 10 years later in 1974, it was thus founded in a city with around 100 years of organized cultural activities and experience of how to attract facilities. The inauguration ceremony in 2014 for the European Culture of Capital year in Umeå, 40 years after the opera and 150 years after the first attempt to start a music society, could in this perspective actually be seen as the continuation of a longer period in the city based on creation of human and cultural capital.

Our three hypotheses regarding the specific atmosphere and comparative advantages, lack of competition from other cities, and gradually more intensive and high-quality information flows through the city add a more regional economic understanding to the question of why the city managed to grow in the way it has so far. This finally leads us to the question 'what does a city with a university and a tradition of cultural engagement located in a region abundant with natural resources have to do in order not to get caught by the curse of the surrounding natural resources?'.

5   Cities as the Cure Against the Curse

Specialized university towns have seldom become large. Perhaps this explains why it took such a long time before Umeå was more generally considered as an urban alternative in the north. The city still seems to have work to do if it wants to become *the* urban alternative. Although Umeå has been growing over the last almost

150 years, it is still considered a 'university town' and not a city that can compete with larger cities in the south and internationally.

Given the slow growth of the region and its cities, one could strongly argue that the debate over the future of northern Sweden should continue. Although Umeå is the growing exception, forces with influence both outside and inside the region seem to want to keep the region along the path where it has had its comparative advantage for 200 years or more – natural resource-based production. Since forest is a renewable resource, and water- and wind-based energy, although not ideal, have some advantages over fossil- or nuclear-based power, the region may, should, and must live with this advantage for a long time. However, as we have discussed, those industries will probably continue to mechanize their production and will not by themselves demand the level of labor necessary to maintain a population in the region. It could then of course be argued that this is not a problem for the national or global society at large. The region was colonized because of its natural resources; work in the resource-based industries was hard and has now been mechanized. Labor can move to new places to develop industries and improve welfare.

On the other hand, Umeå has shown that a city may grow even under those circumstances. In Canada, we have seen cities like Toronto, Montreal, and Vancouver develop, although the country also has had a strong advantage in natural resources. The threat from the resource curse and from larger cities outside the region will always be latent. What suggestions could then be given to the city and the region if it wants to escape the curse?

Northern Sweden needs at least one, probably more, larger cities in order to offer alternatives with a wider palette of lifestyles. Any of the cities in the region may take this challenge. The municipality of Umeå has itself recently set a goal to have 200,000 inhabitants by 2050. An ambitious goal, not easy to reach, but a goal that clearly signals that the city needs a new program of growth if it should move beyond its current image as a 'university town.' If, on the other hand, this goal is reached, it would of course, in a Swedish as well as a Nordic perspective, place the city in a quite narrow group of capitals and larger regional centers. Still, one could argue that 200,000 inhabitants should merely be a first step before a new step is announced, since competition from more competitive cities will remain. In particular, it is also important that surrounding municipalities become attractive places so that the internal market of the region as such expands.

One constraint on this next move is an aspect of the modern resource curse and a specific feature of the "Dutch decease" that regions affluent with natural resources generally meet. Such regions have a tendency to use the free gift taxes that the resource rent represents in order to develop an oversized public sector. From this perspective, it is possible to consider Umeå as a spatial concentrate of public spending and public facilities based on the resource rents gained in the region; rents that are transferred to the city via national taxes and state decisions. So far, these transfers have been advantageous for the city, or the city has made use of the transfers in a way that is advantageous for its development. But, here also lies an obvious threat against further development of the city. Without an ongoing diversification of the employment structure of the city, away from the funds of the

Swedish state over to incomes from locally generated export of services and commodities generated by industries intensive in the use of human capital, information, and cultural symbols, the city will be vulnerable to any changes in the national tax funding system or the national policy towards the northern territories. If the city in the future must act in a region with negative or weak population growth compared with the average in Sweden, such a financial base will sooner or later be emptied.

6 Conclusions

With our attempt to connect the long-term history of Umeå with the overall history and development of northern Sweden, we intended to add to the general knowledge regarding the economic dynamics of regions and their urban centers. We identified and provided some first arguments in favor of three hypotheses that may explain how a small town in a region with a comparative advantage in resource-based production has so far managed to avoid what has been termed 'the curse of natural resources'.

In the explanation of the growth of Umeå, the founding of the university in the 1950s has often been the point of departure. The general argument then has been that the city *got* its university. However, we examined the history before the *arrival* of the university and thus told a story of the long-term regional economic history of northern Sweden. For a number of reasons, this part of Europe became colonized relatively late. We have seen patterns of development common to and representative for this type of resource-rich region around the world: war, pressure on indigenous people, rapid colonization, periods of strong inflow of capital with cycles of booms and busts. Increased welfare and higher wages moreover shifted the technology of the resource-based industries from initially being labor intensive towards becoming more capital intensive, with a subsequent reduction in the demand for labor. Furthermore, we have described the growth of at least one city in response to the parallel demand for more knowledge-oriented development in the region.

Although this has not been our central aim with this paper, we have nevertheless made some connections with theories and models of regional and urban development that we as spatial scientists have in our arsenal. However, those models have often focused on equilibrium processes of prices and produced quantities, while our inquiry into the regional and urban economic history of northern Sweden has instead forced us to focus on mobility in space of assets, technological change, and the creation of new assets. Hence, the history of northern Sweden tells a story of unbalanced rather than balanced growth. Generally, the wealth of regions comes from a successful creation of assets and a capability to keep and attract new assets. From this viewpoint, it can be seen as problematic that the region met its all-time high population in the years around 1960, while the population in Sweden has instead been growing since then.

To help in analyzing the region and the city, we have theories and an international experience from regions facing the curse of resources. Although we have not had space to develop this aspect further here, the analysis should be deepened with more recent research regarding how elites form coalitions in order to dominate nations or territories, often with destructive outcomes. When those are combined with theories of path dependence, spatial science could provide stronger policy suggestions to regions and cities as to how to escape from being locked into such self-destructive processes of prolonged vulnerability.

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Chapter 13
Economic Vitalization Strategy of Schweinfurt: a Small Industrial City in Northern Bavaria, Germany

Simon Suffa

Abstract The old industrial city of Schweinfurt has a special structure in relation to other German industrial bases; it is located between the metropolitan regions Frankfurt, Nuremberg, and Stuttgart as major agglomeration areas within a distance of less than 200 km. It has only 52,000 inhabitants but features an even higher number of workplaces (53,914 in 2013), resulting in about 38,000 in-commuters (70 % of the city's employees) every day. The traditional backbone of the city's economy consists of four major companies that compete in the global markets of the automotive and machine building industry. Due to their specialization, Schweinfurt is the regional center of Germany's roller-bearing industry. It represents one of the most specialized regional labor markets in the country. Today, the city's major machine-building enterprises are complemented by a growing number of innovative small- and medium-sized enterprises (SMEs) in different fields of engineering and by the world-market leading company in the production of hemodialysis devices. This article illustrates historical crises and the present challenges that Schweinfurt's economy is facing. It further discusses the strategies and actions taken by the enterprises and by the political and institutional stakeholders in order to keep the place competitive.

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1   Introduction

The city of Schweinfurt, located in the administrative district of Lower Franconia in northwestern Bavaria, shows a particular economic structure for an industrial location in central Europe. About 38,000 (70 %) of its employees commute in from the surrounding counties, especially from the Main-Rhön Region. Half of the workforce is employed in the secondary sector (manufacturing). Of them, 80 % work in one of four major industrial companies that compete in related global markets of the automotive and machine-building industry (see Table 13.1). The industries share of the city's gross value added sums to 56.5 % (see Tables 13.2 and 13.3). Due to its strong focus on the industrial sector, the local economy has been vulnerable to cyclical downturns.

In the 1990s, Schweinfurt's economy struggled heavily in dealing with the effects of this structural sensitivity. Within only 3 years, almost one-fifth of the local jobs were lost. The city and the companies made use of public investment funds and instruments like the federal short-time working program, which is still an important tool to help companies to ride out times of recession without losing too many qualified employees.

Table 13.1 Key figures of Schweinfurt region

	City of Schweinfurt	Landkreis Schweinfurt (county)
Resident population	51,852	113,007
Surface area (km^2)	36	841
Number of employees	53,914	22,480
Unemployment rate (%)	6	3
Commuter balance	33,629	−22,916
Purchasing power per capita (€)*	5,384	5,356
Retail centrality index	208	
GDP per capita (€)	78,738	19,630
Export quota (%)	47	17
* mean value Germany: 5,500 €		

Sources: Bayerisches Landesamt für Statistik (2014); Sturm (2013)

Table 13.2 Share of local gross value added according to economic sectors (%)

	1988	1990	1992	1994	1996	1990–1994
Agriculture and forestry	0.1	0.1	0.1	0.1	0.1	0
Manufacturing	62.5	62.6	56.8	53.2	52.8	−9.4
Share of industry in manufacturing	56.6	56.5	49.1	45	45.8	−11.5
Commerce and transport	10.4	10.9	12.7	12.8	12.1	1.9
Other services	14.1	13.1	15.6	18.6	19.2	5.5

Table based on Kraft (2001), p. 33

Table 13.3 Share of local gross value added according to economic sectors (%)

	1990	2000	2005	2011	Change 90–11
Agriculture and forestry	0.1	0.1	0.1	0.1	0
Manufacturing	62.6	50.8	58.5	61.4	−1.2
Share of industry in manufacturing	56.5	43.9	53	56.5	0
Commerce and transport	10.9	15	11.3	9.3	−1.6
Other services	13.1	15.2	13.9	12.8	−0.3
Public institutions, private households, NGOs	13.3	18.9	16.3	16.4	3,1

Own calculation, *data source*: Bayerisches Landesamt für Statistik (2014)

In fact, a total recovery took place within almost 20 years. Most important for this revitalization and for today's persistence of Schweinfurt's industrial basis is the fact that its companies successfully adapted strategies to deal with the growing global competition. These are, first, to generate temporary unique selling propositions (USPs) by focusing on the production of innovative, highly complex system components (e.g., multi-clutch transmissions) or on market niches like tailor-made high-performance elements (e.g., for tapered roller bearings for steering purposes in aerospace). Therefore, and second, they try to permanently improve and innovate in all fields of the enterprise. This includes regular outsourcing and off-shoring of the production of goods, with shrinking contribution margins. The need for permanent innovation leads to the companies' demand for exchange with innovative research and development (R&D) facilities and especially to a permanent need for highly qualified staff. Here, the firms are increasingly facing the consequences of Germany's demographic development as a national trend. Due to the negative natural population development in the surrounding Main-Rhön region, which is the city's commuter catchment area, the pool of highly qualified employees is shrinking. The national trend of ongoing polarization processes towards Germany's metropolitan regions entails a strong regional competition in the fields of attractiveness of living conditions and other factors governing location for companies, like diverse forms of infrastructure.

Section 1 of this article gives a brief overview of the historic genesis of Schweinfurt as an industrial city developing rather particular structures.

Section 2 outlines the causes and effects of the deep structural economic crises that Schweinfurt faced in the 1990s. It explains the measures that were taken to revitalize and introduce structural change and discusses their impact on the city's economic structure in terms of the effects of the global economic crises of 2008/2009.

Section 3 deals with contemporary challenges for business location and discusses vitalization strategies and actions taken by companies and by political and institutional stakeholders. These aim to raise the region's level of attractiveness for students and qualified professionals to connect regional institutions and companies with each other and to find solutions for infrastructural challenges under an ongoing polarization towards the metropolitan agglomeration areas.

2 Early Genesis of Schweinfurt's Economy from the Nineteenth Century

Having had some early capital accumulation out of food processing, Schweinfurt's developing mercantilist production of wall colors 'Bleiweis' and especially 'Scheinfurter Grün' that were exported, even to America and Asia, led to an international reputation in the late eighteenth and early nineteenth centuries and to the construction of transportation infrastructure, connecting the city to the world market (Kraft 2001, p. 9–14). The year 1853 was important for the city's further development, as Philipp Moritz Fischer, a local instrument maker, added a treadle to his wooden balance bike, beginning an early cycling tradition that was continued by his son Friedrich, who in 1872 opened a little bicycle factory next to his sewing machine factory (Ultsch 1983, p. 84). Aiming for the optimum performance of his products, Friedrich Fischer tried to minimize the friction on the hub of the wheels by implementing self-designed ball-bearings, for which he had to import steel balls from England. As these balls were very expensive, he searched for his own way to produce them. In 1883, Mr. Fischer's engineering efforts led to a process of grinding standardized steel balls that became the functional principle of the ball grinder, the world's first automatic grinding machine for the production of precision balls of bearings on an industrial scale. This invention revolutionized bearing production with improvements in quality and scalability. Establishing the innovation, Mr. Fischer's company quickly became very successful.

Soon, numerous competing companies were founded close by, forming an early industrial agglomeration on the basis of implicit knowledge (Polanyi and Sen 2009; Nonaka and Takeuchi 1995) that staff had acquired working in Mr. Fischer's company. Due to lack of capital, knowledge, and inventive talent, many of these companies disappeared quickly (Saffert and Müller 1993, p. 69). However, four of them formed the basis of Schweinfurt's very successful economic development, becoming one of the world's leading industrial agglomerations for the production of high-precision ball and roller bearings, which sustained it through the global economic crisis following the Great Depression in the early twentieth century (see Table 13.4 – a short overview of important enterprises in Schweinfurt). Co-operative structures (Storper 1995, p. 193) within this early industrial agglomeration in bearing production and the close interaction of Schweinfurt's companies with other German and international enterprises in the fields of vehicle engineering, aviation, and machine building led to the development of further products like precision (bi)cycle parts, combustion engines, and power-train elements (Osebold 2013).

The structures of this industrial agglomeration, e.g., its knowledge base (Polanyi and Sen 2009) and the basic demand for its products, helped Schweinfurt's companies to successfully recover from crises (e.g., in WWII, 85 % of the cities' industrial complexes were destroyed (Saffert 1975, p. 22)).

In the mid-1970s, at the peak of industrial production in Germany, the four big industrial enterprises, the companies of the two family-owned enterprises *FAG* and

Table 13.4 Short overview of important major enterprises of Schweinfurt

FAG: After Mr. Fischer's death in 1899, his company, which had used the brand *FAG* (Fischers Aktien-Gesellschaft) since 1905, was taken over by Mr. Georg Schäfer in 1909 (and later, in 2001 by the German Schaeffler Group). The enterprise, which is operating under the name Schaeffler Technologies GmbH & Co. KG still uses the brand FAG today. It focuses on production of high-precision bearings and components for various products in automotive, industry, and aerospace, nowadays employing more than 5,500 people in Schweinfurt.
SKF (Schweinfurt branch): Founded in 1890 by Wilhelm Höpflinger and Engelbert Fries, two former employees of Mr. Fischer's company, the enterprise was taken over by the Swedish SKF-Group (Aktiebolaget Svenska Kullagerfabriken) in 1929 together with the bearing production of SACHS and four other German bearing-producing companies outside Schweinfurt. Today Schweinfurt is still the principle office of SKF Germany GmbH. More than 4,000 employees are employed on-site. The product tables of the group are bearings, units, and housings; seals; coupling systems and power transmission products for various areas of application.
SACHS: Ernst Sachs, a precision engineer and race driver who focused on the optimization of bicycles, moved to Schweinfurt in 1894. After being granted a patent for a flexible precision bearing, he founded the company Schweinfurter Praecisions-Kugellagerwerke Fichtel & Sachs together with Karl Georg Fichtel in 1895. In 1903, SACHS developed the 'Torpedo,' the world's first free-wheeling hub. Focusing on the propulsion chain of bicycles and motorcycles, the company's bearing production was sold to SKF in 1929. After being internationally famous for cycle hubs, motorcycle engines, clutches, and brakes until the late 1980s, the company was taken over by the German Mannesmann Group in 1991 and later by ZF Friedrichshafen AG in 2001. Today, the group's product range includes transmissions and steering systems, chassis components, and complete axle systems and modules for the automotive industry. It currently employs more than 9,000 people in Schweinfurt.
STAR: The Deutsche Star-Kugelhalter GmbH, founded in 1904 in Berlin, was transferred to the bearing-agglomeration of Schweinfurt in 1909. The companies' success was based on a USA patent of the ball retainer, where a cage-like retainer keeps the steel balls in place in the bearing, significantly reducing friction. In 1987, the company was taken over by the German Mannesmann Group, which later merged with the automation division of the German Robert Bosch Group. Today, it is part of Bosch Rexroth AG, which produces drive and control technology components for various types of machines. The Schweinfurt branch is focused on the production of linear motion technology; the company is specialized as a supplier of linear technology and currently employs more than 1,500 people in Schweinfurt.
Fresenius: Looking for a new production site, Fresenius, a German producer of dialysis machines opened a factory in Schweinfurt. Being part of the global healthcare group, Fresenius, the firm Fresenius Medical Care AG & Co. KG employs more than 1,000 people in Schweinfurt.

Following (Kraft 2001, p. 13–15)

Fichtel und Sachs, together with the Schweinfurt branch of the Swedish bearing-group *SKF and STAR* formed a co-operative agglomeration that directly employed up to 26,000 people in Schweinfurt. The companies progressively developed a growing range of products in many fields. Over expanding their portfolios, they slowly lost competitiveness of their core products. Furthermore, the agglomeration matured, showing symptoms of a lock-in (Grabher 1993). Thus, internationally growing competition in the 1980s led to a focus on strategies for cutting marginal costs and on economies of scale. Nevertheless, towards the end of the 1980s, signs of decline accumulated. The period of the family-owned companies began to fade

out as *Fichtel und Sachs* was sold to the German *Mannesmann group*, as it was not capable of competing internationally in a long-term perspective. From this point on, Schweinfurt gradually lost headquarter functions within its big enterprises.

3 Structural Crises in 1990s, Far-Reaching Structural Change Towards Lean Production and Focusing on Innovation

The recession in the world markets of automotive and mechanical engineering production in the 1990s uncovered large structural deficits in Schweinfurt's regional economy. As Schweinfurt's major companies, except for Fresenius, focused on closely related key markets, they were following similar business cycles. Thus, the share of the second sector in the local gross value added dropped quickly in the 1990s (see Table 13.2). Facing reducing demand, the companies reacted with massive restructuring measures. For rapid cost reduction, they conducted large scale lay-offs.

As a result, within 4 years, the city's four major companies (of automotive and mechanical engineering production) dismissed almost 10,000 staff, equaling nearly 37 % (see Table 13.5). The big companies' break-in caused corresponding effects in domestic demand. The regional total unemployment rate reached 14 % in 1994, and 17 % in 1997, the highest level in western Germany (see Fig. 13.1). German newspapers called Schweinfurt the 'worst region of crisis in West Germany' (Blien and Dorner 2011, p. 53).

The reasons for the far-reaching regional impact of the external shock on Schweinfurt's economy and thus on the region can be found in various fields.

From a first view, at the time of the crises, the companies' average production costs appeared to be too high compared with their international competitors. Chief causes were the local companies' highly integrated vertical range of production (see Part I, Chap. 2) and the persistence of inflexible, standardized forms of mass production (Blien and Dorner 2011, p. 54–55). Furthermore, their products partly appeared to be not innovative enough. Considered from the view of evolutionary

Table 13.5 Development of employment in Schweinfurt's large industrial enterprises in the 1990

	FAG	SACHS	SKF	STAR	Total
1990	9,752	9,287	6,092	1,027	26,158
1991	9,038	8,559	5,384	1,034	24,015
1992	8,038	7,759	4,750	967	21,514
1993	4,904	6,717	4,529	861	17,011
1994	4,541	6,689	4,450	916	16,596
Change 1990–1994					
Absolute	−5,211	−2,598	−1,642	−111	−9,562
Relative (%)	−53.4	−28.0	−27.0	−10.8	−36.6

Source: Kraft 2001, p. 20

Fig. 13.1 Rate of unemployed dependent labor force (%) in Schweinfurt city, surrounding counties and Free State of Bavaria (1991–2004). * including Schweinfurt city and surrounding counties, Schweinfurt county, Bad Kissingen county, Rhön-Grabfeld county, Hassberge county (commuter zone). Own calculation (*Data source*: Bundesagentur für Arbeit (2014))
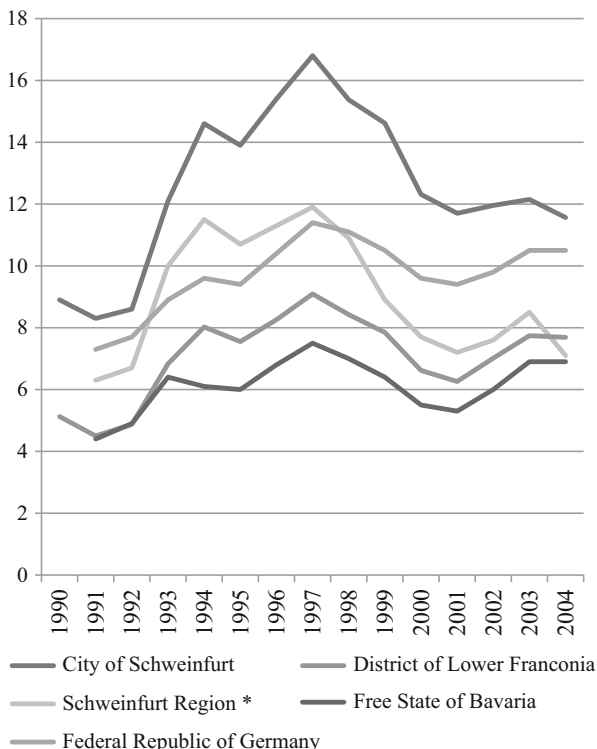
economics, path dependencies (Storper 1995, p. 205–206) had been caused within the companies by the traditional specialization of Schweinfurt's major enterprises in certain sectors of the mechanical engineering and automotive industries. Taking into regard the companies' long-lasting cooperative existence, lock-in effects (Grabher 1993) were feasible in the mature industrial agglomeration.

Another reason for the strong impact of the crisis on the region can be found in the structures of the regional labor market, which had traditionally been dominated by the four major industrial companies of automotive and mechanical engineering production. In 1990, more than half of Schweinfurt's employees (53 %) were employed in the second sector and 93 % of these were in the mechanical engineering and automotive industries (see Table 13.5). The in-commuting ratio of almost 76 %, one of the highest values in Germany, reflected the industries' regional dominance of the labor market (Maier 2009, p. 139–140). In fact, Schweinfurt's industrial companies were attractive as employers in the rural, periphery regions as they offered safe jobs at above-average salaries. With a traditional commitment to professional training, they assured themselves of a constant high offer of qualified labor force. Thus, the lack of competing demanders on the regional labor market led to a regional oligopoly (Kagerbauer 2014, p. 186), which provided Schweinfurt's

industrial enterprises with comparative advantages over their competitors from other parts of Germany.

The major industrial companies' outstanding regional relevance has also been reflected in their share of the local gross value added, reaching almost 57 % in 1990 (see Table 13.2). In fact, the big industrial companies' dominance in the regional economy went along with mutual regional interdependencies that fostered the enterprises' position. One example is the interdependencies between the companies and their employees, as described by the regional labor market. Other interdependencies persisted between the enterprises and the city administration. One of these interdependencies was financial. As local business tax is the most important financial source for German communities, the big industrial companies funded vast parts of the city's budgetary. Moreover, they happened to fund public events and regional civil societies (e.g., sports clubs). In addition, the major industrial enterprises secured the occupation of broad parts of the regional votership. This was also reflected in the majority situation in the city council and by the actions of the city administration, which openly supported the interests of the major industrial companies (Blien, 1993, p. 350). The city council, for instance, protected the dominant position of the four major industrial enterprises by hesitantly declaring new industrial areas, causing a shortage of large industrial real estate. Thereby, external industrial companies did not establish sites in Schweinfurt and thus did not place demands on the regional labor market (Kraft 2001, p. 30–32). Hence, these interdependencies prevented significant structural changes in the region for decades.

3.1 Measures for Revitalization

When the effects of the recession in the world automotive and mechanical engineering production markets hit Schweinfurt in the 1990s, no superordinate master plan existed to counteract the effects of the crises. In fact, public and private stakeholders, who partly cooperated with each other, took several revitalization measures on their spheres of activity. These stakeholders can be classified as private enterprises, the administrative and political stakeholders at the regional level of the city of Schweinfurt, the District of Lower Franconia, the Free State of Bavaria, the Federal Republic of Germany, and the European Union, as well as stakeholders from civil society like the chambers of trade, commerce, and industry or the labor unions.

The private enterprises took urgent consolidation measures for cost reduction, e.g., reduction of labor costs and discharging staff and immediately began to review and reorganize all parts of the companies. Realigning their product portfolios, they started to focus on their core businesses. Thus, they divested their operational divisions and strategically sold parts to other enterprises as well as actively supported management buy-outs. Reorganizing their production systems, they vertically disintegrated (see Part I, Chap. 1) their production by outsourcing and

subcontracting vast parts of their supply, logistics, and industrial services and implemented lean production systems and management structures. In doing so, they established forms of flexible production and flexible working hours management. The enterprises started to focus on the production of high-tech products on highly integrated component systems that implied higher value creation. Thus, they invested in R&D, partly expanding their international and local R&D structures and increasing their cooperation with external R&D institutions, e.g., the regional University of Applied Sciences. At the same time, they started to strategically offshore the production of matured standard products to locations with lower production costs (Blien and Dorner 2011, p. 55).

In the early stages of the crisis, before undertaking mass lay-offs, the companies took advantage of the federal short-time working program 'Konjunkturelles Kurzarbeitergeld,' which aims to avoid large-scale dismissals. Therefore, it allows companies under certain conditions, e.g., in times of recession, to reduce the working time and payment of their employees for up to 6 months. In such cases, the German Federal Employment Agency pays compensation of up to 60 % of the employees' lost income. Nevertheless, due to the dimension of the crisis, these measures appeared insufficient. As the mass lay-offs began, the German Federal Employment Agency took urgent measures, opening offices in the companies where dismissed staff were registered for unemployment compensation payments and replacement measures into new jobs. Cooperating with the chambers of trade, commerce, and industry, the German Federal Employment Agency organized professional training and retraining programs within the region to increase the jobless' chances of successful employment.

In 1992, the government of the Free State of Bavaria announced a relocation of a department of the Bavarian State Office for Statistics and Data Processing to Schweinfurt to strengthen the local domestic demand and for job creation. After the opening of the department in 1995, a total of 80 public officials were relocated to Schweinfurt, and 170 new positions were filled with regional staff (Kraft 2001, p. 66–67). In the same year, the government of the Free State of Bavaria further relocated six senates of the Superior State Social Court to Schweinfurt, entailing 55 working positions. In 2007, it conducted a last relocation process, pooling regional chief customs offices in Schweinfurt, which implied a transfer of 150 jobs.

Beside urgent actions by federal law and by the State Government of Bavaria, various measures for regional revitalization and structural change were conducted by different public stakeholders on the local, regional, national, and supranational level. Although these actions were partly independent from each other, one might refer to them as a 'vitalization strategy' due to some coordinative local structures that were initialized by Schweinfurt's former mayor, Mrs. Gudrun Grieser. Being the newly elected municipal leader of Schweinfurt in the autumn of 1992, she initiated a strategic process for regional improvement ('Standortoffensive'), bringing together, next to herself, the chief officers of the municipality, the management of the city's major companies and representatives of the chambers of trade, commerce, and industry in a series of so-called 'round table talks.' These meetings took place until 1996 (Kraft 2001, p. 58). Talking the situation over, it became clear that

the vulnerability of the region's economy stemmed from its mono-structure, being up to the few major companies. Thus, the group of participating stakeholders targeted the revitalization of the city's economy by initiating a process of 'structural change.' This included rapid steps to absorb the effects of the crisis in the short term. It aimed to strengthen the city's traditional industries and simultaneously diminish its economic vulnerability through diversification of the economic structure in the long term. The group discussed measures, their implementation, and their functioning and coordinated the various actions taken by its members. Since 1996, the coordinative function is administered by the city's department of economic development. Exchanges among the local stakeholders are based on bilateral talks. Round table talks nowadays center on certain topics, e.g., the revitalization of the city center or the conversation of military areas.

Following KRAFT (Kraft 2001), the measures actually taken by the public stakeholders are assigned to the general types of instruments that are available for public entities in regional economic policy (see Fig. 13.2). These can be differentiated according to the field on which the action of public stakeholders takes place (mobility, investment, employment, R&D, business formation, cooperation) and according to the degree of influence the public authorities exert on the private sector. The latter varies from weak forms of influence like information and consultancy to strong forms like regulation through administrative measures. Some measures, e.g., public programs that provide financial incentives, also include a regulating framework.

In her study on the structural crisis and structural change of Schweinfurt, KRAFT compiled the key measures taken by public stakeholders for revitalization and for the initiation of a structural change chronologically until 2001, attributing them with the respective instruments of regional policy (Kraft 2001, p. 62). Making no claims of completeness, I am complementing and continuing her compilation in Table 13.6.

Upon closer examination, it can be seen that some of the measures taken can be related to one instrument of regional policy; others imply several instruments. Infrastructure development, regional marketing, and financial incentives appear to be highly important instruments. In contrast, the instrument of consulting is named rather frequently. As an illustration, Table 13.6 refers to the action taken according to the primary instruments of regional policy; complementary actions are not specified thoroughly. Nevertheless, it is clear that the giving of information and advice to companies by public stakeholders is continuous, e.g., concerning administrative questions or funding opportunities.

Looking at the chronology of actions taken by policy instruments, it is noticeable that, in the early stages, measures linked to financial incentives occur frequently. Regarding their sources of revenue, municipalities in Germany primarily depend on local income tax. Following conjuncture, this source of income usually decreases in times of depression. Accordingly, for having opportunity of action, local authorities rely on federal or supranational funding programs in times of economic crises. Thus, the early steps taken by Schweinfurt's' public players focused on the application of the region as a funding area in national and supranational programs. Here,

Level of influence				
weak ←————————————————→ strong				
on enterprises	**information and consultancy**	**financial incentive**	**infrastructure development**	**administrative measure**
mobility	consulting to location and regional marketing	supporting relocation	development of economically important infrastructure (traffic, ICT, education, R&D, business incubators, science parks)	regulation of relocation
investment		investment incentive		regulation of investment
employment		incentives for job creation		
R&D	consulting to R&D	incentives for new technologies, R&D, innovation		regulation of new technologies
business formation	consulting to entrepreneurs	venture capital, assistance of business launching		regulation of business formation
cooperation	consulting to cooperation	incentives for cooperation		

Fig. 13.2 Instruments of regional economic policy. Table based on Kraft (2001), p 59 following Maier, Tödling and Trippl (1996)

the establishment of a regional development framework according to the federal Joint Program for the Improvement of Regional Economic Structures 'Gemeinschaftsaufgabe Verbesserung der regionalen Wirtschaftsstruktur' (GRW) and to the European regional development fund (ERDF), has to be considered as an important early action. The GRW, which has essentially existed since 1969, provides a framework for regulation and coordination of German regional policy in compliance with the regional funding regimes of the EU (Bundesministerium für Wirtschaft und Energie, 2014). Targeting selected, structurally weak municipalities, the GRW holds available possibilities to support investments in the establishment, the restructuring and the strengthening of regional companies under certain

Table 13.6 Action taken by timeframe: instruments of regional economic policy

Timeframe	Action	Instrument of regional policy
From 1992	Location revitalization campaign 'Standortoffensive'	
1993–1999	Outsourcing-Projects	Financial incentives, consulting
1994–1999	Measures to become area for national funding (GRW)	Financial incentives
1994–2006	Measures to become area EU (European regional development fund – objective 2) funding	Financial incentives
1994	Opening technological business-incubator 'GRIBS'	Infrastructure development, consulting, financial incentives
1994	Designation of Industry and Business Park 'Maintal'	Infrastructure development, Regional marketing
1998	Construction of first company building in Industry and Business Park 'Maintal'	Financial incentives consulting to and regulation of relocation, administrative measures
1999	Construction of business-center 'Chancen – Center'	Infrastructure, consulting, financial incentives
1995–1997	Relocation of public authorities	Administrative measure
1997	Special Program 'Ausbildung 97'	Financial incentives
1997–1998	Industrial location and relocation	Consulting
1998	Foundation of regional-marketing platform 'Chancenregion Mainfranken'	Regional marketing, consulting
1997–1999	Construction of vocational training facilities for motorcar mechanics 'KFZ-Akademie'	Infrastructure development
1997–2000	Construction of 'Georg Schaefer Museum'	Infrastructure development
2000–2001	Construction of convention center and hotel 'Maininsel'	Infrastructure development
2004–2007	Renovation 'Erbacher Hof' – city library, hotel, restaurants	Infrastructure development
2004–2007	Urban development concept	Infrastructure development
2005	Completion of Highway 'Autobahn' A71	Infrastructure development
2006–2009	Conversion of historic indoor aquatic center (1934) 'Ernst Sachs Bad' to municipal museum of arts	Infrastructure development
2007	Relocation of public authority	Administrative measures
2007–2009	Construction of shopping mall 'Stadtgalerie' (ECE)	Infrastructure development
2009	Nationwide Marketing-Campaign (TV, radio, printed media) 'Wir haben mehr auf Lager'	Regional marketing

Table 13.6 (continued)

Timeframe	Action	Instrument of regional policy
2009–2012	Waterfront development concept "Mainlaende"	Infrastructure development
2010	Foundation of joint unit for tourism management "Schweinfurt 360°"	Regional marketing
Since 2012	Planning of conversion areas after closure of US-Military bases	Infrastructure development
Since 2014	International, bi-lingual degree programs 'i-Campus' at university of applied sciences	Infrastructure development, incentives for R&D
Since 2014	Continued Urban development concept	Infrastructure development,

Source: updated illustration on basis of Kraft (2001), p. 62

conditions, e.g., if companies that have a supra-regional distribution area safeguard jobs or provide new ones. It further provides public regional stakeholders with options to obtain co-funding for investments in infrastructure related to economy and for investments in measures for the improvement of the conditions regarding location. This implies the support of endogenous economic growth potential, e.g., by boosting regional networking and cooperation between institutions or by strengthening the competitiveness and the innovative capacity of small- and medium-sized enterprises (SMEs). With its reform in 1993, the ERDF had four objectives to follow: objective 2 aimed at the redevelopment of regions severely affected by industrial decline, providing funding possibilities for investments in infrastructure related to the regional economy. This ERDF objective basically continued in the consecutive funding period 2000–2006, which focused on economic redevelopment and development of areas with structural problems (European Parliament 2014). In fact, the immediate establishment of a regional development framework for GRW and ERDF and Schweinfurt's improvement as an area of action within these programs laid the foundations for many of the following measures.

From Schweinfurt's approval as a GRW action area in 1994 until its drop-out of this development scheme in 1999, a total of 26 projects, mainly in the field of private companies, and comprising investments of 257,202 million Deutschmark (€131,505 million) in total, received an overall support of 32,630 million Deutschmark (€16,680 million), including co-funding of the Free State of Bavaria (Kraft 2001, p. 68–70). This financial support was essential for successful outsourcing projects that generally took place from 1993 to 1999 (Kraft 2001, p. 69–71). As the major companies concentrated on their core businesses, management buyouts and sales of manufacturing departments that were not considered part of their core portfolios occurred. The same happened collaterally to service departments during vertical disintegration processes. From 1993 to 1999, more than 800 jobs were kept or newly created by outsourcing projects in the Schweinfurt region. It is estimated that up to 40 % of these workplaces were created by investments that were triggered by the public financial support.

As mentioned before, development of infrastructure has been an important instrument of regional policy in the process of revitalization and restructuring. The following measures pertain to this type of instrument. To counter the increasing unemployment rates, local infrastructure for advanced vocational training and retraining was expanded, e.g.. the training facilities for motorcar mechanics 'KFZ-Akademie' of the Chamber of Crafts or the extension of the vocational training center of the Chamber of Industry and Trade (1997–1999). Both projects were supported by ERDF funds.

The construction of the Industry and Business Park 'Maintal,' which was opened in 1998, must be considered a far-reaching project. With a usable area of 1,100,000 sq. m., it offered sufficient industrial real estate, solving the problem of lack of space. Besides facilitating late outsourcing projects, it provides the area for further measures of infrastructure development like the startup center for manufacturing companies 'Chancen – Center.' Opened in 1999, it offers combinations of production space and offices totaling more than 2,500 sq. m. for startups and young small companies at very reasonable prices. In fact, Schweinfurt's first business-incubator 'GRIBS' had already opened in 1994 as a cooperation between the city of Schweinfurt (holding 60 % of shares), Schweinfurt County (30 %), and the Chamber of Industry and Trade Würzburg-Schweinfurt (10 %). Providing startups with 2,300 sq. m. rentable office and production space, the 'GRIBS' additionally supports them with central office services and consulting, e.g., to business formation, public financing for SMEs, and project funding possibilities. Cooperating with the University of Applied Sciences Würzburg-Schweinfurt, 66 businesses have been started in the 'GRIBS' since its opening until 2013. After incubation, 42 of them were successfully relocated, providing about 150 jobs in the region (Karl 2013). Unlike most outsourcing projects, which help increase the competitiveness of the regional economy but are still within or related to the automotive and machine-building industries, the startups often target other fields of industry.

In fact, the city administration considered the establishment of the Business Park 'Maintal' and of the business incubator 'GRIBS' as key projects on the way to diversification of the regional economic structure that paved the way for further development. In view of the high unemployment figures in the 1990s, it defined criteria for the allocation of the parcels in the Business Park 'Maintal' to demanding companies not according to business branches but especially concerning employment density (initially 70 jobs per 10,000 sq. m.). To find demand to fulfill this condition, the city administration started a professional marketing campaign, initially including advertisements in professional journals and online marketing. Although there has been enough demand in terms of quantity (about 200 requests per year), only a minority of three to five companies complied with the criteria. Hence, in the mid-1990s, the municipality commissioned a telemarketing campaign (Kraft 2001, p. 97–98). Executed by a professional call center, the executives for location decisions of 300 selected German companies were interviewed about their companies' future demand and about their potential interest in the Business Park 'Maintal.' As a result, the city administration gathered a database of 100 companies that were regularly informed about possibilities in the Business Park 'Maintal.'

Moreover, the city administration applied a progressive, customer-oriented service philosophy to set itself apart from competing municipalities that continues today. This aims to process any request very rapidly compared with other municipalities (e.g., a maximum of 24 workdays for a building permission request) and to provide customers with further services and information for quick realization of the project. Thus, the staff of the department for economic promotion actively guides potential investors through all formalities. In 1997 and 1998, the city administration conducted an industrial location and relocation program, successfully managing to relocate the call center of a major German bank. Initially employing about 170 people, the call center supplied almost 1,000 jobs in 2012. Further relocation activities have been conducted by major German energy and telecommunication providers (Kraft 2001, p. 63–64). The latest relocation took place in 2014 by the Japanese automotive supplying company Hi-Lex, which moved its European subsidiary for sales and account management (Hi-Lex Europe GmbH) from the UK to Schweinfurt, aiming to employ about 30 people, mainly engineers.

Further measures of infrastructure development targeted an improvement of the city's tourist infrastructure, the regeneration of the old city center, and a change to its negative nationwide image as the 'worst region of crisis in West Germany.' One major action has been the construction of the convention center 'Maininsel.' The city's favorable location in central Germany and its good connection to super-regional transportation infrastructure led the municipality to come up with the idea of locating a convention center in Schweinfurt to meet the demand of the local industry and to attract businessmen and tourists from outside the region. The construction of the center in an attractive location on an island in the river Main, which flows through the city, has been funded by the Free State of Bavaria and by the ERDF in equal shares as an investment in infrastructure related to regional economy. The conference center opened in 2002 and includes 13 conference halls/meeting rooms and a hotel (133 hotel rooms, complying with German 4-star standards), counting an average of 70,000 overnight stays per year in 2010.

As a first lighthouse project regarding cultural infrastructure, the establishment of the Georg Schäfer Museum must be mentioned. On the basis of initial ideas to close an unrepresentative area at the rear of the city hall in 1996 by the establishment of a museum, the municipality reached an agreement with the private foundation Dr. Georg Schäfer Stiftung and the Free State of Bavaria. Constructed and owned by the Free State of Bavaria, the museum is run by the municipality, permanently exhibiting the private collection of the former owner of FAG Kugelfischer, Dr. Georg Schäfer, with remarkable paintings from the 19th century. Since its opening in 2000, the museum has earned a super-regional reputation, attracting an average of more than 30,000 visitors per year.

Further lighthouse projects as investments in cultural infrastructure followed, e.g., the renovation of 'Erbacher Hof,' a medieval ensemble now containing a museum of local history, the city library, a hotel, and restaurants (2004–2007). Another cultural lighthouse project has been the conversion of the 'Ernst Sachs Bad,' an historic indoor aquatic center built in 1934 to the municipal museum of

arts, showing changing exhibitions in the field of modern arts. Again, more than 30 % of both investments have been funded by the ERDF.

Additionally, far-going infrastructural investments have been conducted by the municipality for the improvement of the city center. This includes the implementation of an urban development concept (2004–2007) for all parts of the inner city, which is going to be continued, and the development of riverside areas of the city center (2009–2012). Within these campaigns for city improvement, a total investment (private and public) of about €120 million has been made. More than 40 % have been funded by national and federal programs for the promotion of urban development.

In order to raise super-regional awareness of its infrastructural and cultural offerings, to change its image from a ('dirty') working-class town, and, finally, to attract high-potential qualified students, employees, and entrepreneurs, the city of Schweinfurt used various regional marketing instruments. The measures that were conducted for the commercialization of the Business Park 'Maintal' have been described earlier in this chapter. In fact, almost all of the investments in cultural infrastructure mentioned, like the establishment of museums, also contain elements of regional marketing. In 1998, Schweinfurt became a founder member of the regional-marketing platform 'Chancenregion Mainfranken,' which aims to promote cities and counties in the district of Lower Franconia, situated between the poles of metropolitan regions (Holste 2010).

To raise the general awareness of a positive image of Schweinfurt among the German population, the municipality engaged a publicity agency to develop a nationwide image campaign. This campaign 'Wir haben mehr auf Lager' ('we do have more in stock') took place in 2009 and included nationwide television spots, announcements in national magazines, and a sophisticated website. Alluding to the city's image of being an industrial place, it promoted the location as being highly dynamic. For this, it referred to the result of a ranking regularly published by a private research and consulting company (Prognos 2007) that classified Schweinfurt as having the highest development dynamics among all German cities and counties.

To better merchandise their offers in tourism and culture and as a conference venue, the municipality of Schweinfurt and the administration of Schweinfurt County further pooled their departments of tourism management by founding the joint unit 'Schweinfurt 360°' in 2010. On the basis of generated synergies, they intended to significantly improve the performance of regional tourism management and services provided to customers.

4 Robustness During World Economic Crises 2008/2009

After considering the significant measures that were taken to revitalize and structurally change Schweinfurt, the question arises as to the extent to which these actions met these goals. Two studies, BLIEN AND DORNER (Blien and Dorner 2011)

Fig. 13.3 Rate of unemployed dependent labor force (%) in Schweinfurt city, surrounding counties, and Free State of Bavaria (2005–2013) . * including Schweinfurt city and surrounding counties, Schweinfurt county, Bad Kissingen county, Rhön-Grabfeld county, Hassberge county (commuter zone). Own calculation (Data source: Bundesagentur für Arbeit (2014))
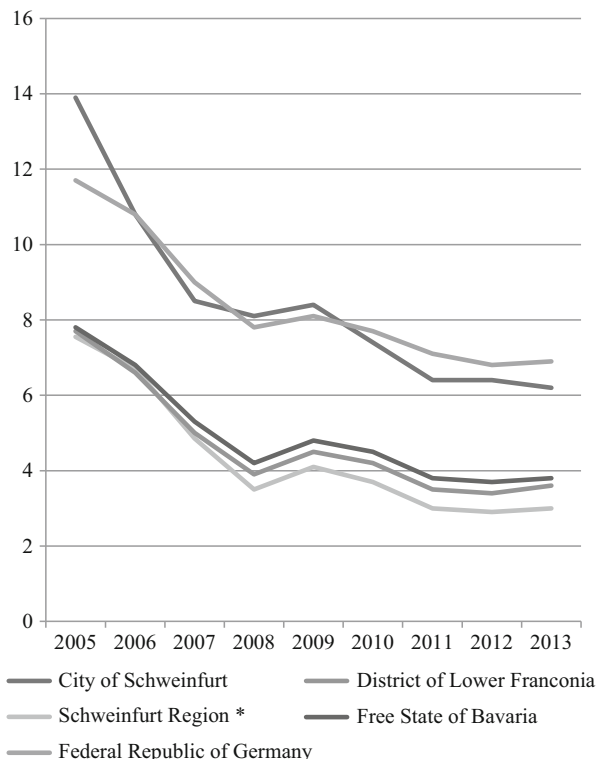
and KAGERBAUER (Kagerbauer 2014) are dealing with this question by analyzing structural data.

In fact, from the turn of the millennium until 2008, the occupation figures of Schweinfurt showed a rising trend (see Table 13.3), driven by the positive business situation of the major industrial companies (Blien and Dorner 2011, p. 56). The unemployment rate of the city of Schweinfurt dropped faster than in many other German regions, reaching its pre-crises level (see Fig. 13.1) in 2008 and even undercut the average figure of the federal republic of Germany (see Fig. 13.3). However, during the international financial crises 2008/2009, the gross domestic product (GDP) of the region, which showed an export share of 45 %, dropped about 9.4 % (Blien and Dorner 2011, p. 56). Unlike in the 1990s, no major dismissals occurred this time (see Fig. 13.3). All major companies and many SMEs managed to stay operative. Despite high cost pressures, they focused on keeping their skilled staff, making intensive use of the federal short-time work program, which included 14 % of the region's employees (Blien and Dorner 2011, p. 57). Then, in 2010, the unemployment figures reached the pre-crises level of 8 % and continued to decrease. According to these figures, the regional economy showed a robust development in the long term.

Table 13.7 Employment development in city of Schweinfurt according to economic sectors

Year	I sector	II sector	III sector	Total	Share I sector (%)	Share II sector (%)	Share III sector (%)	Share major companies in sector II (%)
1991	600	32,200	18,700	51,300	1	63	36	80
2006	60	24,300	24,400	48,760	0.1	49.8	49.1	63
2009	29	25,310	24,613	49,760	0.1	50.7	49.2	70
2012	nd	27,193	26,721	53,914	nd	50.4	49.6	82

Own calculation, data source: Bundesagentur für Arbeit (2014)

Table 13.8 Local density of entrepreneurship

Year	1996	2003	2009
Enterprises per 1,000 inhabitants	1.2	1.8	2.5

Source: Karl (2013)

Now, may one conclude that the measures for revitalization and structural change have been successful? Looking at the data (see Table 13.7), it is remarkable that the share of local gross value added of the manufacturing sector and therein that of industry almost reached its level before the structural crisis in the 1990s.

Regarding the development of employment according to economic sectors, the manufacturing sector has lost relative importance to the service sector in the long term, where almost half of the employees are salaried (see Table 13.3). However, within the manufacturing sector, the major industrial companies have even gained relative importance. Nevertheless, as shown by KAGERBAUER's detailed analysis using employment panel data and micro data, the structural change within led to an increase in the number of employees in business administration and especially in technologically and skill-intensive divisions, e.g., R&D (Kagerbauer 2014, p. 192–194). According to this study, the major proportion of the increase in occupation from 2003 to 2008 took place in the skill-intensive manufacturing sector, which grew 15.2 % in the respective timespan (Kagerbauer 2014, p. 196). This development indeed reflects the companies' actions, which included measures of vertical disintegration, off-shoring of the production of matured goods, and focusing on products of higher technological complexity.

Although Schweinfurt's economic structure is still dominated by its big industrial companies, some factors point to diversification in the corporate landscape, e.g., the increased share of the service sector in total employment and the increasing local density of entrepreneurship (see Table 13.8), which grew continuously after the vertical disintegration measures of the 1990s.

Thus, one may assert that the actions for revitalization and structural change that were taken by the various stakeholders had an impact on the regional economic structure, leading to certain robustness. Retrospectively, it is obvious that the deep economic crisis of the 1990s provided the region with a chance for crucial restructuring.

5 Effects of Demographic Change and National Polarization Tendencies as Contemporary Challenges

After Schweinfurt successfully endured the world economic crises 2008/2009 after undergoing structural change, other challenges appeared.

Like in many other developed countries, Germany's total fertility rate has constantly been below the natural reproductive level since the mid-1960s. Hence, the country's population is getting older, leading to a slowly declining number of working-age inhabitants since the mid-1980s. The demography of Schweinfurt and its surrounding region, the Main-Rhön Region, is corresponding to this development (see Fig. 13.4). Its demographic trend confronts the region with a series of challenges that afford structural change. The first line supply infrastructure, e.g., retail, medical infrastructure, public transport, education, water supply, etc. needs to adapt. Particularly in rural regions, where shrinking demand endangers existing structures, alternative solutions must be found (Seynstahl 2014b). For Schweinfurt's manufacturing enterprises, the shrinking population comprises decreasing offerings on the labor market. Nevertheless, various factors like international division of labor, growing productivity, and immigration led to a constant labor supply until a few years ago. Therefore, during times of recession, e.g., the world economic crisis 2008/2009, the increasing number of retirees appeared to be helpful from a short time perspective, as unemployment figures stayed relatively low. However, the negative effects for the national welfare systems aside, nowadays, demographic development appears to be a threat for the region's economy and infrastructure, as the offer of qualified labor is progressively falling below demand (Seynstahl 2014a). Moreover, the offered labor force is effectively shortened by a mismatch between the actual offer and the demand for the competencies of the employees, as the average level of skills required in the increasingly knowledge-based economy rises quickly. This development is already reflected by Schweinfurt's regional labor market. For more than 3 years, unemployment rates in the city's traditional commuter catchment area, the Main-Rhön Region (Schweinfurt Region), constantly show full employment (unemployment equaling ≤3 %) (see Fig. 13.3). Subtracting the stock of individuals (around 3–4 %) who are permanently unemployed due to structural mismatch (Bundesagentur für Arbeit 2014), the figures of the city of Schweinfurt indicate the same situation.

In fact, the shortage of qualified personnel affects Germany's regions unequally. For small places like Schweinfurt, the demographic implications are negatively enforced by a trend of polarization towards metropolitan growth poles (Rosenfeld 2012, p. 6), e.g., Munich, Frankfurt, Stuttgart, and Nuremberg, which benefit from immigration. Trans-regional administrative, institutional, and economic facilities and steering functions tend to accumulate in these urban agglomeration areas, providing professionals with more opportunities for advancement. In other words, Schweinfurt's employers find themselves in a tightening nationwide competition for skilled employees, while the region competes for them as inhabitants in order to keep its utility institutions running (Seynstahl 2014b). Thus, one might assume that
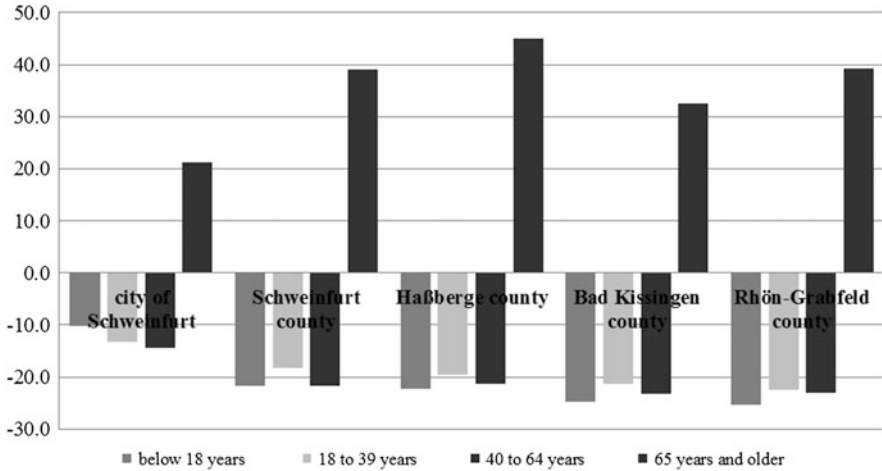
Fig. 13.4 Projection of population development in Main-Rhön area from 2011 to 2013 according to age groups (%). Own calculation (Data source: Bayerisches Landsamt für Statistik (2014))

the companies' efforts to keep their staff during the economic crises 2008/2009 are also related to this upcoming shortage on the regional labor market. Hence, within the region, big enterprises headhunt staff from SMEs, as the bigger municipalities attract inhabitants from smaller ones due to better infrastructure.

6 Measures to Attract and Keep Qualified Personnel in a Peripheral Region

To deal with this challenge, the regional institutions and stakeholders develop strategies to activate every potential of qualified labor. As the settings of the labor market change, there is a growing excess demand on the regional labor market. As a consequence, qualified professionals and young people who show development potential can choose between many employers. Thus, enterprises try to become attractive for professionals, struggling to comply with their boundary conditions on the job.

For young professionals, they make an effort to offer interesting job perspectives and opportunities for advancement. Depending on their size and their possibilities, they establish training programs in co-operation with other firms of their sector to guarantee apprentices widespread experience in the profession they are learning. To bind young academics, they participate in 'dual studies' programs with the regional University of Applied Sciences. Here, students are simultaneously employed by a company and receiving a regular salary. They alternate studying for one semester and obtain a practical education in the company during the next, finishing their studies with a bachelor of arts or engineering. To be attractive to young parents or

people who care for family members (e.g., elderly people) many companies establish flexible working hours and offer their employees help to easily use national programs in this field, like parental leave or caregiving leave. Additionally, measures to keep the staff healthy are gaining importance.

A growing number of enterprises focus on the recruitment of qualified staff from foreign countries, especially from southern and eastern Europe, where large numbers of qualified professionals are unemployed. Here, the chamber of industry and trade and the chamber of crafts support their member companies by giving them consulting on best practices in these fields. For instance, the chambers of industry and trade established a super-regional institution for the approval of foreign skills. The chambers further run programs that help companies to recruit foreign staff. On the regional level, they lobby for the establishment of a 'welcoming culture' in civil society that helps foreign staff to integrate themselves in the region.

The municipality and the University of Applied Sciences established plans to expand the latter by building a new campus on a conversion area, which is going to be left by the US Army in spring of 2015. Here, the 'i-factory,' facilities for the simulation of innovative, fully computerized industrial plants are planned to be built next to 'i-company,' a new incubator area where companies can open offices on the campus, with access to the laboratories, facilities, staff, and students of the university (FHWS 2014). The biggest project in this context is 'i-campus' (FHWS 2014). Starting in winter semester 2014/2015 with 100 international students, 'i-campus' is an umbrella term for bilingual degree programs in the fields of engineering. Until 2018, a total of 2,000 additional students from abroad are intended to study together with fellow German students in bilingual (English/German) courses, graduating with a bachelor degree. Because the University of Applied Sciences already has well-established exchange programs with universities from Asian countries, they expect the majority of international students to come from this region. The aim of 'i-campus' is to supply the regional companies with highly qualified engineers who have work experience in international teams and knowledge of key markets.

Continuing the measures from the improvement of the inner city (see above), the municipality further takes a series of small steps to make the city more interesting as a place of residence, e.g., with the establishment of nursery schools for young children of working parents. Further cultural investments are made, like the annual installation of an open-air stage on the river Main, where regular concerts take place during summertime.

7 Final Statement

Facing massive effects of the structural economic crisis in the 1990s, measures for revitalization and for the initiation of change in the economic structure of Schweinfurt have been taken by various stakeholders. They included measures of the major

companies concerning vertical disintegration, off-shoring of production of matured goods and focusing on products of higher technological complexity. Public stakeholders concentrated on action for the diversification of the regional economic structure by strengthening endogenous potential and on the improvement of Schweinfurt's attractiveness and its super-regional image. Indeed, the relative robustness shown by the regional economy during the economic crisis of 2008/2009 indicates that the actions taken were successful.

Nevertheless, the demographic development of Germany, which comprises the over-aging and the shrinking of the regional population, confronts Schweinfurt and the surrounding region with a series of challenges that afford continuous structural change in many fields.

However, the main focus of contemporary action of the regional stakeholders is on increasing attractiveness and on integration. For the regional companies, the challenge of shortage of skilled labor force is to the fore. Hence, according to their potential, they set up strategies to raise their attractiveness to potential staff, including attractive forms of vocational training, work-life balance, and flexible working hours. Supported by the chambers of manufacturing and trade, they recruit staff from abroad, helping them to integrate in the region.

In the short run, the measures taken by different regional stakeholders to deal with the shortage of a skilled labor force seem promising. Nevertheless, due to the dimensions of the population decline, these are unlikely to be sufficient to counteract its general effects. Considering the various impacts of the over-aging and shrinking population on regional supply infrastructures, far-reaching measures must be developed and undertaken quickly. Conceptual approaches are available (Arnold and Rauh 2012; Seynstahl 2014b).

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Chapter 14
Economic Vitalization Strategy of Chongqing, China

Yanwei Sun and Yoji Taniguchi

Abstract It is difficult to change structures in manufacturing and related tertiary sectors in inland regions in China. However, Chongqing succeeded in upgrading its industrial organizations by inducing Taiwanese personal computer (PC) manufacturing companies in 2009. The regional development policies that aimed to improve the infrastructure of Chongqing and advance industrial structures played an important role in this introduction. Regional policies, particularly urban-rural strategies, are expected to upgrade industrial structures to revitalize local regions. Examining Chongqing's strategy and economy may provide some insight into developing rural regions. The primary aim of this chapter is to show the effects of regional policies on the development of Chongqing: using input-output analysis, we show that the laptop PC manufacturing industry that was introduced to Chongqing had a positive productivity effect on other industries and increased the numbers of workers migrating from other regions. In addition, we show that development of the infrastructure in this city has revitalized the regional economy by attracting other industries. These findings are significant to the development of other under-developed inland regions in China.

1   Introduction

According to Petty-Clark's law, in the process of economic development, the labor force shifts from primary industry to secondary and tertiary industries. Hence, it is important for under-developed areas to develop manufacturing and service industries.

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Geographic factors make it difficult for inland regions (central and western) to upgrade industrial structures when developing manufacturing industries and related tertiary industries. Hence, disparities between the east and the west are significant, and few employment opportunities exist in the west. Additionally, surplus labor in rural inland areas ranges between tens of millions and a hundred million[1]. Consequently, every year, more than one hundred million rural migrants move to coastal regions to look for jobs[2]. Against this background, in 2000, the Chinese central government set up the Western Development Policy to improve the under-developed western region.

With the influence of this policy, public investment in infrastructure and industries increased. In the last decade, the western region has developed rapidly and the gross domestic product (GDP) growth rate of the western region exceeded that of the eastern region. In this process, Chongqing, which is one of four municipalities directly under central government, was noted in recent years as being one of the most important areas for the Western Development Policy and the most rapidly developing city in the west. Infrastructure development, industrialization, and urbanization were all increasing in Chongqing. It is now going to be the transportation hub not only between western and eastern regions in China but also between China and Europe. Furthermore, the Chongqing government succeeded in attracting the investment of Hewlett-Packard and Taiwanese Original Design Manufacturing (ODM) enterprises to upgrade industry structures. Moreover, Chongqing has changed from an area sending out migrant workers to an area absorbing migrant workers.

Chongqing was established as the fourth municipality after Beijing, Tianjin, and Shanghai (these are in the eastern area) directly under the central government in 1997. The Chongqing GDP per capita growth rate exceeded that of the national average and the other three municipalities from 2008. Therefore, it is useful to study Chongqing in terms of further development of under-developed regions in China. If the development policy in Chongqing is successful, this would be significant for other under-developed inland regions in China.

Recent studies about the development policies in Chongqing focus on urbanization. Research on the impact of a specific industry, particularly the notebook PC manufacturing industry, is sparse. Therefore, the purpose of this chapter is to evaluate the ripple effects of the electronic equipment manufacturing industry. This research attempts to use input-output analysis to verify the productivity effect on other industries and the employment inducement on migrant workers after the notebook PC manufacturing industry entered Chongqing in 2010.

In this chapter, we first provide an overview of the Chongqing economy and development policies. Second, we evaluate the effects of these policies, focusing on the upgrade of industrial structures and employment inducement by the electronic equipment manufacturing industry.

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[1] Differing results have been found when estimating the level of surplus labor in China: 101 million (Guo 2007), 168 million (Zhu 2009), and 52 million (Huang 2012).

[2] Yan (2009) discussed this issue in detail.

2 Examination of Chongqing's Economic Policy

2.1 *Economy of Chongqing*

Chongqing is in the upper reaches of the Yangtze River, at the junction of the center and the west of China. As at 2012, the permanent population of Chongqing was 29.45 million; 12.66 million of whom reside in rural areas. The area is 82,400 km^2 (2.4 times the total of Beijing, Tianjin, and Shanghai), but the central district is only 647 km^2 (0.8 % of the total), and administration units total 19 wards and 19 counties. Chongqing has the largest population scale and the most administrative units in China.

As previously mentioned, Chongqing was established as the fourth municipality directly under the central government in 1997 and the only municipality in western China; before 1997, it was part of the Sichuan Province. Historically, Chongqing could be recognized as the most developed area in inland China. In the 1960s, Chongqing was an important area for the Third Front Construction[3] of China because of its specific terrain that encompassed many mountains and fewer plains. In that period, many heavy industries (state-owned enterprises) were built and the foundations for heavy industries were laid. Moreover, in 1983 and 1992, Chongqing was also selected as an area for experimental economic reform and the open city of the upper Yangtze River, because of the heavy industries foundation and the rich resources in coal, gas, and water. However, in that period, most investments were in the eastern regions, so the development of Chongqing lagged.

In the mid-1990s, in the wake of the Three Gorges Project, the biggest water project in China, Chongqing was noticed again and was designated the key area in the west, and then became a municipality. Thus, Chongqing became the most important area for the Western Development Policy and has developed rapidly since 2000, as shown in Fig. 14.1.

In 2013, the GDP per capita of Chongqing was 42,975 yuan ($US7,027), while the national average was 41,805 yuan ($US6,835). In 2012, Chongqing exceeded the national average for the first time. However, in absolute values, disparity was still significant. In 2013, compared with the 90,100 yuan ($US14,732) of Shanghai and the 97,609 yuan ($US15,960) of Tianjin, that of Chongqing was 40 or 50 % of each municipality.

As mentioned above, as a western city with specific geographic location, resource, and population scale conditions, Chongqing had an important role in the history of Chinese development.

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[3] The Third Front Construction was a large-scale military and economic strategic base that relocated industry facilities and labor from east regions to west regions during the period 1964–1979 in China (Wu 2002).
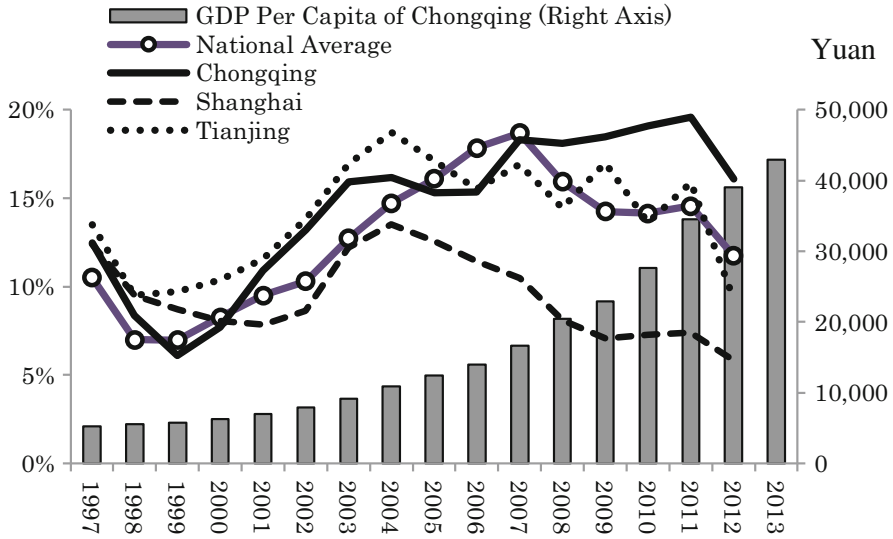
Fig. 14.1 Three years moving average growth rate of gross domestic product (GDP) per capita for each city and GDP per capita of Chongqing (*Source*: China Statistical Yearbook 2013, Chongqing Economy and Society Development Bulletin 2013, Shanghai Economy and Society Development Bulletin 2013, Tianjin Economy and Society Development Bulletin 2013, and China Economy and Society Development Bulletin 2013)

2.2 Development Policies of Chongqing

The position of Chongqing in the Western Development 12th 5-Year Plan (2011–2015) has four points. They are the economic center of the upper reaches of the Yangtze River, a model inland area as an open door for foreign trade, the pole of western economic growth, and a model area of urban-rural integration (Jin 2010). Due to the role of Chongqing in the Western Development Policy, policies regarding infrastructure development, upgrading of industrial structures, urbanization, and education, etc. have been carried out.

2.2.1 Infrastructure Development

In terms of the specific geography of Chongqing's location, it is thus far the only western city with water, rail, and air transportation networks. However, the sea is about 2,000 km from Chongqing, so use of the Yangtze River waterway can sometimes be inefficient. As the terrain is mountainous with fewer plains, and Chongqing had poor railway and airline infrastructure, transportation costs were high, and developing foreign trade was more difficult than in eastern coastal regions. Under the Western Development Policy, development of the waterway, railway, and highway infrastructure proceeded in Chongqing (Fig. 14.2).

Fig. 14.2 Three years moving average growth rate of freight ton-kilometers, freight handled at ports and increased distance in highway and railway of Chongqing (*Source*: Chongqing Statistical Yearbook 2013, Chongqing Economy and Society Development Bulletin 2013. Note: Data for 2012 freight ton-kilometers were not available)
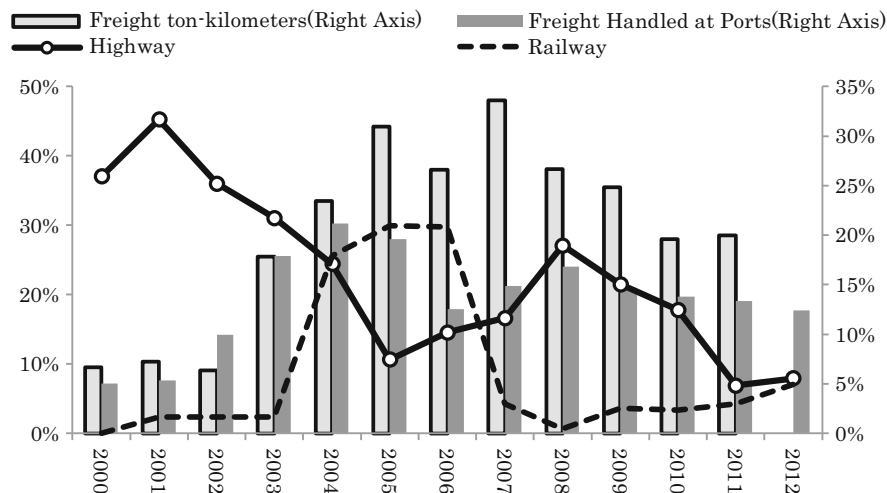
This infrastructure development was designed to increase the convenience of exporting by reducing transport costs in water railway, airway, and international trade passage. Moreover, an industrial zone was also constructed to reduce transfer costs[4].

As the Yangtze River goes through the center of Chongqing, the largest inland free-trade port was built in 2008 and named Lianglucuntan. Groups of 10,000-ton ships are able to sail directly into Chongqing, and the transportation cost is one-third that of using the railway, and one-tenth of that using land transport (He, 2010).

There are three airports in Chongqing. Jiangbei international airport is the fourth largest in China and adjoins the Lianglucuntan free-trade port. In recent years, construction for air transport has been undertaken, including the construction of 35,000 m^2 of warehouse, 70,000 m^2 of ramp-way, and parking space for four Boeing 747 cargo airplanes. Therefore, cargo will be transported smoothly and effectively.

The China Railway Long-Term Plan indicates that a fifth railway hub is going to be built in Chongqing as the centerpoint of ten mainline railways. Currently, railroads have already been opened between Chongqing and five adjoining provinces. From 2001 to 2010, the distance of Chongqing railway will be extended by 806 km, and it will be extended to 2,300 km by 2015. At that time, transportation via railway will be greatly reduced, not only between Chongqing and Shanghai (reduced to one-third of before), but also between Chongqing and surrounding regions.

Moreover, construction of several new international trade passages is planned. Until now, the international freighting route from Chongqing used the waterway,

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[4] Transfer costs include packing costs, loading and unloading costs, and tariff duty. They are not directly related to distance (Nishioka 1968) p. 64.

Table 14.1 International trade passage

	Time (days)	Distance (km)	Route	Cost ($US)
New Eurasia railway	17	11,380	Chongqing – Kazakhstan – Russia – Belarus – Poland – Duisburg in Germany	8,900
River and sea	40	22,000	Chongqing – (Yangtze) – Shanghai – (Pacific) – Rotterdam in the Netherlands	4,000
Railway and sea	30	20,000	Chongqing – Myanmar – (Indian Ocean) – (Mediterranean Sea) – (Atlantic) – Rotterdam in the Netherlands	5,900
Airway	1	8,126	Chongqing – Germany Duisburg	156,000

Source: Chongqing Government (2011), and Xia et al. (2014)
Note: cost is based on the price of each 40'GC (40-foot container) from Chongqing to Duisburg

which is shown in Table 14.1. In 2009, a new Eurasia railway was planned and has now been running since 2011. In addition, sea–train transport routes are under construction. Table 14.1 shows that the new Eurasia railway takes less time than travel via the waterway and the sea–train routes, and is cheaper than air transport.

Not only logistics but also an industrial zone was constructed. As mentioned above, Lianglucuntan Free-Trade Port with both port and airport functions forms the main part of the Liangjiang state-level economic development zone. It is the third state-level economic development zone planed in 2010 after Shanghai Pudong and Tianjing Binghai. In addition, the Xiyong electronic economic zone was constructed in 2005 to deal with customs, bonded processing, and bonded logistics. It is located 30 min from the Lianglucuntan Free-Trade Port. It is located only 3 km above the new Eurasia railway; most of the Taiwanese ODM enterprises are located in this zone, which will be introduced in next section.

In this way, infrastructure development both in transportation and industrial zone has proceeded in Chongqing.

2.2.2 Upgrading of Industrial Structures

In 2013, the percentage of primary industry, secondary industry, and tertiary industry in Chongqing is 7.9 %, 50.5 % (including construction industry 9.1 %) and 41.6 %. Compared with the national averages of 10.0 %, 43.9 % (including construction industry 6.8 %), and 46.1 %, the secondary industry rate of Chongqing is high (Bureau of Statistics of Chongqing 2014; National Bureau of Statistics of China 2014). During the Third Front Construction, Chongqing was the base of the munitions manufacturing industry. Industries such as car and motorcycle manufacturing were also the leading industries in Chongqing[5].

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[5] (Yamamura and Shen 2005) discussed this issue in detail.
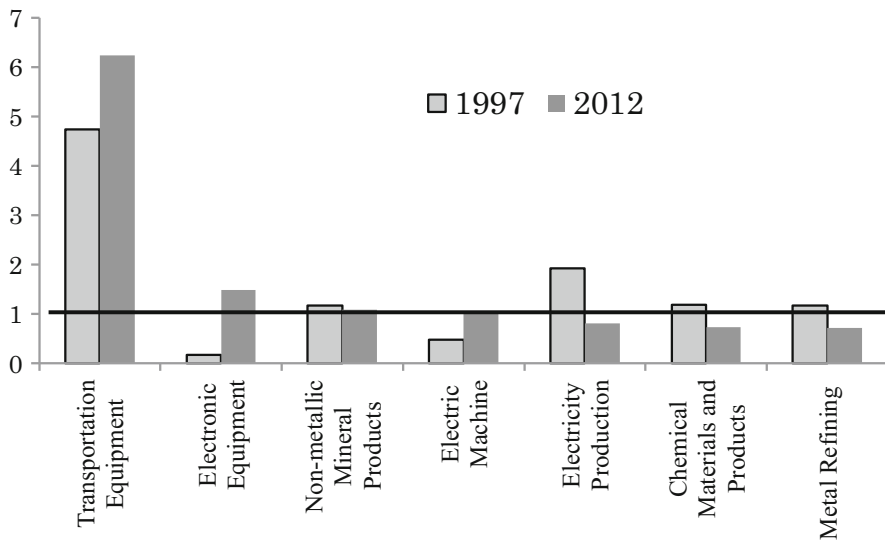
Fig. 14.3 Industry specialization of Chongqing in 1997 and 2012 (*Source*: China Statistical Yearbook 2013, Chongqing Statistical Yearbook 2013, Chongqing Economy and Society Development Bulletin 2013)

Figure 14.3 shows that the transportation equipment industry is far more specialized than other main industries in Chongqing. However, the electronic equipment industry has become specialized in recent years.

In the Chongqing 12th 5-year Development Plan (2011–2015), the Chongqing government planned to upgrade industry structures in transforming heavy industry such as metal refining and machinery equipment through to electronic information industries. By 2015, the Chongqing government is planning to become the biggest production base of notebook PCs and information processing center in China (Chongqing Government 2011).

In 2009, the Chongqing government succeeded in attracting an order from Hewlett-Packard for 40 million notebook PCs, with several conditions, as follows: construction of infrastructure for freight, covering the transport cost difference, and promising 80 % of the local supply rates for components. The new Eurasia railway mentioned above was one important part in the infrastructure construction. As no notebook PC manufacturing industry had previously been based in Chongqing, to bring about the local supply rate, the Chongqing government used the order of 40 million notebook PCs to attract Taiwanese ODM enterprises in the east[6]. According to the deep relationship of cooperation between Taiwanese ODM enterprises and component manufacturers, more and more component manufacturers

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[6] Today approximately >90 % of notebook PCs in the world are produced by Taiwanese enterprises (Kawakami 2012). The development of Taiwanese information technology (IT) enterprises is discussed by (Kawakami 2012) and (Zhuang 2004).

followed ODM enterprises and relocated to Chongqing from coastal regions[7]. From 2009 to 2012, an agglomeration of notebook PC manufacturers was formed in Chongqing by five notebook PC brand companies, six ODM firms, and about 700 component manufacturers. From 2010 to 2013, production of notebook PCs in Chongqing increased from 1.93 million to 54.71 million, totally about one-fifth of the world share.

In 2013, production value of the electronic information manufacturing industry was 18.5 % of Chongqing's industrial gross value added, after transportation equipment at 18.8 % (Bureau of Statistics of Chongqing 2014). Thus, after improving the infrastructure, Chongqing was successful in developing an electronic information industry to upgrade the industry structure. It is not difficult to see that the two policies are deeply linked[8].

2.2.3   Urban – Rural Strategy

As the model area of urban-rural integration in Western Development, the Chongqing government has been repealing the family register system, transfer system, and the support rural labor flow. As mentioned above in Sect. 2.1, the rural population of Chongqing is 12.66 million, about 42 % of the total. To promote urbanization, the Chongqing government planned to change ten million rural population into urban population from 2010 to 2020.

First, it was decided that the family register system would be repealed. In China, the Family register system means that farmers do not have the same rights to quality education, wellbeing, employment chances, and many other preferential treatments of the average citizen. Thus, it is difficult for farmers to find jobs in urban areas. Moreover, in undeveloped western regions, the ratio of state-owned enterprises and institutions to all enterprises and institutions is much higher than in eastern regions. Conversely, the ratio of private enterprise and some tertiary industries that are easier for farmer to engage in are lower than in eastern regions. Hence, millions of rural laborers leave Chongqing as migrant workers to find jobs in the east. Chongqing is the first experimental area in which the local government has repealed the family register system in China.

By repealing this system, the same quality education and wellbeing will be offered to famers as new citizens. The land transfer system is set up to obtain the financial resources for these polices. Therein, farmers transfer their land-use rights to the government; government then offers the site to housing developers to get the financial resources. The arable land part is transferred to a large-scale agricultural manager. In China, arable square per capita is small and it is difficult to develop large-scale agricultural management. The fewer farmers engaged in farming, the

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[7] Research on the agglomeration of Taiwanese IT enterprises in China can be found in (Kawakami 2012), (Zhu 2003), and (Seki 2005).

[8] The influence of transport costs to Taiwanese ODM enterprises was discussed in (Sun 2014).

Table 14.2 Changes due to urbanization polices

| Year | | Hoses supply (10,000 m²) | Population inflow | |
			From rural Chongqing (10,000)	From outside Chongqing (10,000)
2007	48.3 %		258.1	74.2
2008	50.0 %		285.8	84.5
2009	51.6 %		314.3	96.3
2010	53.0 %	88.0	462.8	94.5
2011	55.0 %	484.0	476.0	121.0
2012	57.0 %	626.3	485.6	135.0

Source: Chongqing Statistical Yearbook 2013, Chongqing Economy and Society Development Bulletin 2013, Chongqing Government News

better the land transfer system works in terms of obtaining financial resources and promoting large-scale agricultural management.

With the financial resources from the land transfer system, the same pension, healthcare, and education opportunities are offered to the new citizens and rural labor flow. Furthermore, new houses are offered free or at low cost, as well as vocational school, and a labor agency can be established.

As shown in Table 14.2, it is clear that the urbanization ratio of Chongqing has grown rapidly, and the population flow from rural areas (Chongqing) and other areas into Chongqing is increasing. It should be noted that the population flow from rural areas increased sharply from 2009 to 2010. This may be the influence of employment inducement effects of the electronic equipment manufacturing industry. This possibility is argued in Sect. 3.3. Table 14.2 also shows that the population inflow of Chongqing in 2012 was 6.2 million: 78.2 % from Chongqing rural areas and 21.8 % coming from outside of Chongqing. By industry, 26.3 % of them engage in wholesale and retail trade, 15.3 % in manufacturing industries, 12.4 % in hotels and catering services, 11.7 % in social services, 10.2 % in other sectors, and 9.6 % in construction[9]. Most work for individual businesses and private enterprises. It seems that Chongqing is becoming an area that not only sends out migrant workers but is also becoming an area that absorbs migrant workers.

2.2.4   Education

Education is another important issue in Chongqing's development. In fact, the educational standard of Chongqing is high compared with the rest of China.

Table 14.3 shows that the number of students per 100,000 population in Chongqing is higher than the national average in each education stage; in particular, the high school stage index of Chongqing is much larger. In general, many students leave their hometown for their higher education in China. Comparing the higher

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[9] Chongqing Government News (2013, Apr 3). Inflow of population in Chongqing, http://www.scio.gov.cn/xwfbh/gssxwfbh/xwfbh/chongqing/Document/1307936/1307936.htm.

Table 14.3 The number of students per 100,000 population index (China average is 100)

Year	Junior High School Stage		High School Stage		Higher Education	
	Chongqing	West AVE	Chongqing	West AVE	Chongqing	West AVE
2007	107.4	110.0	103.3	92.5	106.2	76.1
2008	113.5	110.7	113.1	96.7	107.4	77.7
2009	114.3	113.2	115.3	99.0	109.1	78.5
2010	113.4	114.1	114.1	101.8	110.2	81.3
2011	109.2	117.1	114.0	103.5	112.0	82.1
2012	105.4	117.8	117.1	105.1	117.1	84.3

Source: Chongqing Statistical Yearbook 2013
Note: (1) Junior high school stage includes junior high school and vocational junior high school.
(2) High school stage includes high school, vocational high school, polytechnic school, and adult
junior high school. (3) Higher education includes college and adult higher education

education index of Chongqing with the average in western China suggests that
Chongqing is a region in which many colleges are concentrated.

To support the electronic equipment manufacturing industry and related IT
industries, IT is establish as a subject in colleges, and the number of students taking
these courses is increasing. In fact, the Chongqing college district is established
beside Xiyong electronic economic zone and HP and Taiwanese ODM enterprises.
In addition, in the Chongqing 12th 5-Year Development plan, plans to strengthen
basic education and increase the number of vocational schools and polytechnic
centers for rural migrant workers become an important project. Therefore, the
education sector of Chongqing is planned to not only advance basic education but
also to support the upgrading of industrial structure and urbanization.

3 Evaluation of Policies

Using input-output analysis, let us evaluate the effects of the industrial structure
upgrading policy and employment effect by the electronic equipment manufacturing
industry. This industry started in 2010 in Chongqing. The latest version of the Chong-
qing input-output table was published in the same year. Thus, it is possible to compare
the situation in 2007 and in 2010 to see what has been changed by the new industries.

Production equation is established according to the Leontief open model as
follows[10]:

$$X = \left[I - \left(I - \widehat{M} \right) A \right]^{-1} \left[\left(I - \widehat{M} \right) F + E \right] \tag{14.1}$$

where X is gross output vector, the first term is Leontief inverse with import of
Chongqing endogenous, and the second term is the total final demand of goods and
services in Chongqing.

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[10] See (Huang 2008) and (Yamada and Tokuoka 2007).

Based on this equation, first, the change of industry-related degree is inquired using the effect ratio and the response ratio. Second, attribution of Chongqing upgrading of industrial structures is analyzed by comparing the Chongqing input-output table from 2007 and 2010. Third, a simulation analysis is carried out to obtain the employment effect of the electronic equipment manufacturing industry of Chongqing in 2010.

3.1 Industry-Related Degree of Chongqing Industries

Effect ratio and response ratio are the degrees that evaluate the production ripple effect of each industry in the productive structure[11]. If the effect ratio of industry j is bigger than 1, it means the ripple effect of industry j is bigger than the average ratio, and vice versa. If the response ratio of industry i is bigger than 1, it means that industry i is easily influenced by other industries, and vice versa.

In general, industries manufacturing final goods have a strong ripple effect to other industries. Their effect ratio tends to be bigger than 1, while the effect ratio of service industries is smaller than 1 because few materials are input. Figure 14.4 and Table 14.4 show that, in Chongqing, the effect ratio of manufacturing industry in transporting, electronic equipment, machinery, and electrical machinery, etc. are
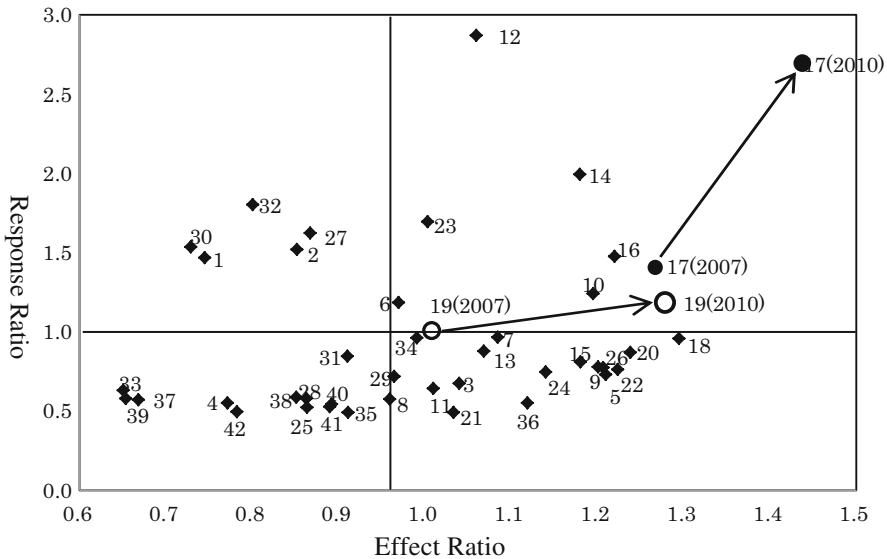

Fig. 14.4 Effect ratio and response ratio of Chongqing industries in 2010 (*Source*: Bureau of Statistics of Chongqing (2012a, b))

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[11] See (Han 2009) and (Ma 2007).

Table 14.4 Effect ratio and response ratio of Chongqing industries in 2010 and change of effect ratio from 2007 to 2010

No	Industrial Sector	Effect ratio	Response ratio	Change of effect ratio
1	Agriculture, Forestry, Animal Husbandry and Fishery	0.74	1.46	−0.06
2	Mining of Coal	0.85	.52	−0.09
3	Petroleum and Natural Gas	1.04	0.67	0.18
4	Metal Ores	0.77	0.55	−0.14
5	Non-metal Ores	.21	0.73	.18
6	Foods and Tobacco	0.97	0.18	−0.05
7	Manufacture of Textile	1.08	0.96	−0.08
8	Wearing Apparel	0.96	0.57	−0.20
9	Wood and Furniture	1.20	0.78	0.05
10	Paper, Printing and Other Goods	1.19	1.24	0.00
11	Processing of Petroleum, Coking and Nuclear Fuel	1.01	0.64	0.13
12	Chemical Industry	1.06	2.87	0.05
13	Non-metallic Mineral Products	1.07	0.87	0.05
14	Smelting and Pressing of Metal	1.18	1.99	0.14
15	Metal Products	1.18	0.81	0.06
16	Machinery	1.22	1.47	0.10
17	Manufacture of Transporting	1.44	2.69	0.17
18	Electrical Machinery	1.29	0.95	0.14
19	Electronic Communication Equipment and Computers	1.28	1.18	0.27
20	Instrument Measuring appliances and Office Supplies	1.24	0.87	0.13
21	Art, Craft Products	1.03	0.49	−0.05
22	Waste Resources	1.22	0.76	0.11
23	Electric Power and Heat Power	1.00	1.69	−0.05
24	Supply of Gas	1.14	0.74	0.16
25	Supply of Water	0.86	0.52	−0.15
26	Construction Industry	0.21	0.77	0.07
27	Transport and Warehousing	0.87	1.62	0.02
28	Postal and Telecommunication	0.86	0.58	−0.14
29	Information Transmission and Software Services	0.96	0.71	0.11
30	Wholesale and Retail Trade	0.73	1.53	−0.12
31	Hotels and catering Services	0.91	0.84	−0.11
32	Financial Industry	0.80	1.80	−0.07
33	Real-Estate Agency	0.65	0.63	−0.07
34	Leasing and Business Services	0.99	0.96	−0.06
35	Researching and Testing	0.91	0.49	−0.13
36	General Technology Services	1.12	0.55	0.13

Table 14.4   (continued)

No	Industrial Sector	Effect ratio	Response ratio	Change of effect ratio
37	Water Conservancy and Public Facilities Management	0.67	0.57	−0.15
38	Resident Services	0.85	0.59	−0.06
39	Education	0.65	0.58	−0.20
40	Health and Welfare	0.89	0.54	−0.04
41	Culture and Entertainment	0.89	0.53	−0.07
42	Public Administration and Social Organization	0.78	0.49	−0.15

Source: Bureau of Statistics of Chongqing (2012a, b)

far bigger than 1, and that of real estate agencies, financial industry, and wholesale and retail trade are far less than 1.

As shown in Fig. 14.4 and Table 14.4, the response ratios for the chemical industry and smelting and pressing of metal are bigger than 1 due to supply materials, and that of independent industries, such as general technology services and public administration and social organization are less than 1. Figure 14.4 also shows that the effect ratio of the electronic equipment manufacturing industry grew rapidly from 2007 to 2010; it is also smaller than that of manufacture of transporting.

The largest increase in the effect ratio among all industries during this period is that of the electronic equipment manufacturing industry, at 0.27 (see Table. 14.4). It is clear that the manufacture of laptop PCs strengthens the production ripple effect of the electronic equipment manufacturing industry on other industries in Chongqing's industrial structure. Moreover, as a result of the arrival of laptop PC manufacturing in 2010, the electronic equipment manufacturing industry has become one of the leading industries in Chongqing.

3.2   Attribution Analysis of Upgrading of Industrial Structures

Let us clarify the role of the electronic equipment manufacturing industry in upgrading industrial structures by focusing on changes in industrial productivity.

3.2.1   Attribution Analysis Method

Using the same method used in Ide's work (2003), the attribution of Chongqing upgrading of industrial structures between 2007 and 2010 is queried. The equation is developed as follows (Ide 2003, p. 155–157):

$$\Delta X = B_{2007}\Delta\left[\left(I - \widehat{M}\right)F + E\right] + \Delta B\left[\left(I - \widehat{M}_{2007}\right)F_{2007} + E_{2007}\right]$$
$$+ \Delta B\Delta\left[\left(I - \widehat{M}\right)F + E\right] \tag{14.2}$$

where B is Leontief inverse, the first term shows the amount of change caused by final demand, the second term is the amount of change caused by Leontief inverse, which can also be considered as technology. The third item is the confounder between final demand and technology.

3.2.2 Results of Attribution Analysis in Upgrading of Industrial Structures

Using Eq. 14.3, the results of the change in industrial structure from 2007 to 2010 is shown in Table 14.5. In the table, final demand is shown itemized by private consumption, government consumption, investment, and export.

With the increase of the Chongqing gross output value from 2007 to 2010, contribution from the investment factor is the largest, and the next is the technology factor. However, the export factor tends to reduce the gross output value because of the influence of the collapse of Lehman Brothers.

In an industrial structure, almost all industries have a positive impact on the increase of the Chongqing gross output value, especially the manufacturing of transport industry (16.41) and construction industry (16.14).

As shown in Table 14.5, the secondary industry is also the leading industry for Chongqing upgrading industrial structure, especially manufacturing of transporting and chemical industry. However, the impact of the electronic equipment manufacturing industry does not seem strong during this period. This could be because PC manufacturing started in 2010, and it is difficult to reflect the effect because of data constraints. The construction figure is especially high because infrastructure development in traffic, urban construction, and house supply for migrant workers proceeded rapidly during this period (see Fig. 14.2 and Table. 14.2). Furthermore, the table seems to show that, as the development of secondary industry proceeds, so do related tertiary industries such as wholesale and retail trade and transport and warehousing development.

It is obvious from the table that final demand of private consumption factor had an effect on food and tobacco manufacturing; the final demand of investment factor worked effectively on the construction industry and on the manufacturing of transporting smelting and pressing of metal; final demand of technology factor has a great effect on manufacturing of transporting, chemical industry.

Finally, it is worth considering government consumption of education. Table 14.5 shows education and government consumption had little impact on the upgrading of the industrial structure, but government consumption of education is about one-fifth of the whole. It seems education is the most important sector in terms of Chongqing government consumption from 2007 to 2010.

Table 14.5 Attribution analysis in upgrading of industrial structure of Chongqing

	Industrial Sector	ΔX	PC(F)	GC (F)	I(F)	E(F)	T	C
1	Agriculture, Forestry, Animal Husbandry and Fishery	3.24	3.06	0.30	0.85	−2.44	1.11	0.37
2	Mining of Coal	2.60	0.38	0.04	0.96	−0.33	1.13	0.42
3	Petroleum and Natural Gas	0.80	0.18	0.00	0.02	−0.01	0.46	0.15
4	Metal Ores	0.21	0.02	0.00	0.10	−0.05	0.13	0.01
5	Non-metal Ores	1.69	0.03	0.00	0.12	0.04	0.98	0.51
6	Foods and Tobacco	5.05	4.08	0.03	0.10	−1.99	2.43	0.41
7	Manufacture of Textile	1.23	0.86	0.01	0.11	−0.18	0.29	0.14
8	Wearing Apparel	0.83	1.54	0.01	0.06	−0.22	−0.19	−0.37
9	Wood and Furniture	1.05	0.33	0.03	0.17	−0.02	0.34	0.21
10	Paper, Printing and Other Goods	1.90	0.94	0.10	0.17	−0.07	0.62	0.14
11	Processing of Petroleum, Coking and Nuclear Fuel	0.34	0.11	0.03	0.08	−0.07	0.17	0.02
12	Chemical Industry	6.09	2.48	0.26	1.00	−2.34	3.66	1.03
13	Non-metallic Mineral Products	4.39	0.26	0.03	2.60	−0.47	0.98	0.98
14	Smelting and Pressing of Metal	3.04	0.59	0.09	5.15	−2.02	0.15	−0.93
15	Metal Products	1.49	0.10	0.05	1.04	−0.15	0.27	0.18
16	Machinery	5.82	−0.21	0.11	3.67	−0.56	1.97	0.83
17	Manufacture of Transporting	16.41	1.89	0.06	5.94	−4.14	9.80	2.86
18	Electrical Machinery	3.28	0.54	0.05	2.37	−0.79	0.70	0.42
19	Electronic Communication Equipment and Computers	1.91	0.73	0.02	0.14	−0.09	0.69	0.43
20	Instrument Measuring appliance and Offices Supplies	0.43	0.08	0.02	0.10	−0.24	0.38	0.10
21	Art, Craft Products	0.34	0.27	0.00	−0.04	−0.02	0.08	0.05
22	Waste Resources	0.68	0.02	0.00	0.09	−0.05	0.46	0.15
23	Electric Power and Heat Power	2.30	0.07	0.12	1.63	−0.75	0.85	0.38
24	Supply of Gas	0.29	−0.15	0.00	0.07	0.12	0.17	0.08
25	Supply of Water	0.31	0.04	0.01	0.03	−0.01	0.14	0.10
26	Construction Industry	16.14	0.54	0.07	14.93	−0.60	0.49	0.72
27	Transport and Warehousing	2.13	0.40	0.58	1.16	−1.13	0.76	0.36
28	Postal and Telecommunication	0.26	0.00	0.01	0.02	0.07	0.10	0.06

Table 14.5 (continued)

	Industrial Sector	ΔX	PC(F)	GC (F)	I(F)	E(F)	T	C
29	Information Transmission, and Software Services	1.17	0.28	0.04	0.47	−0.29	0.46	0.20
30	Wholesale and Retail Trade	2.94	0.60	0.10	2.95	−2.19	0.72	0.77
31	Hotels and catering Services	0.25	0.26	0.11	0.40	−0.25	−0.18	−0.09
32	Financial Industry	6.05	1.83	0.42	0.48	−0.43	2.75	1.00
33	Real Estate Agency	1.89	0.57	0.02	1.24	−0.06	0.08	0.02
34	Leasing and Business Services	1.46	0.19	0.15	0.25	−0.07	0.70	0.24
35	Researching and Testing	0.16	0.01	0.10	0.14	−0.01	−0.04	−0.04
36	General Technology Services	1.17	0.03	0.25	0.54	−0.05	0.23	0.17
37	Water Conservancy and Public Facilities Management	−0.18	−0.11	0.10	0.08	−0.10	−0.10	--0.04
38	Resident Services	0.34	0.22	0.04	0.20	−0.02	−0.10	0.00
39	Education	0.19	−0.75	1.04	0.03	−0.18	0.10	−0.05
40	Health and Welfare	0.37	−0.15	0.79	0.09	−0.17	−0.09	−0.10
41	Culture and Entertainment	0.10	−0.04	0.16	0.04	−0.07	0.02	−0.01
42	Public Administration and Social Organization	−0.17	−0.03	0.11	0.00	−0.17	0.01	−0.09
	Total	100	22.10	5.45	49.57	−22.57	33.67	11.77

Source: Bureau of Statistics of Chongqing (2012a, b)

Note: ΔX: $X_{2010} - X_{2007}$, F final demand, PC private consumption, GE government consumption, I investment, E export, T technology, C confounder between final demand and technology. ΔX is 100, others are the amount of change caused by each factor

3.3 Effect of Employment Inducement in Electronic Equipment Manufacturing Industry

It is thought that the introduction of the laptop PC manufacturing industry in Chongqing in 2010 would have an effect on employment inducement not only in electronic equipment manufacturing but also in other industries. In this section, we conduct a simulation using the Leontief open model to examine what kind of industry is likely to be affected.

Table 14.6 Top ten industries of employment inducement if 10 billion yuan final demand was increased in 2010

Rank	Sector	Employment Inducement Coefficient	Production Inducement (10,000)	Employment Inducement (person)
1	Agriculture, Forestry, Animal Husbandry and Fishery	0.6132	61,225	37,541
2	Manufacture of Electronic Communication Equipment, Computers	0.0108	1,812,716	19,529
3	Wholesale and Retail Trade	0.1809	62,637	11,332
4	Leasing and Business Services	0.1312	63,968	8,393
5	Education	0.1730	18,825	3,256
6	Chemical Industry	0.0135	220,175	2,983
7	Hotels and Catering Services	0.0869	24,384	2,120
8	Manufacture of Transporting	0.0109	174,539	1,898
9	Financial Industry	0.0142	87,385	1,243
10	Resident Services	0.1563	6,313	934
Total of Top Ten			2,532,167	89,299
Top10/Total %			82.5 %	91.1 %

Source: Bureau of Statistics of Chongqing (2012a)

3.3.1 Employment Inducement Analysis

According to Ishimura et al. (2009) and the Leontief open model, the effect of employment inducement equation is as follows (Ishimura et al. 2009, p. 120–126):

$$\Delta L_i = \widehat{l}_i \left[I - \left(I - \widehat{M}_i \right) A_i \right]^{-1} \Delta \left[\left(I - \widehat{M}_i \right) F_i + E_i \right] \tag{14.3}$$

In Eq. 14.3, ΔL_i is the employment inducement number, $\widehat{l}_i$ is the employment coefficient diagonal matrix, and $\Delta \left[\left(I - \widehat{M}_i \right) F_i + E_i \right]$ is the change of final demand in industry i.

3.3.2 Results of Employment Inducement Analysis

Table 14.6 shows the effect on employment inducement if the final demand for the electronic equipment manufacturing industry increased to 10 billion yuan in 2010. The effect of employment inducement is largest on primary industry[12]; next is the

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[12] Because the government of China did not publish an employee matrix, we used the database of person engaged by industry in the China Statistical Yearbook instead. However, the definition of each differs; statistical data for employees is less than that of individuals engaged generally. In addition, statistical data for individuals engaged in primary industries may appear bigger than it actually is because many farmers are today leaving rural areas as migrant workers without engaging in farming. See (Wang and Hu 2008).

electronic equipment manufacturing industry itself. The rest of the industries are in the top ten, except for the chemical industry and manufacture of transporting, all others are tertiary industries. The productivity of these tertiary industries are relatively low, except for the financial industry. It is easier for rural migrant labor to engage in these industries. The effect of employment inducement to wholesale and retail trade, leasing, and business services are outstanding. As mentioned in Sect. 2.2.3, of the population inflow of Chongqing in 2010, a total of 26.3 % engaged in wholesale and retail trade, 15.3 % manufacturing industry, and 12.4 % hotels and catering services. Hence, it is reasonable to consider that the PC manufacturing industry contributes on offering employment opportunity to inflow population of Chongqing. Furthermore, employment inducement on education is also large. According to Sect. 2.2.4 and Table 14.5, it is clear that Chongqing government pays more money to establish IT as a subject and vocation schools for rural migrant workers. Therefore, it is clear that by increasing the final demand of electronic equipment industry, employment effect of education will be induced in Chongqing.

4   Concluding Remarks

In terms of the influence of economic factors and location conditions, Chongqing has become the leading example in western China. With improvements of transport for export, the PC manufacturing industry was attracted to the upgraded industrial structure of Chongqing. This chapter evaluated the effect of the electronic equipment manufacturing industry on upgrading the industrial structure and employment inducement using input-output analysis. The results derived from the analysis confirm that the inducement of the PC manufacturing industry into Chongqing had a strong ripple effect on other industries; in addition, the technology transferred from the manufacturing industry to other industries, such as the financial industry, and plays a certain role in upgrading industrial structure and the economic development of the city.

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Chapter 15
City Development in Emerging Economies: The Case of Davao City in the Philippines

Arianne Dela Rosa Dumayas

Abstract Globalization and decentralization are two phenomena that have been significantly altering the spatial pattern of growth and development in many countries. Globalization has brought about a 'world of cities', wherein cities are becoming more influential in international economies and politics. The wave of decentralization has swept through many countries in response to growing international competition and to stimulate local development. Using the case study of Davao city in the Philippines, we attempt to analyze the policies and strategies undertaken to manage the challenges of globalization and decentralization. While the primacy of the capital Metro Manila remains, other cities and metropolitan areas are converging rapidly, most notable of which is Metro Davao. At the forefront of Metro Davao is Davao city, which is located far from the capital but is one of the most competitive cities in the country. This study also discusses the development of cities in the Philippines.

Keywords Local Development • City System • Urbanization • Decentralization • Globalization

1 Introduction

In past decades, the twin phenomena of globalization and decentralization have changed not only how we live but have also reconfigured the places in which we live. Globalization has brought about increased mobility of goods, people, and other factors production which consequently led to massive urbanization as people tend to flock to cities with better opportunities and higher wages. Moreover, globalization has intensified competition, not only among nations but also among cities, both on the global scale and the local level, which often results in spatial inequality of growth and development. Thus, some cities have expanded faster, while others have lagged behind.

Given the kinds of predicaments that globalization has brought about, many countries have started to shift to decentralization to ensure growth and to enhance

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the competitiveness of local government (Antipolo 2010). Decentralization was pursued under the assumption that, due to proximity and familiarity, local officials are more knowledgeable about the strengths and weaknesses of their territory and are thus capable of formulating what is best for their constituencies (Capuno 2013; Capuno 2005). Decentralization has had varied results across different countries. Some countries have a positive experience in decentralization but some do not. Either way, decentralization has a profound impact on the spatial nature of growth and development.

As the Philippines has been embedded in the international economy and is one of the prime movers in decentralization in Asia, this study adopts the case of the cities in the Philippines to illustrate how globalization and decentralization influenced the spatial nature of growth and development at the city level. Like many developing countries, spatial inequality has remained daunting for an archipelago of 7,100 islands. Metro Manila is the only city that qualifies for definition as a world city, with a population of 12 million; however, other cities and metropolitan areas are converging rapidly, particularly, Davao city, which is widely recognized internationally for its competitiveness and livability. The study also analyzes how a particular city of Davao has managed to thrive with globalization and utilizes decentralization more efficiently by looking at local development policies and strategies. This study also examines the characteristics and systems of cities in the Philippines. In particular, this study aims to answer the following questions:

1. What are the characteristics of cities in the Philippines? How has the city system evolved over past years?
2. How has Davao city evolved to its present-day competitive and livable city status?
3. What are the policies and strategies geared towards globalization and decentralization?
4. What are the best practices or useful implications that can be learned from the experiences of Davao City?

This chapter is organized as follows: Sect. 2 discusses the characteristics, pattern, and development of cities in the Philippines; Sect. 3 provides a short background about Davao City; Sect. 4 examines the development policies and strategies of Davao city that are pursued in response to globalization and decentralization; Sect. 5 concludes the analysis.

2 Cities in the Philippines

2.1 City Classification and Urbanization

The Philippines is a republic with a presidential form of government. It is divided into three main islands: Luzon, Visayas, Mindanao. The country is divided further

Table 15.1 City income class

Class	Average annual income
First	P 400 M or more
Second	P 320 M or more but less than P 400 M
Third	P 240 M or more but less than P 320 M
Fourth	P 160 M or more but less than P 240 M
Fifth	P 80 M or more but less than P 160 M
Sixth	Below P 80 M

Source: National Statistical Coordination Board (NSCB)

into 17 regions, 80 provinces, 144 cities, 1,496 municipalities, and 42,025 barangays. The 144 cities are classified into three categories: highly urbanized cities (34) and independent component cities (five); the rest are component cities of their respective provinces and are defined as follows:

Highly Urbanized Cities – Cities with a minimum population of 200,000 inhabitants and with the latest annual income of at least 500 million pesos based on 2008 constant prices. Highly urbanized cities are autonomous from provinces.

Independent Component Cities – Cities of this type are independent of the province, and as such their charters ban residents from voting for provincial elective officials   (although some are allowed to participate). These cities have a minimum population of 150,000 and earn at least 350 million based on 2008 constant prices.

Component Cities – Cities that do not meet the preceding requirements are deemed part of the province in which they are geographically located. If a component city is located along the boundaries of two or more provinces, it is considered part of the province of which it used to be a municipality.

The cities are also categorized according to their average annual income. There are six classes of cities in the Philippines, as shown in Table 15.1.

In order for a municipality to be converted into a city, the municipality must satisfy the following requirements:

- locally generated income of at least 100 million pesos (based on constant prices in the year 2000) for the last 2 consecutive years, AND
- a population of 150,000 or more, as certified by the National Statistical Office (NSO); *OR* a contiguous territory of 100 km^2.

During the post-war period in the 1950s, there were only 18 cities in the country, and almost 70 % of the population still lived in rural areas (Cuervo and Kim Hin 1998). In the 1960s, there were 36 newly created cities, but from the 1970s to the 1980s, only three cities were formed. The significant growth in the number of cities that occurred from the 1990s coincides with a remarkable increase in population. A total of 91 cities were ratified, and almost half of the population is now living in urban areas (Fig. 15.1).
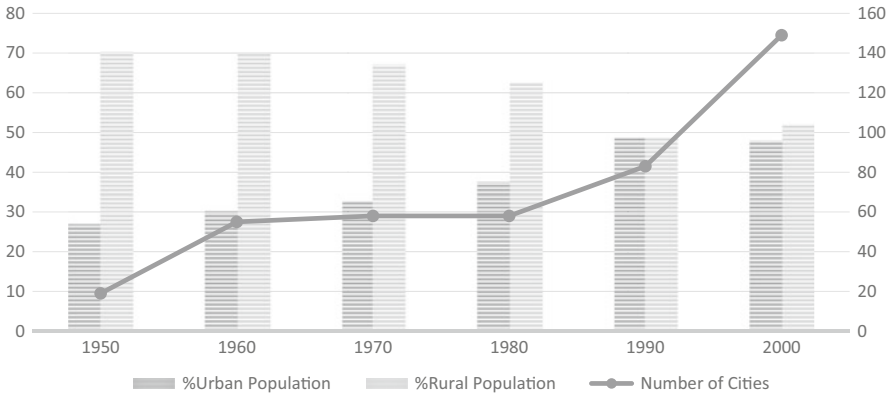
Fig. 15.1 Cities and urbanization. *Source*: NSCB

Table 15.2 City status

Region	Highly urbanized	Independent component	Component
NCR	16	0	0
CAR	1		1
Region 1– Ilocos		1	8
Region 2 – Cagayan Valley		2	2
Region 3 – Central Luzon	2		12
Region 4A – Calabarzon	2		16
Region 4B – MIMAROPA	1		1
Region 5 – Bicol		1	6
Region 6 – Western Visayas	2		14
Region 7 – Central Visayas	3		13
Region 8 – Easten Visayas	1	1	5
Region 9 – Zamboanga Region	1		4
Region 10 – Northern Mindanao	2		7
Region 11 – Davao Region	1		6
Region 12 – SOCCKSARGEN	1	1	3
Region 13 – CARAGA	1		5
ARMM			2

2.2   City Size, Location, and Pattern

Half of the highly urbanized cities are located within the National Capital Region (NCR), while the rest are scattered across different regions. Region 4A (CALABARZON) has the highest number of cities at 18: two highly urbanized and 16 component cities. Region 6 (Western Visayas) and Region 7 (Central Visayas) are also home to many cities, with 16 cities each. Cordillera Administrative Region (CAR) and Autonomous Region of Muslim Mindanao(ARMM) are both located far from the capital and have cities (Table 15.2).

As some cities were created before the enactment of the Local Government Code, some did not satisfy the population requirement. For comparison, cities were grouped according to population size: small (<150,000), medium (151,000–200,000), and large (≥201,000). Based on the graph below, large cities are concentrated within three adjacent regions of NCR, Region 3 (Central Luzon), and Region 4A (CALABARZON), while many of the small cities are located in Region 6 (Western Visayas) and Region 7 (Central Visayas).

Four distinct patterns can be observed based on the classification of cities according to size: big city regions, small city regions, and primary city regions. All of the 16 cities in NCR, except San Juan, are considered large, with Quezon City as the biggest city with a population of 2.8 million. The majority of the cities in Region 3 and Region 4A are comparatively larger than other regions in the country. San Jose del Monte is the biggest in terms of population, with 454,553 residents in Region 3. On the other hand, Palayan City in Nueva Ecija is the smallest, with 37,219 residents. This figure is smaller than the present population requirement for cityhood. Antipolo is the biggest, with 677, 741 residents in Region 4, while Tagaytay is the smallest, with only 62,030 residents. While these two regions have similar city system patterns, their economic structures differ slightly. These regions are the second and third largest regional economies. Region 4A relies primarily on the industry sector, while Region 3 is mainly based on both industry and services and still sources 16.8 % of its regional output from agriculture (Tables 15.3, Fig. 15.2).

Regions 6 and 7 can be considered small city regions, as the majority of the cities have a population of <150,000. Bacolod and Iloilo are the only two large cities in Region 6, while the rest are small and Carlota is the smallest at 63, 852 inhabitants. On other hand, Region 7 has four large cities, all of which are located in Cebu Province: Cebu City, Lapu-Lapu, Mandaue, and Talisay. However, ten of the 16 cities have a population <150,000, with Canlaon as the smallest with 50,627 inhabitants. In terms of economic structure, these two regions are quite different. Region 6 is the fifth biggest economy, and Region 7 is the fourth largest economy. While both regions are primarily based on the services sector, Region 7 sources 37 % of its output from the industry sector, more than double that of Region 6, at 18 % (Fig. 15.3).

Meanwhile, a number of regions fall under the category of primary cities, wherein one or two cities are considerably larger than the rest within the region: Zamboanga city in Region 9, Cagayan de Oro in Region 10, Davao city in Region 11, General Santos in Region 12. Interestingly, these regions also exhibited similar economic structures. The services sector accounts for 39–45 % of total regional output, and the industry sector contributes 28–39 %. . Region 11 is the only region with more than 50 % of its output coming from the services sector (Fig. 15.4).

Table 15.3 Regions and city sizes

Regions	Land Area	GRDP (%)	GRDP Per capita	City size			
				Small	Medium	Large	Total
NCR	636	35.73	183.75	1		15	16
CAR	84	2.2	73.57	1		1	
R1 – Ilocos	12,840	3.07	39.81	7	2		9
R3 – Central Luzon	21,470	9.21	55.07	5	1	8	14
R4A – Calabarzon	16,229	17.39	82.39	4	1	13	18
R5 – Bicol	17,632	1.97	22.31	3	3		
R6 – Western Visayas	20,223	4.11	35.56	10	4	2	16
R7 – Central Visayas	14,891	6.3	56.51	11	1	4	16
R8 – Eastern Visayas	21,432	2.29	34.31	4	2	1	7
R9 – Zamboanga Region	15,997	2.09	37.28	3	1	1	5
R10 – Northern Mindanao	14,056	3.8	53.63	5	2	2	9
R11 – Davao Region	27,141	3.84	52.2	3	1	2	6
R12 – SOCCKSARAGEN	14,373	2.73	40.04	2	1	2	5
CARAGA	18,847	1.23	30.95	5	0	1	6
ARMM	11,608	0.76	14.32	2			

Source: National Statistical Office (NSO)

Land area (km^2), population (2007) in thousands, GRDP (2012), GRDP per capita (2012) in thousand pesos
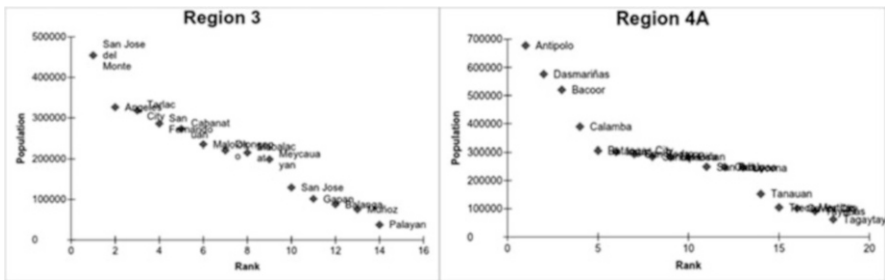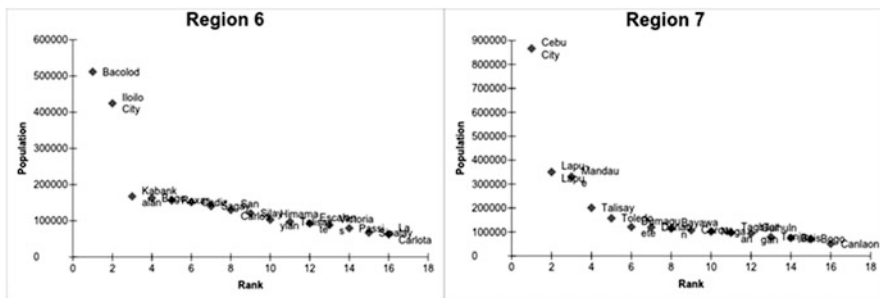

Fig. 15.2 Big city regions
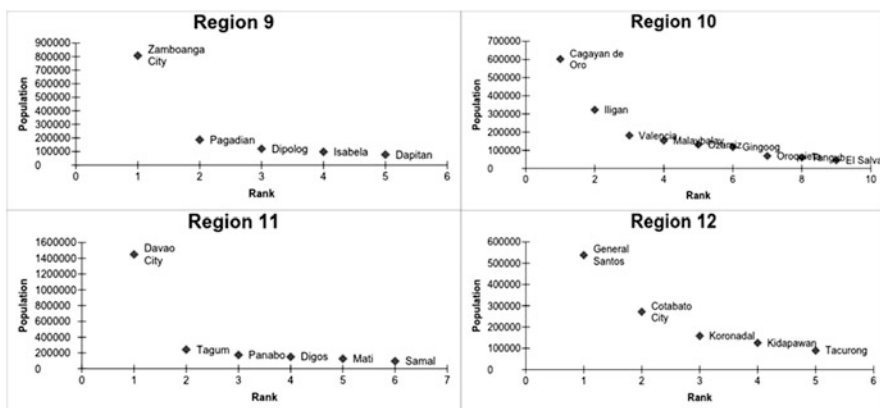
Fig. 15.3 Small city regions

Fig. 15.4 Primary city regions

3   Davao City: Background Information

3.1   Facts and Figures

Davao City is located in Southeastern Mindanao and has a total land area of 2,444 km^2, making it the biggest city in the Philippines and in the world (Mercado 1998). It is divided into three congressional districts, and further divided into 11 administrative districts governing 182 component barangays. Around 70 % of the land area is dedicated to agricultural use, 15 % for settlement and industrial use, and 18 % for forest and conservation. It has a mild climate and fertile soil, which is favorable for the production of many agricultural crops such as banana, coconut, grains, fruits, and coffee.

Davao has a population of 1.45 million, which makes it the most populous city in the Mindanao. Population has continuously increased, with an average annual growth rate of 2.5–3.0 % from 1995 to 2007, higher than the national rate of 2.0 %. Approximately 53 % of the total population is in their working years, with around

94 % employed and 6.1 % unemployed. Approximately half of the population is of Cebuano and Bisaya origin, but the city is also a melting pot of various native tribes such as Bagobo, Mandaya, Manobo, Tiboli, Mansak, and the B'laan, as well as migrants from within and outside the archipelago.

Davao city is considered an economic center of Mindanao. Its economy has continuously grown at almost 7 % as at 2013. Although agriculture remains the top contributor in economic production, it has declined in recent years to –8.0 %. The top agricultural produce includes banana, coconut products, and fresh/dried pineapple. On the other hand, the industrial sector experienced a remarkable 16.2 % increase in 2013. Industrial activities include the manufacture of industrial goods, gifts, toys, household goods, and furniture; food processing; and metalwork. The services sector is also growing, at 6.6 % in 2013, as the number of business processing outsourcing (BPOs) investments started to relocate to the city. The tourism sector also registered significant growth with an increasing number of tourists; as at 2013, a total of 1.4 million tourists visited the city.

Davao city is widely recognized as one of the most livable cities in the Philippines and Asia. The city has consistently appeared in the Top 40 Best Cities in the survey conducted by Asiaweek. The average annual family income in 2009 was 166,000 pesos, the highest within the Davao Region, although lower than the national average. The poverty rate of 13.20 % is the lowest, not only within the Davao Region but also within the whole island of Mindanao. The literacy rate is high, at 98.70 %. Access to clean water and sanitary toilets is relatively good, at 98.65 and 88.6 %, respectively. The crime rate is relatively low, at 5 % per 10,000 population. The website Numbeo. com ranks the city of Davao as the fourth safest place in the world (Table 15.4).

3.2 History

Like the rest of Mindanao Island, Davao remained relatively autonomous from the Spanish rule until the late nineteenth century, primarily due to the dominance of Moro tribes on the island. The Spanish attempted to conquer the Davao Gulf in 1848, and the settlement was named Nueva Vergara but was later changed to Davao, a phonetic blending of Bagobo subgroup names for the river. The town evolved into a new growth center with the arrival of American rule in 1898, as they introduced new farming and plantation practices. With the vast uncultivated lands and lack of labor, worker migration from Luzon and Visayas as well as from Japan, many of whom were former workers in Baguio, Benguet road construction, was encouraged. These Japanese became land owners themselves and contributed to the development of large-scale plantations of abaca, copra, and lumber (ILO 2010). This expansion in agricultural cultivation established the significance of Davao to the country's economy and foreign trade.

Despite protest from the nationalist leaders against Japanese political and economic dominance in Davao, the Japanese population increased substantially from 1903 to1925. Davao was inaugurated as a city in 1937 under the Commonwealth Act No. 51, or the Charter of the City of Davao. The city began with 244,000 ha of

Table 15.4 Davao City facts and figures

Davao City	
Land area	2,444 km^2
Administrative subdivisions	3 congressional districts, 11 administrative districts, 182 component barangays
Demography	
Population (2010)	1.47 million
Population density (2010)	600 km^2
Working age population (2010)	0.78 million
Employment rate (2013)	94 %
Unemployment rate (2013)	6 %
Economic indicators	
GRDP (2013)	258,485, 862 (in thousand pesos, 2000 constant prices)
Per capita GRDP (2013)	54,359 (2000 constant prices)
GRDP growth rate (2013)	6.80 %
Agricultural growth rate (2013)	−8.00 %
Industry sector growth rate (2013)	16.20 %
Services growth rate (2013)	6.6
Investments (2013)	203,040.25 million pesos
Exports (2013)	1,616.87 million dollars
Imports (2013)	1,154.26 million dollars
Balance of trade (2013)	462.61 million dollars
Top exports	Banana, coconut oil, fresh/dried/canned pineapple, banana chips, dessicated coconut
Top imports	Mineral fuels, oils, waxes, machinery, fertilizers, chemical products, cereals
Tourist arrivals (2013)	1.4 million
Social indicators	
Annual family income (2009)	166,000 pesos
Poverty incidence rate	13.20 %
Literacy rate	98.70 %
Household with access to potable water	98.65
Household with sanitary toilets	88.6
Average monthly crime rate per 10,000	5.00 %

Sources: http://www.davaocity.gov.ph

territory and a population of 68,000 in 1937. WWII inflicted considerable damage to the city but it was able to successfully recover with the rebuilding efforts of the US army and President Roxas' endeavor to attract more veteran settlers and investors through the redistribution of land previously owned and left behind by the Japanese. Agricultural cultivation shifted from abaca to new produce such as logs, lumber, copra, and banana.   In 1967, Davao province was divided into three provinces: Davao del Sur, Davao del Norte, and Davao Oriental. It should be noted that, while Davao city is located inside Davao del Sur, it is autonomous from the provincial government.

Table 15.5 Davao city awards and citations

Most Livable City
Top 40 Best Cities in Asia by Asiaweek in 1996–1999
Top 25 Best Practices in the Philippines by League of Cities for the Integrated Emergency Response System, a fully computerized response system linking the people of the city to the emergency resources of the government
First runner-up Clean and Greenest Highly Urbanized City in the Philippines Gawad Pangulo sa Kapaligiran Awards 2004, second runner up in 2001–2003
World Member of Clean Cities Coalition
Most Child-Friendly City in the Philippines in 1988 and 1999 due to the landmark legislation, Davao City Children's Welfare Code of 1994
Gawad Galing Pook 2004 Awardee for Gender Responsive LGU
National Commission on the Rights for Women (NCRFW) Award for Gender-Responsive Local Governance
Hall of Fame in Best Peace and Order Council in 2004 for winning Best Peace and Order Council for 3 consecutive years.
Most Outstanding Local Government Unit in the 2005 National Literacy Awards by Department of Education
2004 Regional Green Banner by the National Nutrition Council for the exemplary performance in nutrition program and nutritional status of the constituents. Clean Land for Big Cities in 2014 by ASEAN
Most Competitive City
Most Competitive City to Do Business in 2004 by the Asian Institute of Management Policy Center
Third Most Competitive Metro City in the Philippine Cities Ranking
Top Government Withholding Agent by Department of Finance and Bureau of Internal Revenue
Most Outstanding Chamber Award for 2005
Best Chamber in Asia-Pacific Region in 2005
IBM Smart City

Source: www.davaocity.gov.ph

Davao City spiraled into unrest and economic decline during the Martial Law Period due to the prominence of armed insurgent groups who often collected revolutionary taxes from businesses and individuals. Peace and order was restored and the economy was subsequently revitalized when mayor Rodrigo Duterte took office in 1988. Under Duterte's administration, Davao city evolved into one of the most competitive and livable cities, not only in the Philippines but also in Asia. It has garnered numerous awards and citations from different organizations and award-giving bodies (Table 15.5).

4   Davao City: Globalization and Decentralization

Globalization and localization are seen as mutually enforcing mechanisms from the viewpoint of local development. Over past years, we have seen increased movement of goods and people, processes primarily driven by transnational corporations

(TNCs). Although cost saving is the main determinant for TNCs in relocating their activities, the socioeconomic condition and business regulations of the potential locations matter significantly. In this case, to attract these international investments, local governments must improve local conditions and offer various incentive schemes.

When Duterte came into power in the late 1980s, he was well aware that the city was facing serious problems. The city's economy had deteriorated, budding industrial activities had been stalled, and the factories had moved to other countries like China, primarily due to the insurgencies that had undermined peace and order in the city. Thus, one of his earliest actions was to restore peace, order, and safety with the aim of revitalizing the local economy (ILO 2010).

Duterte's administration coincided with the passing of the Republic Act 7160, or the Local Government Code Act of 1991. The code devolves responsibility in delivering basic social services to the local government units under the assumption that due to proximity and familiarity, these local officials are well informed in managing the welfare of their constituencies. The code also aims to improve fiscal conditions of the local government units through the increased share of 40 % of the national revenue and expansion of the tax base, particularly for cities. With increased power and autonomy under the decentralization, Duterte's administration instituted various innovative local legislation and development programs.

In recognition of the presence of various ethnic groups within the city, Duterte established satellite offices and appointed Muslim or tribal leaders as deputy mayors since they are considered to more knowledgeable about the issues and concerns of their constituencies. Duterte also reorganized the city into 11 administrative groups with the aim of delivering development programs tailored according to the various needs of local constituencies, even before the enactment of the Local Government Code.

Under the general welfare provision of the Local Government Code, further reorganization was undertaken and multi-sector-based forums for planning, financing, implementing, and accounting within local development work at the city and barangay levels were established. Duterte administration also formulated the City Comprehensive Development Plan of 1996–2021 in the early 1990s. This development plan has been the basis of many long-term development programs and projects regarding urbanization, sustainability, and environmental management. The ultimate goal of this plan is to establish Davao as the leading socioeconomic and tourism area in Mindanao (Adriano 2014).

To improve social conditions, landmark legislations were implemented by the city government. The Children's Welfare Code of 1995 proposed initiatives empowering children aged 1–17 years and protecting them from any form of abuse during their development. The Women's Development Code of 1995 was ground-breaking legislation in gender and development and upholds the rights of women and recognizes them as full and equal partners of men in development and nation building. The Water Code of 2001 is considered landmark environmental legislation as it identifies and declares certain areas within the city as aquifers and water resource areas. The Shelter Code of 2007 is the country's first local

government-initiated shelter code and addresses the issue of informal settlers and squatting in public and private lands.

To revitalize the local economy, the city government ventured into Invest in Davao Project and implemented the Davao City Investment Incentive Code of 1995. These programs were considered pioneering as they were the first known initiatives from local government that offered incentives over and above the Philippines Omnibus Incentive Code of 1987 (ILO 2010). To avail themselves of these local incentives, the enterprise must satisfy the following requirements: minimum capitalization of at least 1 million pesos and an ability to generate employment for at least ten people from Davao City. In return, the enterprises were granted the following incentives: 3-year exemption from payment of local fees and charges, including mayor's permit, building permit fees, and other charges following the placement of investment; and 2-year exemption from payment of basic real property taxes. These initiatives generated 5 billion pesos worth of investment in 1995.

The Brunei Indonesia Malaysia Philippines East ASEAN Growth Area (BIMP-EAGA), a sub-regional economic cooperation initiative, was formed in Davao city in 1994. Davao city is identified as a priority investment area in this economic bloc (NEDA 2009). These investment initiatives were amended and replaced after the 1997 financial crisis. In particular, the business groups were incorporated with six slots in the newly created Investment Incentive Board. Thereafter, the private sector became more active in the development programs and one of their prominent contributions was the Davao product branding system in 2006. The branding system aims to recognize the excellence of products from Davao and encourage local producers to further improve the quality and excellence of their products.

The Davao city government currently continues to walk towards the path of sustainable development and has implemented various legislation and programs under six main development themes: Peace and Security; Disaster Risk Reduction and Climate Change Adaptation; Social Development, Environment Protection and conservation of the city's Watersheds; Environment-Ecological Waste Management; Support to Private Sector Initiatives in Business and Economic Activity; and Good Governance and Sound Fiscal Management. The Davao City government identifies the following industries as the priority investment areas and offers various fiscal and non-fiscal incentives to potential investors (http://www.davaocity.gov.ph/davao/investment.aspx).

1. Property development such as development of industrial estates, convention centers, residential, commercial, and office building development.
2. Tourism and recreational facilities such as business hotels, restaurants, beach and mountain resorts, and theme parks.
3. Agro-business and food processing such as but not limited to fruit processing (vacuum, dehydrated, spray dried), canned specialty vegetables, extruded snack food, cupflower production.
4. Light manufacturing and assembly such as but not limited to garments, footwear, toys, bulky kitchen and housewares.

5. Trans-shipment infrastructure/facilities such as seaport construction and common bonded warehousing.
6. The establishment of environmental enhancement and protection projects.
7. The establishment of foreign bank branches.
8. Telecommunications (including information and communications technology [ICT]).
9. Educational, medical, training, and sports facilities.

In sum, the city has evolved to its present-day competitive and livable status as a result of innovative development strategies of the local government and greater authority under decentralization. The city was able to revitalize its economy and manage the challenges of globalization through ground-breaking development strategies. The local government was successful in creating an excellent socioeconomic environment that enables productive investments and enterprises.

5   Conclusion

The shift to economic liberalization and decentralization has paved the way for the creation of additional cities in the Philippines. From 18 cities during the post-war period, the number of cities has grown to 144 at present times. The growth in the number of the cities occurs together with the shift of the population towards urban areas. The big cities are clustered within the capital region and its neighboring regions, while small cities are often found in areas far from the capital. Primacy of one or two cities persists in many regions. Experiences in Davao city demonstrate the importance of a local government that can create an environment suitable for businesses and environment, and, at the same time, an environment with high social standards for its constituents. Local government's development plans and programs are considered innovative and based on the long term. Despite attaining highly competitive and livability status, Davao city still continues various efforts to achieve sustainable growth and development.

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Chapter 16
Significance of Constructing City Systems in Regional Policy

Toshiharu Ishikawa and Rickard Wall

Abstract City systems are closely related to economic and social performance achieved in a region. The city system provides important information to firms that are selecting a region in a country in which to build their new factories. While constructing an appropriate city system in a region contributes to the development of a healthy regional economy, the city system is considered an important location factor for both firms and administrations. Based on empirical studies in Japan and Sweden, this chapter clarifies that the city system reflects the economic and social performance of a region, and that this system plays a role not only in firm's location selections but also in the location policies of regional governments.

Keywords City system • Regional performance • Location factor • Location policy

1 Introduction

This chapter shows that the city system in a region is a location factor for attracting firms to a region. Because the city system reflects economic and social performance achieved in the region, it provides important information to firms when they select a region in a country in which to establish their new factories. In addition, constructing an appropriate city system in a region contributes to improvement of its regional economy. Thus, the city system can be considered an important location factor in regional government's policy making for economic development.

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2   Numerical Index of City System Structure

To compare city systems with regional performance, it is necessary to represent the characteristics of the city system numerically. The City System Index (CSI) was devised and is used to reveal characteristics of city systems. It captures the characteristics of a city system from two viewpoints: the distribution of city population and the distribution of cities in a region. The CSI describes these features of city systems.

2.1   *Divergence of City Population Distribution to the Largest City*

First, the coefficient of the divergence (CD) is devised to build the index. The CD indicates the divergence toward the primary city of the population distribution of the cities that form a city system. The CD is based on the framework shown by Sheppard (1982) and is derived as follows (Sheppard 1982).

Assuming there are N cities in a region, let p_r denote the population share of a city for all cities' population in the region; Eq. 16.1 is established,

$$1 = \sum_{r=1}^{N} p_r \tag{16.1}$$

If there is no a priori information on the cities, it is rational to infer that every city has the same share, $p_r = 1/N$. This inference is given by maximizing Eq. 16.2 in the subject to the Eq. 16.1,

$$H = -\sum_{r=1}^{N} p_r L_N(P_r) \tag{16.2}$$

In the real world, there is always a priori information on the cities. Let r indicate the rank of a city according to its population, and multiplying the value of $\log_e(r)$ by its share as a weight and summing up these values. Dividing it by N gives Eq. 16.3. The value of CD obtained by Eq. 16.3 is considered the CD of the population distribution to the primary city in the region.

$$\mathrm{CD} = (1/N) \sum_{r=1}^{N} p_r L_N(r) \tag{16.3}$$

CD is used as the index that indicates a characteristic of the distribution of cities' population in a city system. As the distribution of cities' populations diverges more to the largest city of the system, the value of CD lowers.

2.2   Spatial Convergence of City Distribution in a Region

It would be possible to capture the character of a city system from the viewpoint of the locations of the cities within the system; the spatial convergence of the cities' locations in a region. The spatial convergence of the cities' locations (SC) in a region is derived using Poisson distribution. Assume there are N_i ($i = 1, 2, 3\ldots N$) cities in a region, of which land area is M. The distance from a city N_1 to the nearest city is denoted as d_1. This distance is named as the least distance of the city N_1. The least distance is obtained for each of cities N_i ($i = 1, 2, 3\ldots N$); the average least distance (AD) of cities is derived as Eq. 16.4,

$$\text{AD} = (1/N)\sum_{i=1}^{N} d_i \tag{16.4}$$

The SC is expressed by Eq. 16.5,

$$\text{SC} = \text{AD}/\left(1/\left(2\,(N/M)^{0.5}\right)\right) \tag{16.5}$$

As the cities locate more closely each other, SC becomes smaller. The SC's value is used to specify a spatial characteristic of a city system.

2.3   Derivation of the City System Index

The values of both CD and SC become smaller as the divergence of the distribution of cities' populations to the largest city increases and the spatial convergence of cities distribution raises. Hence, combining these two values, an index can be built to reveal characteristics of a city system, the CSI, which is derived by Eq. 16.6,

$$\text{CSI} = \left((\alpha\text{CD})^2 + (\beta\text{SC})^2\right)^{0.5} \tag{16.6}$$

where α and β are positive parameters (Wall and Ishikawa 2011). When the value of the CSI is lower, it means that the structure of the city system has concentrating characteristics in terms of the cities' population distribution and the location of cities. On the other hand, a high CSI value means that the structure of the city system has leveling characteristics in terms of the cities' population distribution and the location of cities. In the rest of this paper, CSI is used as the index that indicates the characteristics of a city system.

3 Relationship Between the City System Index and Region's Performances

3.1 The Relationship Between the City System Index and Regional Performance in Japan

This section examines the relationship between the CSI and the performance of regions in Japan. Japan has 47 prefectures, and a city system is laid in each prefecture. Using Eq. 16.6, the CSI of each prefecture in 2011 can be derived from the data of all cities' population in 47 prefectures and the data of all cities' least distances for each prefecture in 2000 (since the distance is stable in the short term, the data for 2000 are used here). In the derivation of the CSI, the parameters in Eq. 16.6 are assumed as $\alpha = 20$, $\beta = 1$.

First, in order to examine the relationship between the CSI and the economic performance in each region, the gross regional product per capita (2011) of each region is obtained and standardized using Eq. 16.7 to a score (S), which shows the economic performance achieved in a prefecture.

$$S_i = (X_i - \text{AVE})/\text{ST} \tag{16.7}$$

where X_i is the gross regional products per capita of a prefecture i; AVE is the mean value; ST is the standard deviation. Table 16.1 indicates the CSI and scores of 47 prefectures, and Fig. 16.1a shows the relationship between them.

As shown in Fig. 16.1a, there is a clear relationship between the structure of the city system laid in a prefecture and the economic performance achieved in the prefecture. As the city system has concentrating characteristics in terms of the cities' population distribution and the location of cities, its economic performance increases.

3.2 The Relationship Between City System Index and Economic Performance in Sweden

There are 20 counties with clear municipalities in Sweden. It may be said that a city system is laid in each county. Using Eq. 16.7, the CSI of each county in 2010 can be derived from the data of the municipalities' population and the data of the distances between the nearest municipalities. The distance between the largest business centers of the adjacent municipalities is used as a proxy for the value of the distance between municipalities. The same values in the examination of Japan are assigned to parameters, $\alpha = 20$, $\beta = 1$.

The CSI values of the counties in Sweden are shown in the first row in Table 16.2, and the score of gross regional product per capita (2010) achieved in each county is obtained using Eq. 8. They are indicated by the second row in

Table 16.1 City System Index (CSI) and score of gross regional products per capita in Japan

Prefecture	CSI	Score GRP	Prefecture	CSI	Score of GRP
Hokkaido	1.53	−0.5493	Mie	2.76	0.53751
Aomori	3.08	−0.5583	Shiga	2.56	1.20998
Iwaate	3.21	−1.0146	Kyoto	2.18	0.78969
Miyagi	2.29	−0.222	Osaka	1.49	0.98182
Akita	3.14	−0.5883	Hiyogo	2.23	0.08419
Yamagata	2.33	−0.9876	Nara	2.2	−0.4322
Fukushima	2.72	0.06618	Wakayama	4.37	−0.4742
Ibaraki	1.94	0.30334	Tottori	4.25	−1.0596
Tochigi	2.15	0.92178	Shimane	3.69	−0.8615
Gunma	2.56	−0.0509	Okayama	2.74	−0.0539
Saitama	1.57	0.9458	Hiroshima	2.58	0.39941
Chiba	2.09	1.0959	Yamaguchi	3.64	0.46846
Tokyo	1.18	4.068	Tokushima	4.09	0.11421
Kanagawa	1.81	1.60326	Kagawa	2.29	−0.0029
Niigata	2.13	−0.0689	Ehime	2.52	−0.6874
Toyama	1.95	0.25831	Kochi	3.72	−1.606
Ishikawa	3.5	0.05117	Fukuoka	1.73	0.22229
Fukui	3.06	0.33336	Sago	3.03	−0.8405
Yamanashi	2.33	−0.0299	Nagasaki	2.83	−1.1917
Nagano	2.31	0.44744	Kumamoto	2.98	−1.1077
Gifu	2.36	−0.0959	Oita	3.19	−0.7864
Shizuoka	2.26	1.12292	Miyazaki	3.33	−1.4529
Aichi	1.56	1.25501	Kagoshima	2.88	−1.0356
			Okinawa	2.42	−1.5219

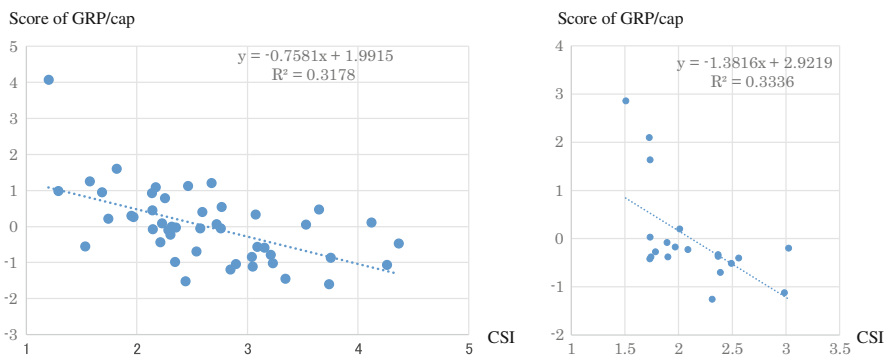*Source*: Toyo Keizai Shinposha, Data Book (2013)

Fig. 16.1 (**a**) The relationship between City System Index (CSI) and score of gross regional products per capita of prefectures in Japan (2011). (**b**) The relationship between CSI and gross regional products per capita of county in Sweden (2010) (*Source*: Statistics Sweden, http://www.scb.se)

Table 16.2 The relationship between City System Index (CSI) and score of gross regional products per capita in Sweden (2010)

County	CSI	Score GRP	County	CSI	Score GRP
Stockholm	1.51	2.86165	Vastra Gotaland	1.73	2.10073
Uppsala	1.89	−0.08303	Varmland	1.9	−0.37842
Sodermanland	2.56	−0.40484	Orebro	1.78	−0.27451
Ostergotland	2.01	0.19883	Vastmanland	1.73	−0.41967
Jonkoping	1.73	0.03335	Dalarna	2.09	−0.22834
Kronoberg	2.39	−0.69887	Gavleborg	2.37	−0.33417
Kalmar	2.49	−0.5156	Vasternorrland	2.37	−0.36556
Blekinge	2.98	−1.12281	Jamtland	2.31	−1.25872
Skane	1.73	1.63822	Vasterbotten	1.74	−0.37757
Halland	3.02	−0.19561	Norrbotten	1.97	−0.17439

Source: Statistics Sweden, http://www.scb.se

Table 16.2. The relationship between the CSI and the score of gross regional product per capita achieved in counties is illustrated in Fig. 16.1b.

As illustrated in Fig. 16.1b, there is a clear relationship between the structure of the city system and economic performance achieved in each county in Sweden. As a city system has concentrating characteristics, the county's economic performance increases. A comparison of Fig. 16.1a, b shows that Japan and Sweden have the same characteristics in the relationship between the CSI and the score of the gross regional product achieved in a region.

3.3 Relationship Between City System Index and Social Performance in Japan and Sweden

Using Japanese and Swedish data, this subsection examines the relationship between the CSI and social performance achieved in regions. For this examination, the analysis selects the number of doctors in general hospitals in regions in Japan and Sweden.

Figure 16.2a shows the relationship between the CSI and the score for the number of doctors in general hospitals (2010) for each prefecture in Japan. It could be said that as the structure of the city system in a prefecture has a tendency of leveling, the score of the prefecture tends to be high.

Figure 16.2b shows the relationship between the CSI and the score of the number of doctors in general hospitals (2008) for each county in Sweden. As shown in Fig. 16.2b, while the score is lower, the structure of the city system becomes leveling. However, it seems that the score reaches the bottom around a CSI of 2.5. Comparing Fig. 16.2a, b shows that Japan and Sweden may have different relationships between the CSI and the score of doctors in general hospitals.
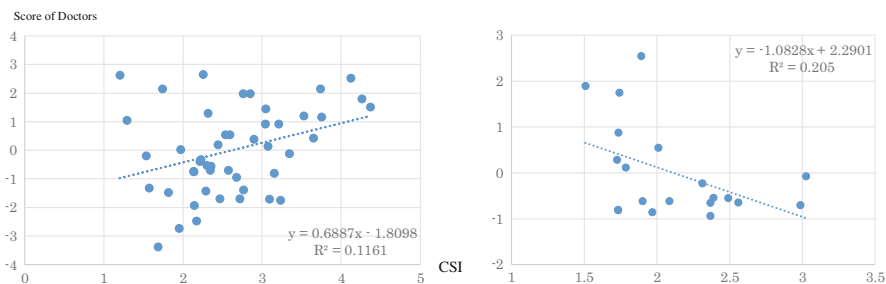
Fig. 16.2 (**a**) The relationship between City System Index (CSI) and score of doctors in Japan (*Source:* Toyo Keizai Shinposha (2013) Data Book). (**b**) The relationship between CSI and score of doctors in Sweden (*Source:* Statistics Sweden, http://www.scb.se)

4 City System as a Location Factor Attracting Factories to a Region

Based on the above analysis of the relationships between the CSI and performances achieved in region, firms may pay attention to the structure of the city systems laid in regions when firms select a region in a country for factory's location. If some firms make much of the production efficiency of the factory, they may select a region in which the city system has converging characteristics. On the other hand, if other firms consider the region's health and medical care level to be the most important factor in the selection of a region, they would select the region of which the city system has characteristic of relatively leveling.

The city system can be considered an important location factor for firms selecting a region for a factory. The city system is an important element for the locational policy of a regional government that plans to attract firms to the area to sustainably develop the regional economy. In order to attract appropriate firms to the region, the regional governments should form the appropriate city system as well as individual cities.

5 Concluding Remarks

When activities of a manufacturing firm are expanding to cover different countries and several regions and new factories are being built, manufacturers are forced to pay attention to various location factors (corporate tax rates, interest rates, infrastructure). The industrial organization of countries has come to be recognized as a location factor by manufacturers. This article explains that the city systems laid in regions are related to the economic and social performances achieved in regions,

and the relationship between them differs between counties.[1] Firms planning a new factory should consider the characteristics of the city systems in regions when selecting a region in the selected country for a new factory.[2]

While, regional governments induce factories from other countries and regions to their own regions, the governments select the factories that are suitable to the characteristics of the region. If a regional government has a strong intention to attract factories that attach great importance to production quantity, the city system of the regions is expected to be converged in terms of the cities' population distribution and cities' location in the region. The governments' policy should be to construct a high-density city system.

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[1] The economic performances of regions in Japan and Sweden are examined by Wall and Ishikawa (2011). They show a mechanism in which the distributions of the manufacturing and the retailing activities change due to economic globalization (2011).

[2] The importance of the city system in regional economy is clearly shown by Capello (2007).