Zhao Chen · Ming Lu

Toward Balanced Growth with Economic Agglomeration

Empirical Studies of China's Urban-Rural and Interregional Development

北京大学出版社
PEKING UNIVERSITY PRESS

Springer

Toward Balanced Growth with Economic Agglomeration

Zhao Chen · Ming Lu

Toward Balanced Growth with Economic Agglomeration

Empirical Studies of China's Urban-Rural and Interregional Development

北京大学出版社
PEKING UNIVERSITY PRESS

Springer

Zhao Chen
China Center for Economic Studies
Fudan University
Shanghai
China

Ming Lu
Antai College of Economics
and Management
Shanghai Jiaotong University
Shanghai
China

ISBN 978-3-662-47411-2 ISBN 978-3-662-47412-9 (eBook)
DOI 10.1007/978-3-662-47412-9

Library of Congress Control Number: 2015941129

Springer Heidelberg New York Dordrecht London

Printed on acid-free paper

Springer-Verlag GmbH Berlin Heidelberg is part of Springer Science+Business Media (www.springer.com)

Contents

Chapter 1
Introduction

A great developing economy is rising on the Pacific west bank, which is undoubtedly the most important global economic event of the 21st century. The story of China's rising economy has evolved a specific historical background. The policy of economic opening-up, which originated in the late 1970s in Shenzhen, a small fishing village on the coast of South China, triggered China's economic transformation and integration into the global economy as a major developing country. After the international economic stagflation of the late 1970s and early 1980s, sources of competent, cheap labor were badly needed to restore global manufacturing, while international trade was dominated by ocean shipping, which contributed to the formation of industry clusters in the eastern coastal areas in China, where international capital and the country's cheap labor met together.

However, it is complicated to examine the urban, rural and regional development, since China is such a large developing country with economic transformation. "Transformation" indicates a lot of institutional change toward market economy, while "developing" denotes the transition from a traditional urban-rural and regional dual economy to a modern industrialized economy with fast speed of urbanization, and "large" means that the transformation of China's economy is inevitably stared from such an initial status with huge economic and social heterogeneity across the regions. Meanwhile, China's reform and opening up also meet the wave of globalization, that is to say, China's urban-rural and regional economic development must be discussed in the context of marketization, urbanization and globalization.

1.1 The Power of Space: Density, Distance and Division

There are three core questions about urban-rural and regional development in China. First, what is the optimal size for cities? This relates to following questions. How much population should mega city like Shanghai has? Should Chinese government relax control over the population size of big cities? What's the relationship between the development of large cities and small cities. Second, what is a reasonable urban system in China? Should China develop more metropolis eastern

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9_1

coastal areas or distributing big cities more evenly throughout the country. The question thus concerns policies of regional economic development. Third, how can China achieve balanced economic development with industrial agglomeration in eastern areas? This question relates to methods of narrowing the development gap between urban-rural areas and among regions while giving full play to the agglomeration effects of eastern coastal areas.

When discussing urban-rural and regional development in China, no one can afford to ignore the fact that these questions are also questions for the world. Scholars who participated in the World Bank research project came up with three similar questions involving economic growth at urban, regional and national levels.[1]

The first question is: "Why is Tokyo so big?" This is based on a wider question of what factors decide the optimal size for a city and how are we to understand the trend for ever-expanding metropolises in the world—e.g. Tokyo, Paris and Seoul. There are incisive historical lessons behind answers to the short question. The population of Tokyo once decreased over about 10 years, when city authorities implemented the Capital Function Dispersion Program because they were concerned about a tendency in its development history for the city to grow too much. At the time, Japan's economic growth had dropped to its lowest rate since the World War II. Scholars call this period "the lost decade". Similarly, the ever-expanding capital circle of Seoul caused much local discontent. Subsequently, the Roh Mu-Hyun government developed the Five-year Plan for Balanced National Development with a budget as high as RMB 820 billion. The plan included measures to restrict the building of new factories in the capital circle and encouraged the relocation of many enterprises. However, the result was that more people still flooded into the central area, the income gap between residents in the central circle and outlying districts widened, and only a few small and medium-sized enterprises (SMEs) were relocated to places near the capital area.[2] These lessons help us to understand the issue of urban development in China.

The second question is: "Why is Siberia underdeveloped?" Siberia is a vast region in Russia that is scarcely populated despite its abundant natural resources. The World Bank raised the question because Siberia is a highly representative case. Population and economic activities are "rare" in many places in the world that have rich natural resources and beautiful landscapes. However, this question raises the issues of how to achieve balanced development among internal regions in one country. In China, to answer the question of how to realize balanced development among regions with great differences in geography, resources, history and other conditions, it is necessary first to find out the reasons for unbalanced inter-regional development around the world.

The third question is: "Why is African so poor?" There are many poor countries in Africa, so what is the economic law behind this? Neoclassical growth theory predicts the convergence of underdeveloped and developed countries under the

[1]See *World Development Report* 2009.

[2]Expanding Capital Circle Discontents Local Korean Governments. Global Times. April 15, 2008.

condition of free factor mobility. However, it seems that such a situation has not happened in reality. Instead, globalization shows us a world of ever-increasing polarization. New growth theories argue that the speed of innovation in developed countries outpaces the speed of learning in developing countries. These theories fail to convincingly explain why some underdeveloped countries or specific regions in underdeveloped countries economically catch up with developed countries, while others remain backward. This question actually concerns the association of economic development among countries in the face of today's increasingly globalized economy. Some less developed inland provinces in China equate to a developing country in terms of area, population and economic activities, so does this mean that it will always be difficult for those inland provinces to catch up as seems to be the case with other economically backward countries and regions around the world?

The answers to these three questions may be summarized by the "3D" law[3] in spatial economic development, namely population movement to places with higher density (Density), shortening distance (Distance) and continuous division (Division) among countries.

The first "D" reflects the importance of the effects of agglomeration and scale economy in economic activities. Economic activities are more concentrated in cities where scale economy is obvious, so developing countries must first develop cities rather than rural areas if they are to achieve faster development. However, this does not mean they should not bother to develop rural areas. On the contrary, rural development is driven by urban development, and urbanization enables more rural residents to share the benefits of economic growth in the cities. The basic conclusion of research into poverty alleviation is that sustainable economic growth is a fundamental driving force in alleviating poverty. If that is the case, economic growth and immigration due to urbanization in developing countries are the most important factors for eradicating poverty.

The second "D" indicates that regions in one country become "closer" to each other with shortening time distances due to improvements in transport infrastructure and this is also true for different countries because of global economic integration. The shortening distance and decreasing transportation costs further spatially separate producers and consumers and intensify economic agglomeration.

Consequently, regions with economic agglomeration may achieve faster economic growth. This can help us understand the relationship between economic agglomeration and balanced development among regions in China. Economic agglomeration widens inter-regional gaps in the short term, but free factor mobility will enable backward regions to share the benefits of scale economy in developed regions and inter-regional gaps will eventually tend to converge as long as the effect of agglomeration will finally become diminishing. On one hand, per capita land and other natural resources of inland residents will keep increasing during the process of labor outflow toward costal regions, while, on the other hand, interregional balance

[3]The "3D" theory originates from the speech delivered by Indermit Gill at the World Bank Conference on the World Development Report 2009.

will occur when "crowding effects" such as congestion, environmental destruction and rising land price in the coastal areas overwhelm the agglomeration effect. However, by then, such "balance" must be understood as balance in life quality rather than equality in level of economic activities. Meanwhile, because of agglomeration effect of costal regions, the central government are more able to make fiscal transfers to backward regions. The current situation shows that the development gap among regions in China has continued to widen, which is attributed to the fact that the effects of agglomeration in eastern areas have not yet fully played out, to the failure to achieve a fully free factor mobility between urban and rural areas and among regions, and, in particular, to restrictions on the low-skilled labor mobility due to the *Hukou* system. Consequently, inland residents have not yet been able to fully share the benefits of economic agglomeration in the coastal areas.

The third "D" predicts that the development gap among countries will always exist. Why will the development gap among regions in one country finally converge while the division among countries will always exist? There are two reasons. First, factors may freely flow within one country, but inter-country barriers for low-skilled labor flow always exist. If high-skilled labor in a poor country flows to developed countries because they believe "man struggles upwards", it will be naturally more difficult for poor countries to catch up with developed countries. For instance, rapid development of the high-tech industry in the United States was to large extent due to contributions made by numerous high-skilled migrants, resulting in a brain drain in underdeveloped countries. Second, fiscal transfer policies by central governments enable backward regions to share the benefits of economic agglomeration in developed regions, while there is hardly any international organization trying to balance inter-country gaps. That is to say, balanced development between urban and rural areas and among regions will be expected in the future if regional Chinese administrative authorities are mutually integrated in economic activities. On the contrary, the sustained inter-country division will be duplicated between urban and rural areas and among regions in China if regional administrative authorities are economically divided and, in particular, factor mobility is not realized. This is a potential key problem behind China's rapid economic growth that restricts long-term economic and social development and on which we must keep a watchful eye when we try to build a harmonious society.

Next, China's urban-rural and regional development will be discussed in the dynamic process of the reform and opening-up.

1.2 Understanding Urban-Rural and Regional Development in China

Urban-rural and regional development in China has occurred during the process of globalization, marketization and urbanization. The logic of this book is shown by Fig. 1.1, which briefly tells the story of urban-rural and regional development in

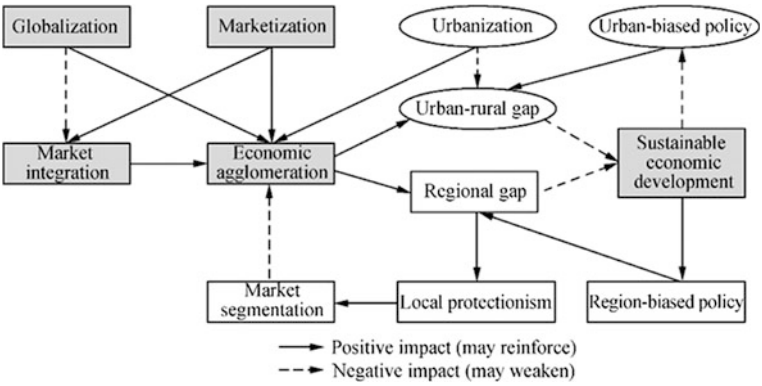

Fig. 1.1 Urban-rural and regional development since the reform and opening-up

China since the reform and opening-up and also covers relevant issues. The figure indicates that economic agglomeration is crucial in understanding urban-rural and regional development in China since the reform and opening-up.

The four gray blocks in left side of Fig. 1.1 describe the roles played by the reform and opening-up in economic agglomeration, if we use "marketization" and "globalization" to represent the process of the reform and opening-up. Economic agglomeration is a direct result of marketization and globalization. Marketization has changed plan-commanded factor allocation under a traditional planned economy to enhance factor mobility and improve efficiency in factor allocation. How did factors flow during globalization? Due to preferential policies in the early years of the reform and opening-up as well as geographical advantages with major ports in international trade, coastal areas especially the Yangtze and Pearl River Deltas became centers of economic agglomeration during globalization, where international capital met Chinese domestic surplus labor. As stated in the beginning of this book, international industrial capital and cheap labor from inland and rural areas in China have come together in the country's coastal areas.

Meanwhile, marketization and globalization have indirectly contributed to economic agglomeration by promoting market integration. Marketization has for a long time reduced interventions into economic activities by local governments, which therefore find it more difficult to practice local protectionism of market segmentation. At the same time, the private economy has grown rapidly under the process of marketization, becoming an important force in breaking market segmentation across regions. Relatively speaking, globalization is a double-edged sword for market integration. On one hand, domestic market segmentation to some extent does little harm to the economy as long as China is fully involved in the international division of labor. So China's local governments generally adopted the strategy of "opening-up and domestic segmentation" in the early years of reform. On the other hand, when it reaches a certain level economic opening-up eventually imposes higher requirements for the integration of domestic resources and thus

becomes a driving force behind domestic marketization. Market integration has reallocated production factors across regions and gradually reinforced economic agglomeration. Moreover, urbanization in China's economic development has also driven the flow of workers from rural to urban areas and concentrated economic activities in urban areas.

So far we can see that economic agglomeration in urban and eastern coastal areas reinforces during globalization, marketization and urbanization. Meanwhile, urban-rural and regional gaps are widening during the same period.

In China, urban-biased and region-biased policies have been important forces in widening urban-rural and regional gaps since the reform and opening-up. The three ellipses in Fig. 1.1 demonstrate the impact of urbanization on urban-rural gaps under urban-biased policy. Urbanization helps to consolidate economic agglomeration in cities and thus plays a role in widening the gap between urban and rural areas. Meanwhile, urbanization will eventually benefit rural residents and narrow the urban-rural gap as long as they can adequately share in the fruits of the economic growth due to urbanization. Our studies have found that urbanization indeed has the net effect of narrowing the urban-rural income gap, while urban-biased policies directly widens that gap (Lu and Chen 2004, 2006; Lu et al. 2005; Wan et al. 2006; Chap. 6 of this book). As cities has accumulated more capital since the reform and opening-up, more rural workers are needed, and therefore cities have relaxed control over the inflow of rural workers. However, urban-rural policies are unilaterally developed and executed by city governments and thus primarily aim to benefit the urban-registered population or people with local hukou. The flow of rural labor is still controlled by the city and those workers do not enjoy the same access to urban public services as urban residents. Access to social security, children's education and other public services, which all relate to urban *hokou*, has become an important means for cities to restrict the inflow of migrant rural workers. Because of the *hukou* barrier many rural residents are confined to rural areas with lower agricultural productivity, which makes the lower reservation wage of rural-to-urban migrant workers. The gap between marginal output and real wages for rural workers in the city has been widening, although farmers have increased their income during urbanization under urban-biased policies, and consequently, ever-widening income gaps rather than equality in urban-rural wages are found in China (Chen and Lu 2008). That is to say, it is right to promote economic growth and alleviate poverty by means of urban development, but the key is to enable rural residents to fully share the benefits from urbanization through free labor mobility; otherwise the urban-rural gap will not be narrowed at all. The failure to enable rural residents to fully share the benefits of urbanization and economic development is an important reason behind the development predicament encountered by contemporary China.

Similarly, the four white blocks centering on economic agglomeration in the lower right corner of Fig. 1.1 represent the impacts of region-biased policies on regional gaps in China since reform and opening-up. From the perspective of regional development policy, policies of economic opening were first implemented in eastern coastal areas with geographical advantages mainly by establishing special

economic zones that enjoyed preferential policies. The Special Economic Zones, Open Coastal Cities, Open Coastal Economic Zones, National Economic and Technological Development Zones, and National High-tech Industry Development Zones that were established under the opening-up policy in the 1980s were located in eastern coastal areas. The policy bias accelerated the development of those eastern coastal areas and directly widened the development gap across regions. Local protection was an immediate consequence of the widening gap among regions. Backward regions invariably engage mostly in low value-added production and share few benefits of domestic trade. As a result, local governments in backward regions developed some strategic industries to improve their political performance and image and to increase distribution of benefits from domestic trade. Due to such kind of strategic behavior by local governments, new rounds of over-capacity and redundant construction occurs. These are accompanied by measures adopted by local governments to protect weak local industries (Lu et al. 2004, 2007; Lu and Chen 2006). In particular, local governments have desperately tried to increase financial resources by relying on the local economy after local financial power was downgraded following the tax sharing reform in 1994, which had adversely affected local protectionism.

Local protectionism cumbers economic agglomeration because of market segmentation. However, weakened economic agglomeration due to local protectionism has actually widend rather that narrowed the development gap across regions for following two reasons. First, backward regions develop industries in which they do not have comparative advantages for the purpose of seeking short-term local benefits. More protection means more losses of efficiency. Even those protectionist policies that are adopted for long-term strategic goals are somehow unilateral and invariably fail, though, of course, success is not impossible. Second, backward regions suffer more losses than developed regions when the effect of economic agglomeration fails to fully play its role because, as the economy opened to the rest of the world, developed coastal areas are more able to achieve rapid development by participating in the international markets (see Chap. 5).

Next, we seek to answer the question of whether it is possible to narrow the ever-widening development gap between urban and rural areas and among regions, which, however, is expected to be bridged as long as factors (low-skilled labor in particular) can fully flow. Theoretically, inland regions can share the benefits of economic agglomeration through factor flow and free labor mobility in particular. In addition, inland per capita resources will increase as the population concentrates in the eastern coastal areas because of the inland's immobile natural resources. This will lead to increases in inland per capita income. Finally, when returns from agglomeration effect become diminishing while crowding effects take place, consequently spreading effect from coastal to inland areas will narrow development gaps across regions. However, the reality in China is that labor, capital and other factors cannot fully flow between urban and rural areas or across regions due to urban-biased and region-biased policies. Therefore, the possibility of narrowing the ever-widening urban-rural and regional development gap depends on policies towards free factor mobility between urban and rural areas and across regions. It is

believed such a possibility exists in reality as long as China wants to achieve the goal of sustainable economic development shown in Fig. 1.1.

As more and more rural residents move to cities, the widening urban-rural gap will intensify internal social conflict in the cities, which might slow urban capital accumulation and damage the interests of local urban residents. Empirical studies in Chap. 6 find that the widening urban-rural gap will indeed exert a lasting adverse impact on economic growth by lowering investment levels. In other words, the increasing urban-rural gap will affect sustainable economic development in the cities, which will in turn encourage urban governments to ease urban-biased policies in consideration of sustainable urban development even they only care about the interests of residents with local hukou. The ever-expanding regional gap will harm sustainable economic development could also be recognized since local protectionism as a result of widening regional gaps will deter economic agglomeration. The central government has become aware of various problems caused by unbalanced regional development and adopted many policies—such as Development of Western Regions, Rise of Central Regions and Rejuvenation of Old Industrial Bases in Northeast China—in an effort to adjust original development policies that favored eastern coastal areas. The block in gray in the right of Fig. 1.1 and two vertical arrows depict the mechanism of changing urban-biased and region-biased policies for the sake of sustainable economic development. Urban-rural and regional development policy, economic growth as well as urban-rural and regional imbalance constitute two triangles in the right of Fig. 1.1. These two "developing triangles" specifically embody the path of economic development in contemporary China in urban-rural and regional dimensions (Lu et al. 2013).

1.3 Contents and Structure

How should we view the ever-widening urban-rural and regional development gap in China in the context of globalization? What is the layout of economic growth in China in urban-rural and regional dimensions? Is China likely to realize balanced urban-rural and regional development and in which way? All these are important questions to be answered for policy makers. This book tries to answer these questions by providing theoretical frameworks and empirical evidences.

Urban-rural and regional issues are always intertwined in China due to its vast territory. Urban-rural development in China is understood from a regional perspective and vice versa, and the core issue of urban-rural and regional development is cross-regional resource reallocation driven by the trends of globalization, marketization and urbanization and their influence on growth and inequality. This is the right way to understand the relationships between equality and efficiency as well as government and market in urban-rural and regional development.

Important links that involve urban-rural and regional development in China are associated by theoretical inference or empirical study based on Fig. 1.1. Theoretical studies correspondingly involved are not explored in detail in this book, which

focuses on empirical study. Readers who are interested in theoretical studies may refer to the authors' recent research such as findings that the regional development gap may lead to local protectionism in backward regions and thus aggravate market segmentation (Lu et al. 2004, 2007; Lu and Chen 2006), urbanization may widen the urban-rural income gap under unilaterally developed city-biased policies (Chen and Lu 2008), and the endogenous change of *hukou* system due to social conflicts with income gap in the city (Chen et al. 2013). The empirical studies will be introduced according to the organization of this book.

Chapters 2 and 3 present conclusive analyses on the trends, problems and countermeasures of urban-rural and regional development based on empirical facts. Regional development is discussed in Chap. 2, where the core question is how China should pursue reasonable city scale and layout. Blocks in gray and three ellipses in Fig. 1.1 demonstrate explorations of urban-rural issues in this book. The urban-rural issue in China comes into being in the context of globalization, marketization and urbanization and is closely related to city-biased policy. Although globalization and marketization drive economic agglomeration and bring about the urban-rural development gap, analysis in Chap. 2 indicates the efficiency of urbanization should be guaranteed by giving full play to city agglomeration, while lagged urbanization and insufficient agglomeration are attributed to segmented policies for urban and rural areas during the process of urbanization. A policy adjustment that can give full play to city agglomeration and narrow the urban-rural gap should reduce city-biased policies and create better conditions for free factor mobility, in particular the free mobility of low-skilled labor. Several misunderstandings concerning urbanization and regional development to be corrected by the government are also discussed in Chap. 2, where goals for future urban and regional development and specific directions of policy are also expounded.

Chapter 3 focuses on regional development, of which the core question is how China balances regional development during the process of economic agglomeration. The trend of industry agglomeration in the eastern coastal areas and the Yangtze and Pearl River Deltas since the reform and opening-up is examined in Chap. 3 from the perspective of space. Data from inter-provincial panels indicate that both urbanization and globalization promote industry agglomeration and that scale economic effect in cities also positively impacts industrial growth. Moreover, adjustments of regional and urban-rural development policies are observed in Chap. 3, where the influences of policy changes on regional development are discussed based on change to the direction of central fiscal transfer payments. Our analysis attempts to find out whether China bridges the regional development gap at the cost of efficiency. The last section of Chap. 3 also examines measures for realizing economic agglomeration while narrowing the development gap across regions. Analysis in this chapter mainly involves contents excluded in the three ellipses, although as we always indicate that regional development is associated with urbanization and urban-rural issues.

The remaining three chapters concern several key links in Fig. 1.1, all of which are very important topics for discussion on urban-rural and regional development in

China. Heated debates on these topics exist while further evidence is needed. Hence contents in these three chapters are technique-based in order to clearly show the relationship between economic research and common expression, to illustrate the empirical basis of our views and to demonstrate the contributions of Chinese empirical evidence to studies on contemporary regional economics and development economics.

Chapter 4 explores the influence of globalization, marketization (development of the non-State-owned economy) and urbanization on the regional gap based on data from inter-provincial panels. Special attention is paid to globalization as explored in extensive and heated debates in academic circles. We found that globalization significantly widens the income gap across regions in China and its action strengthens as time passes. Moreover, marketization and urbanization also aggravate cross-regional income gaps, but their actions are being weakened.

Chapter 5 presents changes, influences on economic growth and determinants of domestic market segmentation in China since the reform and opening-up. There are different academic views on whether the domestic market has been segmented or integrated since the reform and opening-up. This constitutes an important criterion for judging the success of China's market-oriented reform. How does segmentation impact local economic growth? Our empirical studies in this regard help us to understand the motivation behind the implementation of market segmentation by local governments as well as a possible "prisoner's dilemma" of market segmentation suffered by local governments. This section will provide a practical basis for coordination and intervention by the central government. What factors cause market segmentation? Analysis in Chap. 5 helps to judge the trend of market integration in China in the future and to discover the fundamental driving force behind market integration in the country. We find that the domestic market was more integrated during 1985–2001. Market segmentation by local governments contributed to local economic growth over a considerably long period and regions where the economy is highly opened can benefit from market segmentation, which partly explains the motivation behind local governments' willingness to pursue market segmentation. However, we cannot support market segmentation policies. Generally speaking, China may lose the scale effect of economic growth because of beggar-thy-neighbor market segmentation, which, however, benefits local regions. We also note that economic opening-up intensifies domestic market segmentation in the early stage, but at a higher level it can promote domestic market integration. In addition, intervention by local governments works against market integration, while development of a non-State-owned economy is a fundamental driving force behind market integration. These findings clearly show the mechanism behind our empirical results based on Fig. 1.1. As shown there, globalization and marketization indeed give rise to cross-regional gaps, driving local governments to develop local economies by means of market segmentation, while economic opening and access to the international market provide realistic conditions for policies of domestic market segmentation in the early stage.

Chapter 6 discussed the impact of inequality on growth. The available empirical studies present different conclusions on this issue due to varying data and methods,

and there is less empirical evidence in China. However, the answer to this question is very important in understanding the future of urban-rural and regional development in China. Empirical evidence is badly needed to illustrate the relation between income gaps and economic growth at a time when China is proposing the goal of building a harmonious society. Supposing the urban-rural or regional income gap does no harm and even is conducive to longterm economic growth, we are more inclined to believe development and growth are the primary tasks and urban-rural or regional inequality can be controlled by retrospective fiscal transfers. Consequently, policy controlling income gaps is not expected to be universally accepted in society nor valued by the government. Empirical studies based on data from inter-provincial panels found that the urban-rural income gap in China has harmed economic growth in both the short and long run, mainly because it hampers investment growth. The findings provide new empirical evidence that will help us to understand the importance of controlling the income gap and will support the adjustment of city- and region-biased policies for the purpose of achieving sustainable economic growth.

Discussions in this book can be finally summarized by a new understanding of the relation between equality and efficiency in regard to urban-rural and regional development. The common belief is that "balanced development" and the "pursuit of efficiency" are incompatible goals in balanced urban-rural and regional development. Consequently, it seems that China only has two strategies for urban-rural and regional development. One is to restrict both land supply[4] in coastal areas and eastward labor transfers for the sake of balanced development, and the other is to strengthen cross-regional factor reallocation for the purpose of efficiency. However, Chap. 7 presents "the third path" of balanced development between urban and rural areas and among regions based on preceding empirical studies. In other words, economic agglomeration is compatible with regional balance, urban-rural integration with urban development, and social harmony with economic growth during the process of economic agglomeration in the eastern coastal areas, as long as cross-regional labor mobility and transactions of land development quotas are promoted. On the contrary, China is likely to embark on a path of unsustainable development because of faster inland development by simple administrative government intervention at the cost efficiency in eastern coastal areas.

The understanding of either "balanced development" or "pursuit of efficiency" for urban-rural and regional development in China is theoretically false and is very likely to lead to a high price being paid in practice. In the era of globalization and a knowledge-based economy, a new economic geography that emphasizes the concept of space and increasing returns substantially explains and predicts the spatial distribution of economic activities. The theory says that economic growth depends

[4]Industrialization in China usually relates with converting agricultural land into non-agricultural usage. However, in order to keep some minimum amount of agricultural land, the central government set the quota of such kind of land usage conversion for each province every year. As a result, land quota becomes an important way through which central government restricts the industrial development in costal regions.

on the agglomeration effect, and free factor mobility will finally contribute to balanced development across regions. As the "third path" of an urban-rural and regional development in China that gives consideration to both balanced development and the pursuit of efficiency comes into play, there will be no need to worry about the urban-rural and regional gaps in the cities and eastern coastal areas. Actually, the agglomeration effect represents a must-take step for urban-rural and regional development in China during the processes of globalization, marketization and urbanization. Against such a backdrop, China should consider how to promote balanced development in the agglomeration process and drive inland and rural development in a balanced way instead of sacrificing agglomeration for balanced development.

Sustained domestic market integration will offer future economic growth in China due to the country having the largest domestic market in the world. It will create rare favorable conditions for China's economic takeoff and long-term growth. Predictably, China will enter a stage of rapid urbanization as control over the household registration system is relaxed and land system reform advances in rural areas, as confirmed by policy adjustments made by Chinese governments at all levels over recent years. In the stage of rapid urbanization, scattered rural industries with low technological levels will become less important, and industry is likely to further concentrate in the Yangtze River Delta, Pearl River Delta and Bohai Bay. Meanwhile, improvement in Chinese urbanization will be manifested initially by the formation of several national or international city clusters in the coastal areas and several regional city centers of various sizes in the inland.

However, economic agglomeration in the eastern coastal areas will still inevitably widen the cross-regional development gap in China at least in the short term. How should we view this short-term practical problem? First, in terms of policies, it is necessary to minimize barriers for factor mobility and, in particular, labor flow between urban and rural areas and to further promote economic growth in the process of factor flow and spatial agglomeration. Second, cross-regional allocation of non-flowing land resources may be allowed while the amount of total cultivated land nationwide is controlled and price mechanisms may be implemented to enable backward regions to share the benefits of economic agglomeration in developed areas. For instance, it is necessary to allow eastern coastal regions to buy land quotas from western and central regions in order to transfer more agricultural land into nonagricultural usage. Economic growth and cross-regional reallocation of labor and land will lay a foundation for the central government to make fiscal transfers to backward regions. The central government also can purposefully narrow the regional gap in development and quality of life by improving inland public areas and increasing investments in inland infrastructure construction.

A reasonable state of future urban-rural and regional development in China is foreseen as follows. The law of economic agglomeration requires eastern coastal regions (Yangtze River Delta, Pearl River Delta and Bohai Bay in particular) to always surpass other regions in density of economic activities, without a great difference in residents' quality of life between urban and rural areas and among regions. In the future, people will be able to go to a big city to earn a high income

and enjoy high consumption, while facing a faster and more stressful life, or to go to a small city or even a village to enjoy relaxation, open spaces and a fresh environment while leading a relatively simple life. The essential significance of balanced development between urban and rural areas and among regions lies in harmonious development in terms of quality of life although economic agglomeration is embodied in the big cities and GDP is mainly created around big cities in the eastern regions.

How should inland regions develop under the process of economic agglomeration in the eastern coastal areas? First, we repeat that economic agglomeration in the eastern coastal areas can create conditions for fiscal transfer to more regions if it is conducive to economic growth. Secondly, per capita quantity of resources (including land and natural resources) in the inland areas increases because more laborers in inland areas are transferred to eastern areas in the process of economic agglomeration. This constitutes an essential condition for narrowing the regional gap in development and life quality. Third, economic agglomeration in the coastal areas is aided by low transport costs due to the proximity of ports, while inland areas should give play to their advantages in developing industries (mining and tourism) related to local resources or industries (computer chips) with low unit transport costs and high added value. Fourth, China's inland areas and central provinces in particular are not too far away from ports, which are likely to join in the industrial value chain dominated by coastal provinces and develop manufacturing industries relocated from coastal areas where land and labor costs increase. However, currently, industries are still agglomerated towards eastern regions, and thus it is necessary for central regions to make preparations in infrastructure and education, among other issues. Fifth, some inland regions may develop features in some industries by preemptively seizing opportunities in forward-looking and domestic-demand-based industries.[5]

How should small towns develop during the process of economic agglomeration in the big cities? Generally speaking, small towns should play a role in connecting big cities and rural areas. First of all, simple processing and manufacturing industries will inevitably move out of big cities when modern service industries characterized by higher labor productivity and more efficient use of land are suitable for big cities where land and labor costs are increasing. However, in the process of globalization, industries in the big cities will focus on design and creativity, which will be translated into products in the small towns, unless original manufacturing industries in the big cities are relocated to other countries where costs are lower. By then, big cities and small towns will depend on each other. Manufacturing industries in the small towns will become less competitive without design and creative ideas from big cities, and small towns will support modern service industries in the big cities. In addition, small towns may become residential zones for people who work in the big cities, which in return will offer residents in the small towns

[5]Hengdian Film & TV Production Base in Zhejiang represents a successful experience in preemptively seizing market opportunities.

diversified, modern and high-quality services. Moreover, small towns will also serve rural areas and provide professional production services—including seeding, packaging, transport and marketing—in the small towns where modern and scale-effect agriculture will be realized.

Economic agglomeration should become one of the means instead of a barrier to realizing the goal of balanced development between urban and rural areas and among regions. Moreover, the government should actively promote free factor mobility between urban and rural areas and among regions and offer backward inland regions more public services and infrastructure. Subsequently, economic agglomeration will become an effective means of realizing balance development between urban and rural areas and among regions, and China will "move toward balance through agglomeration". Breaking the limitations of local protectionism and correcting misunderstandings of governments at all levels and among the general public constitute the greatest challenge for economic development in contemporary China.

1.4 Significance of This Study

We repeat the assertion that a problem faced by China is a problem confronted by the world. Traditional development economics rarely studies urban-rural development from the perspective of regions or, more accurately, space. Urban-rural development and regional development in China are observed in this book together to highlight the perspective of space. As shown by the rise of new economic geography, the concept of space has become more important due to the law of increasing returns. Therefore, discussion of urbanization and urban-rural issues in China depends on spatial agglomeration. With a high urbanization ratio, eastern coastal areas have attracted substantial foreign investments by leveraging their advantages in sea transport and accelerated economic agglomeration in the increasing trend of globalization, and thus have become main destinations for urban-rural labor flow. Consequently, urbanization in China is inevitably closely related to the regional layout of the urban population. Observations on economic agglomeration and regional development during globalization help us to understand the importance of spatial factors in economic development.

Urban-rural and regional development in China is also impacted by urban-rural segmentation, economic decentralization and other structural characteristics in addition to spatial factors. On one hand, city-biased economic policies and segmented systems for urban and rural areas have existed in China for a long time and have restricted labor flow between urban and rural areas. On the other hand, urban-rural and regional development is very important because China is a big country. It is not essentially different from other countries when the impact of globalization on regional gaps in China as a whole is considered. However, regional characteristics in such a large country like China cannot be ignored if we further analyze the mechanism shaping urban-rural and regional gaps. Regions in China

vary greatly in geography, history and natural conditions. Meanwhile, there is a serious lack of information on how local governments implement the policies of the central government. Consequently, a governance model of economic decentralization is adopted. During economic decentralization, local government officials with outstanding performances in economic growth are more likely to be promoted by the central government (Li et al. 2005). Local protectionism and associated domestic market segmentation is inevitable when local governments compete for economic growth. Similarly, local governments raise funds to supply local public goods under a system of economic decentralization and, consequently, different regions vary greatly in public services and social security. The governments of developed coastal areas and big cities have no incentive to offer non-local residents equal public services and social security, and this can increase barriers to free labor mobility. The central government has also adopted strict policies to control cross-provincial reallocation of construction land quotas when workers are not fully transferred across regions and unbalanced economic development exists from region to region. Discussions in this book on restrictions of cross-regional labor and land allocation caused by urban-rural segmentation, economic decentralization and other specific structural characteristics are critical to understanding the failure of economic agglomeration in moving toward balanced development. Studies from the perspective of development and spatial economics reveal the features of political economics.

References

Chen Z, Lu M (2008) From segmentation to integration: political economies of urban-rural economic growth and social harmony. Econ Res J 1:21–32

Chen Z, Liu X, Lu M (2013) Beyond Lewis: rural-to-urban migration with endogenous policy change. China Agric Econ Rev 5(2):213–230

Li H, Zhou L-A (2005) Political turnover and economic performance: the incentive role of personnel control in China. J Public Econ 89(9–10):1743–1762

Lu M, Chen Zh (2004) Urbanization, urban-biased policies and urban-rural income gap. Econ Res J 6:50–58

Lu M, Chen Z (2006) Market integration and industry agglomeration in regional economic development in China. SDX Joint Publishing Company and Shanghai People's Publishing House

Lu M, Chen Zh, Yan Y (2004) Increasing returns, development strategy and regional economic segmentation. Econ Res J 1:54–63

Lu M, Chen Z, Wan GH (2005) Equality for the sake of growth: the nexus of inequality, investment, education and growth in China. Econ Res J 12:4–14

Lu M, Chen Zh, Yang ZZ (2007) "Equality and growth hand in hand: increasing returns, strategic behavior and efficiency loss in the division of labor. China Econ J (Q) 6(2):443468

Lu M, Chen Z, Wang Y, Zhang Y, Zhang Y, Luo C (2013) China's economic development: institutions, growth and imbalances. Edward Elgar

Wan G, Lu M, Chen Z (2006) The inequality–growth nexus in the short and long runs: Empirical evidence from China J Comp Econ 34(4):654–667

Chapter 2
Urban-Rural Integration and Spatial Agglomeration in the Process of Chinese Urbanization

Joseph Stiglitz, winner of the 2001 Nobel Prize in Economics, asserted at the World Bank Conference that urbanization in China and high-tech development in the United States will be the two key factors profoundly influencing human development in the 21st century.

Indeed, the continuation of and rapid improvement in urbanization in China will be a factor that will influence development there and in the world at large. Historically, the urbanization rate in China still stood at 43.9 %[1,2] in 2006 after sustained rapid growth for nearly 30 years since the reform and opening-up began in 1978. By contrast, the urbanization rate in the Philippines and Mexico reached 63 and 76 %[3] respectively around 2006. China's urbanization rate by urban population ratio was only 44.9 % by the end of 2007, while the share of secondary and tertiary industries in GDP reached 88.3 %.[4] China's annual urbanization rate is predicted to grow by 1.5 % for the next few years. That is to say, about 10 million people will move to cities every year and the urbanization rate in China will only reach 60 % or so by 2020. China still has a huge room for urbanization.

The goal of urbanization is well defined, but the road to urbanization may be tortuous.

It seems that in the future China will have to choose one of two entirely different paths to urbanization and regional development. One is the path of "balanced development" that pursues balanced regional development in the short term at the

[1]Data source: China Statistical Yearbook 2007. Data published by the World Bank is 41 % (*World Development Indicators 2007*). There are two opposite views on similar statistics. One view holds that China's urbanization rate will rise slightly if.

[2]−150 million rural migrant workers in the cities are included (Research Group of Academy of Macroeconomic Research, NDRC 2000). According to opponents, permanent residents are already included in the data and some permanent residents will return to rural areas and are not urban residents in a real sense, so the actual urbanization rate in China is insufficient (Ren 2004). Actually, urban population statistics published in recent China Statistical Yearbooks are based on or adjusted by the number of permanent residents. China's urbanization rate remains very low even according to the first view.

[3]Urbanization rate data of the Philippines and Mexico come from the *World Development Indicators 2007* published on the World Bank's official website.

[4]Data source: Statistical Communiqué of the People's Republic of China on the National Economic and Social Development 2007 published by the National Bureau of Statistics of China.

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9_2

cost of the agglomeration effect in urbanization, while the other one is the path of "pursuit of efficiency" that gives full play to the agglomeration effect in urbanization. It is generally believed that these two paths represent an either-or choice. The former means that China may sacrifice the development of eastern coastal areas and embark on a path of unsustainable development, while the latter may further widen the development gap across regions and aggravate domestic contradictions. Is there any "third path" that gives considerations to both efficiency and balanced development?

The process of China's urbanization and its impact on regional development are discussed from the perspective of urban-rural integration and spatial agglomeration in Chap. 2, where we explore a future path of balanced development between urban and rural areas and among regions in China. To this end, it is necessary to further study more of the details behind China's urbanization. Indeed, we invariably pay attention to the overall improvement in urbanization levels when we point out China's potential for urbanization. However, we do not realize that what is more important than overall improvement in urbanization for China, a populous country with vast territory, considerable regional differences and sustained economic growth, is adjustment to spatial pattern of urbanization and enhancement in factor mobility under the process of globalization, during which policy adaption to spatial agglomeration in urban development is of great importance.

Analysis of China's inter-city panel data indicates that the agglomeration effect in urban development has indeed reinforced urbanization, but it has not fully played its role due to restrictions caused by lagged urbanization. Several misunderstandings about urban and regional development have existed in Chinese policies. Hence it is imperative for the nation to further follow market laws and give more reasonable play to the role of government in urban-rural integration, spatial agglomeration and balanced regional development.

In Sect. 2.1 we look at theories of new economic geography in relation to urban development. This indicates that the scale effect of spatial agglomeration in the cities will become more important in urban development in China. Changes to scale effect in China's urbanization are analyzed based on inter-city panel data in Sect. 2.2, where we discuss the question of whether the scale effect is given full play. Four misunderstandings of obstacles to city scale effect are summarized in Sect. 2.3 in accordance with existing policies. Section 2.4 presents the significance of development models with a big city as the center of agglomeration. This is based on comparisons between Shanghai and Tokyo. The goals of future urban and regional development in China and policy adjustments are expounded in Sect. 2.5.

2.1 What Kind of Urbanization Do We Need?

As far as China's urbanization is concerned, we need pay special attention on differences in spatial agglomeration in urban development besides the general trend of urban populations increase. Because of its large size and regional heterogeneity,

China cannot ignore cross-regional development gaps. China has proceeded toward a market economy and into globalization from a scattered industrial development pattern that was left over by the planned economy, indicating that adjustment to urban spatial layout in the process of urbanization is of great significance.[5] Sustained economic growth in China determines that the adjustment will be a long-term process which requires us to seek answers to the question of what kind of urbanization we need from the spatial perspective of urban system. However, it is necessary to refer to new economic geography that introduces the factor of space into growth theories because traditional economic growth theories overlook the importance of space.[6]

According to new economic geography, the scale effect brought about by spatial agglomeration of economic activities is considered an important driving force of economic growth. Economic development will gain scale effects in at least the following three aspects when economic activity and population are concentrated in the big cities (Gill and Kharas 2007):

First, sharing. Producers will enjoy an extensive supply of inputs on a larger scale to give play to scale economy in production and lower average production costs while expanding the scale of production. Also, input suppliers will have greater market demand because of input sharing by product vendors as they provide highly specialized products and services according to specific demand.

Second: matching. All factors are well matched in the markets on a larger scale where enterprises more easily find out the inputs and employees with special skills meeting for their specific needs. Needs for diversified inputs are more easily satisfied and employees are more likely to find a proper employer in a place with numerous enterprises.

Third, learning. Spatial agglomeration helps to accelerate the flow of knowledge, exclusive or nonexclusive, explicit or implicit, to facilitate mutual learning between employees and entrepreneurs and among different industries.

It will become more important to give play to the agglomeration effect in cities to drive industrial development in consideration of the international environment facing China, which can be elaborated from the perspectives of post-industrialization and globalization.

Spatial agglomeration of economic activities will become more important after a city enters into the stage of post-industrialization. The latest empirical studies have indicated that scale effect mainly comes from diversified inputs in the process of population agglomeration (Au and Henderson 2006a). The share of service industries will increase after cities enter into the stage of post-industrialization and most service industries (including the production service industry) are non-tradable and face difficulties in cross-regional transport, so "sharing" and "learning" of the

[5]Empirical studies by Lu and Chen (2006), Jin et al. (2006) indicate weakening government intervention and globalization have considerably promoted industry agglomeration in China.

[6]Readers may read review articles in this regard (e.g. Neary 2001) to learn about research progress in economic geography.

scale effect need spatial agglomeration. For example, a big city can host large, high-quality performances and exhibitions because it has enough potential audience members to share costs and also can find various relevant professional service staff. Residents can enjoy a colorful life and consumers can enjoy diversified services, such as fine food from all over the country, in a big city where scale economy is realized. Residents in the big cities are well informed because the bigger the population, the greater the differences in individual knowledge, experience and taste. As a result, many creative ideas and thoughts come into being during face-to-face communication, and information and knowledge are spread by direct human-to-human interactions. This is how the agglomeration effect helps to improve labor productivity.[7] Knowledge-based economies have gradually revealed their characteristics since the second half of the 20th century. Knowledge has played an increasingly significant role in economic development, which is obviously different from traditional economic growth models, which were mainly driven by the accumulation of material capital. Learning produced by the scale effect will be more important in the face-to-face interaction needed to produce and spread knowledge. The city will become an important place where highly skilled people will be spatially concentrated, that is why high-tech and creative industries achieve better development in the big cities.

Figure 2.1 shows the relation between optimal city size and industrialization and post-industrialization that was examined by Au and Henderson (2006a) in empirical studies of China's urban development. The quantity of employment represented by the horizontal axis reflects city size. It shows an inverted U-shaped relation with labor production as the vertical axis. The peak point of the curve is the status of highest labor productivity in the city, and the thinner curve represents the higher proportion of the service industry. As shown in Fig. 2.1, both curves are characterized by steep falls on the left of the peak point, indicating that the smaller the size, the greater the loss under deviation of the same degree to the optimal size because the agglomeration effect of city size can improve labor productivity in the city. Two inverted-U-shaped curves demonstrate that the agglomeration effect will be dominated by crowding effect if the city is oversized, and thus city productivity will decline. However, the scale effect produced by economic agglomeration in improving labor productivity will be increasingly important as the share in the economy taken by the service industry increases and more diversified services are used as intermediate good[8] and, subsequently, optimal city size will also be increased (Au and Henderson 2006a, b). In the figure, the curves move toward the right when the share of the service industry rises. City size accordingly varies in space because of differences across regions in China in the development of urban service industries.

[7]Studies do indeed show that employees who have lived in cities produce more human capital (Glaeser and Mare 2001). In China, labor productivity has been significantly improved in the process of agglomeration of economic activities and population (Au and Henderson 2006a; Fan 2006, 2008).

[8]This is embodied by the production function of complementation of input factors in their model.

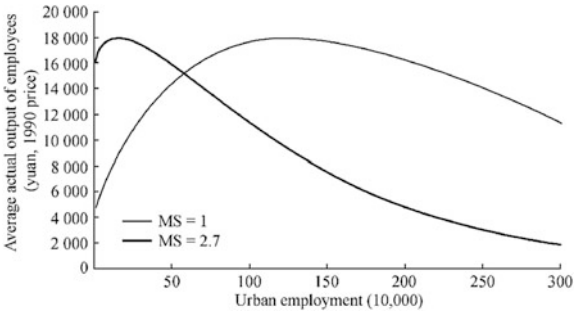

Fig. 2.1 Industrialization, post-industrialization and optimal city size. *Note* MS presents the ratio between value added in manufacturing industry and service industry. *Data source* Au and Henderson (2006a)

Economic globalization has also driven adjustment to urban spatial layout in China. The theories of new economic geography argue that agglomeration is more likely to happen in well-located regions in order to save transportation costs in international trade (Fujita 2007). On a world scale, big cities more easily cluster in coastal areas where the cost of ocean transportation is very low. The reality in China is that China relies more on international trade during further opening up and globalization.[9] As a result, the effects of agglomeration are predicted to increase in the eastern coastal areas and big cities become more concentrated.[10]

2.2 Spatial Agglomeration and Scale Effect in Urban Development

China's urbanization has gone through different stages since reform and opening-up. From 1978 to the late 1980s, a special rural industrialization model, in which "rural laborers worked at township factories", appeared in China along with rapid development of township enterprises. Guided by the urban development guideline to "control the size of big cities, reasonably develop medium-sized cities and activity develop small cities", the proportion of small-city population in the country kept increasing, while that of the big-city population declined. The overall urbanization rate rose from 20 % before the reform and opening-up to above 40 % (see Fig. 2.2). China's urbanization entered a new stage around 1990. Reform of the land system launched in the late 1980s made it possible to transfer land use rights and contributed to more flexible land reallocation. Deepening market-oriented reform and opening-up helped to further strengthen industrial agglomeration in

[9]See Chap. 4 for development of China's foreign trade.

[10]See Table 3.1 in Chap. 3.

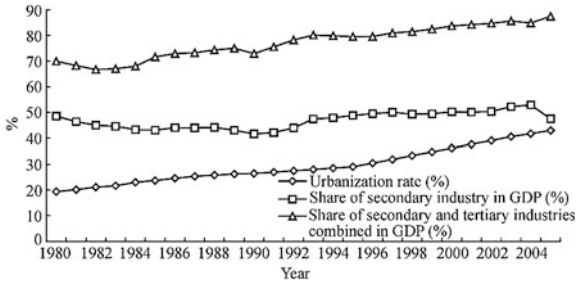

Fig. 2.2 Industrialization and urbanization in China (1980–2009). *Data source* China Statistical Yearbook, China Statistics Press, 2010 (In this figure, the urbanization rate is calculated based on urban population. Data 1980 are household registration statistics, data 1985 and 1988–1989 are adjusted subject to census data 1990, data 1990–2000 are adjusted subject to census data 2000, data 2001–2004 are based on sample survey data of population changes, and data 2005 are based on a national sample survey of population. As stated in the notes in the Questionnaire of the National Sample Survey of Population 2005 by the National Bureau of Statistics, respondents were residents in the sampled quarters and people who were living in the sampled quarters on the night of October 31, 2005, regardless of household registration, including people whose registered permanent residences were in villages, towns and neighborhoods; external population was also included. The proportion of the 2005 urban population already includes external residents who lived in cities and towns. It is inferred that the external non-registered population was included as a proportion of the urban population subject to adjustment of census data or data from the sample survey of population

coastal areas and the Yangtze and Pearl River Deltas in particular (Jin et al. 2006; Chen et al. 2006; Lu and Chen 2006).[11] The urbanization rate increased by approximately 10 % points in the decade after 1990. China's urbanization has been increasing along with rapid economic growth since 2000. According to the sixth population census, the urbanization ratio was 49.68 % in 2010.[12]

During China's urbanization, market forces from the agglomeration effect have continued to increase the number of big cities, although the government once controlled their expansion. From 1991 to 2003, the number of big cities with a population of more than 2 million increased from nine to 33 and the number of prefecture-level cities of the same population reached 37 in 2006.[13] According to the latest *China Statistical yearbook* in 2013, the number of big cities with more than 5 million populations is 103 in 2012, which accounts for more than 35 % of the prefecture-level cities in China. Theoretically, expansion of local market capacity in the process of urbanization will increase the level of industrial agglomeration in cities. The share of the service industry will increase when industrial agglomeration in the big cities reaches a certain level and that is when the

[11]See Chap. 3 for regional development related to economic agglomeration.

[12]Data source: State Statistical Bureau of China: The First Report on the Main Statistics of the Sixth Population Census, http://www.stats.gov.cn/tjfx/jdfx/t20110428_402722253.htm.

[13]Data source: China Statistical Yearbooks, various years.

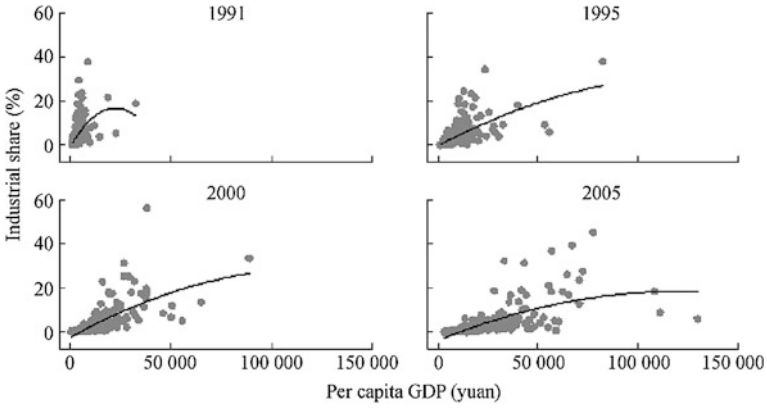

Fig. 2.3 Per capita GDP and industrial share (1991–2005). *Data sources* Fifty Years of Cities in New China (Xinhua Publishing House, 1999) and China City Statistical Yearbooks (China Statistics Press various years)

urban economy is very likely to enter the stage of post-industrialization. However, a fall in industrial share in the cities does not indicate a decline in absolute industrial scale in the big cities. On the contrary, complementation among different industries further promotes the agglomeration of more high value-added industries in and near big cities.

Inter-city panel data indicate that scale economy in China's urbanization has indeed been strengthening industrial agglomeration in cities. The relationship between urban per capita GDP and industrial share shown in Fig. 2.3 reflects the relation between urban development and industrialization in China since 1990. Urban per capita GDP on the horizontal axis presents local market capacity in cities, which is an important factor in generating the agglomeration effect, while the share of the city's industrial output value in the total[14] on the vertical axis shows the level of urban industrial agglomeration. The fitted line, including the quadratic term added to the scatter diagram, clearly demonstrates the inverted-U-shaped relation between urban industrialization and urban development.[15] Comparing data in different years we could find two important characteristics in China's urbanization and industrialization since 1990. First, most cities are still in the stage in which urbanization and industrialization promote each other, as shown by the tiny minority city samples on the right of the inverted-U-shaped curve in the figure. Second, urbanization and industrialization have increasingly promoted each other

[14]Data sources: *Fifty Years of Cities in New China* and *China City Statistical Yearbook*. We use only inter-city panel data without counties within the jurisdiction. Industrial share of one city means the proportion taken by the city in the sum of industrial output value of all sample cities. Data from Shenzhen and municipalities directly under the central government are dropped as outliers.

[15]It is noted that the inverted U-shaped curve also represents the law that cities enter post-industrialization with economic development.

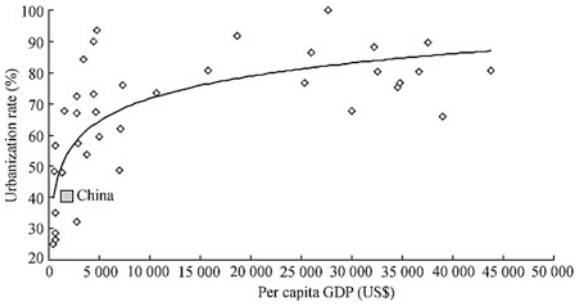

Fig. 2.4 Comparisons in economic development and urbanization by country (2008). *Data source* official website of the National Bureau of Statistics

over the years. The rightward location of the turning point in the fitted curve indicates economic development and market capacity measured by per capita GDP are increasingly conducive to industry agglomeration.[16]

However, it is noted that the agglomeration effect during China's urbanization is also driven by globalization, industrialization and marketization, which cannot conceal the fact that the urban agglomeration effect is limited because of lagged urbanization and constrained size of large cities.

Figure 2.2 also shows China's urbanization has lagged behind industrialization for a long time. Comparatively speaking, urbanization in Russia, Brazil, Mexico and South Korea surpassed industrialization in history, urbanization in Bangladesh always approached industrialization, while urbanization in India surpassed industrialization in 1997.[17] The relations between economic development and urbanization in some countries are further explained in Fig. 2.4, taking into account the fact that urbanization and industrialization in the same period in countries at different development stages are not fully comparable. The horizontal axis presents per capita GDP and the vertical axis proportion of urban population. As shown in Fig. 2.4, China's level of urbanization is significantly lower than what its per capita GDP suggests: the Figure's projection of China's urbanization rate based on per capita GDP is 50.5 %, while the actual figure was 40.4 %, a difference of nearly 10 %. China's urbanization rate should be higher based on international comparisons, given that China's per capita GDP calculated by purchasing power parity is higher.

Lag-behind urbanization makes it difficult for big cities to give full play to the agglomeration effect. As shown in Fig. 2.5, an inverted U-shaped relation between urban population density and per capita GDP exists in China, but most cities are on the left of the inverted U-shaped curve. Many Chinese cities suffer from losses in

[16]The good fit of the curve to data gradually rose from 0.255 to 0.367, 0.462 and 0.443 over the 15 years, indicating that generally speaking, urban per capita GDP plays an increasingly important role in promoting industry agglomeration over time.

[17]Urbanization and industrialization data of these countries are available on the official website of the National Bureau of Statistics of China.

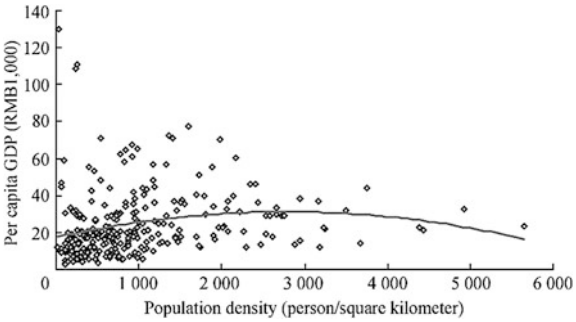

Fig. 2.5 Urban population density and per capita GDP (2005). *Note* Shenzhen with abnormal per capita GDP data is excluded. *Data sources* China City Statistical Yearbook, China Statistics Press, 2006

productivity because of their small size when optimal city size is measured by maximum per capita GDP. Quantitative analysis indicates approximately 51–62 % of cities in China are too small. The losses caused by the small size of typical cities account for about 17 % of average output of employees. Cities suffering from losses as high as 25–70 % in average output of employees account for a quarter of total city samples (Au and Henderson 2006a). Empirical studies by Fujita et al. found that size gaps among Chinese cities are far smaller than in other countries (Fujita et al. 2004).

Low efficiency of land use represents another serious consequence of inadequate population and spatial agglomerations; it is particularly severe in China where contradictions between population and land are prominent. According to statistics, the urban areas of 338 cities at prefecture-level and above have increased by 60 % from 16,000 to 250,000 m^2 over a period of 10-plus years since the middle 1990s, and urban population (including rural migrant workers) in the cities grew by about 10 % from 270 million to approximately 300 million in the same period. The growth rate of the urban area was six times that of the urban population (Yan and Jiang 2007). Scarcity of agricultural and industrial land and limited improvement in quality of life in backward regions are all attributed to low efficiency of land use. Worse still, urban development in inland areas will inevitably occupy a large quantity of land resources when inland residents can no longer move to and concentrate in coastal areas, which may give rise to unreasonable and difficult-to-adjust spatial distribution of land utilization.

2.3 Misunderstanding About Urbanization and Urban Development

Theories and empirical studies have proven that the agglomeration effect from scale economy helps to improve labor productivity in the cities, but China's urban development is faced with limited scale of large cities and limited diversification of city scale,

which are related to the following four misunderstandings about urbanization and urban development that are summarized in this section. Local governments have adopted policy measures that constrain urban agglomeration effect (Chen et al. 2008).

The first misunderstanding is, policy controlling inflow of external population protects the interests of urban residents. Many city governments have restricted by various means the inflow of external population to protect the interests of urban residents because they believe external population will scramble for limited city public resources and take too many jobs in the cities. However, policies that restrict the inflow of external population harm the interests of all parties concerned, including urban residents. First, the interests of external population and rural laborers in particular are harmed because they find it difficult to keep a foothold in the cities and have to depend on farmland. Second, enterprises are unable to employ more suitable laborers or have to pay higher wages to existing workers because of policies restricting population inflow. Consequently, enterprises will suffer from a loss in efficiency of labor resources and lose their competitive advantage due to rising costs.[18] Third, in the long run, failure in full flow of labor factors will impose restrictions on factor matching, sharing and other mechanisms on which city scale effect depends. In fact, the external population helps to increase labor supply in cities and to improve the productivity of urban laborers through agglomeration. All restrictions in labor flow will harm urban development and the well-being of local residents in the long term.

To be specific to China, segmentation of urban and rural labor markets based on the household registration system (*Hukou* system) still exists in cities nationwide, and big cities in particular, although more and more rural laborers have entered cities since the mid-1980s. Rural migrant workers who do not have local *hukou* are not treated equally with urban residents in wages, social security, children's education and other services (Cai et al. 2003). As urbanization continues and more external people move to cities to find a job, a "dualistic society" in which local residents and non-local residents are separated will develop, especially in mega-cities like Beijing, Shanghai and Guangzhou, if current circumstances are not fundamentally changed. Rural migrant workers who do not have local *hukou* generally belong to the low-income population, which may lead to urban residential segregation and further accelerate the formation of a dualistic society in the cities (Chen et al. 2012). A dualistic society will make it even harder for low-income people to benefit from local public goods such as education and medical care among others and may further widen income gaps in the cities. All these problems will finally exert an influence on the accumulation of capital (including human capital) accumulation among low-income groups, intensify social contradictions among different groups in the cities and impose great challenges on city governance, harmonious social development and sustained economic growth in the cities.

[18]Chen and Lu (2008) analyze by a theoretical model the harm caused by labor market segmentation between urban and rural areas to the interests of urban and rural residents as well as obstructions to the process of urbanization.

The second misunderstanding is that during future urbanization, China's rural migrants should move into small cities (towns) rather than large cities, because of concerns over "urban disease". However, such a judgment is attributed to a failure to realize that "urban disease" does not necessarily happen in the big cities or the development of small cities (towns) rely on the agglomeration effect of big cities. This misunderstanding in practice will result in limited size of big cities and limited diversification of city size across China. In fact, development of small cities is a result of an ever-enhanced agglomeration effect of big cities. With decreasing transportation cost the economic activities in the big cities spill over to a wider range along with further agglomeration effect in central urban areas. However, land rent as well as wage and other commercial costs increases during the same process, which results in further crowding-out effect and promotes the relocation of some industries toward surrounding areas, resulting in "city circles" or "urban belts" which economically complement each other and giving full play to the scale effect of big cities (Fujita 2007). More diversified demand and supply, better public service and improved city governance will all be embodied in the development of big cities, which is hard to be realized in small cities (towns).

At present, some big cities have consciously controlled the expansion of city size because of concerns about population-carrying capacity, and governments yet have not become aware that a city can improve its governance along with expansion of the city scale and subsequently increase its population-carrying capacity. The Tokyo Circle has accommodated 35 million residents and become the biggest city in the world because it maintains convenient transportation, a clean environment and a low crime rate. Economic development in Japan has benefited from the agglomeration effect of these conditions. As far ad Shanghai is concerned, if the municipal government could achieve a better governance it has great potential to contain more population and further expand. The Report to the Seventeenth National Congress of the Communist Party of China said that "focusing on increasing the overall carrying capacity of cities, we will form city clusters with megacities as the core so that they can boost development in other areas and become new poles of economic growth", and "taking a path of urbanization with Chinese characteristics, we will promote balanced development of large, medium-sized and small cities and towns on the principle of balancing urban and rural development, ensuring rational distribution, saving land, providing a full range of functions and getting larger cities to help smaller ones". This was a positive signal that the government wanted to correct this misunderstanding. Shanghai and Tokyo are compared in Sect. 2.4 to demonstrate how big cities in China should free up their attitudes to development, move beyond population control in city management and fully pursue agglomeration.

The third misunderstanding is that the current scarcity of rural migrant workers indicates the era of labor shortage and industrial relocation toward inland region is coming closer. It seems that the scarcity of rural migrant workers since the spring of 2004 foreshadows the arrival of the era of labor shortage in China and capital should actively transfer to inland areas where laborers are abundant. Such kind of conclusions would be drawn without consideration of further urban agglomeration

effects and possible system changes in the process of urbanization. However, there is ample evidence that policy discrimination against rural migrant workers in the urban labor market, in addition to factors causing partial short-term shortages of migrant rural workers, is the root cause of the scarcity of such workers. There are great differences in employment, social security, children's education and other social benefits between migrant workers and urban residents. Migrant workers in cities without local hukou do not enjoy equal social security with urban residents, their rights as employees are invariably not considered equally by city authorities and their children are frequently discriminated against in education policy, although they can find a job in the cities. Due to institutional urban-rural divide, rural labor flow in China is dominated by short-term flow and most migrant workers (women in particular) will return to rural areas after they get married or during their pregnancy (Chen et al. 2008). Many rural laborers are unable to become residents with urban household registration during urbanization due to man-made labor market segmentation and migration cost. In other words, a great quantity of "potential" surplus labor still exists in rural areas in China. Many of these workers should transfer to modern secondary and tertiary industries to inject new vitality into China's economic growth.

In addition, from the perspective of labor supply, some obvious troughs have existed in rural population structure in China due to the "Three Years of Natural Disasters" from 1959 to 1961 and the one-child policy that has been vigorously implemented since the late 1970s. As well, the size of the population aged 20–25 as the main force of labor flow was low during 2002–07, and this was one of the main reasons for the scarcity of rural migrant workers in recent years. Meanwhile, the policies to support and benefit agriculture, rural areas and farmer that has been implemented by the central government since 2004 has reduced the relative interests of rural migrant workers in the cities and constitutes another objective cause of the labor shortage.[19] Of course, non-transferable rights to rural land have hindered the permanent settlement of rural laborers in the cities. The rapid growth of labor-intensive industry after China's accession to the WTO has driven demand for low-skilled laborers and intensified labor shortages in coastal developed areas in the short term (Meng et al. 2007).

The fourth misunderstanding is that it is necessary to adopt policy measures to restrict city development in eastern areas because the agglomeration effect in urban development will widen the urban-rural and regional development gap in China. This understanding is analyzed at the following levels.

First, objectively, the city agglomeration effect indeed may widen the development gap between urban and rural areas. However, the widening gap is embodied in GDP statistics rather than in real per capita income when there is free laborer mobility and the labor market is fully competitive. In fact, rural migrant workers in the cities spend most of their income on their rural family. According to a survey of

[19]Laborers flowing into cities are likely to flow back to rural areas when a policy change is not conducive to attracting farmers to find jobs in cities.

the Chinese Green Book of Population and Labor 2007 issued by the Chinese Academy of Social Sciences, the average monthly wage of rural migrant workers who were engaged in production and business activities in non-local areas rose from RMB781 to RMB953 from 2003 to 2006. It is roughly estimated that the total wages of rural migrant workers account for approximately 7 % of national GDP and that most wages are returned to rural areas as well as central and western regions in various forms (Cai 2007).

Second, capital, technology, management skill and other scarce resources accumulated by rural laborers in the cities and brought to rural areas help to considerably promote the development of rural areas and narrow the urban-rural gap to some extent. Our studies find that urbanization helps to narrow the income gap between urban and rural areas (Lu and Chen 2004, 2006).

Third, in the long run, some industries will be relocated to inland areas or rural areas only when the urban agglomeration effect is given play, and by then labor outflow and increasing per capita resources (in particular land and other natural resources) in inland areas will inevitably contribute to an increase in labor productivity and income in the inland areas. Therefore, the agglomeration effect that has been given full play to in the long term will not widen the income gap among regions. Studies by the World Bank indicate that factor mobility rather than special regional policies contributed to inter-regional income convergence in the US, Chile and Pakistan. Widening the regional gap has also occurred at times in developed countries such as the US and France, which, however, showed a trend of continuous decline afterwards. Only factor mobility and sustainable development can finally help to narrow the regional gap. Globally, the richer a country is, the smaller the regional gap is (Uchida, forthcoming). Regional balanced development will be discussed in detail in Chap. 3.

2.4 Agglomeration Effect of Metropolises: Comparisons Between Shanghai and Tokyo

The latest economic studies and the history of world city development have indicated that concentration of economic activity and population in metropolises is an important driving force behind economic growth and social development. In particular, population agglomeration represents an effective approach to improving efficiency in land use in Asia where per capita land is quite limited. Metropolitan regions in China and cosmopolises such as Shanghai and Beijing should become images of China's economic and international status as well as growth poles of the regional and national economies in the future by embracing development, ending population control in urban management and addressing issues in city expansion.

Analysis in the following sections shows that scale effect constitutes an important driving force in modern economic growth and that spatial agglomeration of the economy will become more important after a city enters the post-industrialization stage. Figure 2.1 shows that smaller city sizes will cause a

decline in efficiency, and therefore the government should deregulate control of the size for large cities. In this sense, giving up scale is giving up development.

The strategy of balanced development between urban and rural areas and among regions requires China to accelerate population agglomeration in cities and, in particular, megacities when it is possible. It will be difficult to guarantee China's sustainable economic development and future international competitiveness if there is no metropolitan circle and cosmopolis that matches China's increasingly improving economic status in the world. It is a consensus among researchers that population density in Chinese megacities is far below that in cosmopolises such as Paris, London, Tokyo and New York. Take Shanghai for instance. Shanghai has been positioned as a center of the economy, finance, trade and shipping and should become a cosmopolis that represents China's economic and international status. This would require a population of at least 25 million permanent residents that will match the goal of the city's development in the next 20–30 years. To this end, Shanghai should take the lead in changing its attitude to pioneer a new model of cosmopolis development by giving play to the city agglomeration effect.

Shanghai and Tokyo are compared in this section to illustrate the significance of further expansion of Chinese metropolises. Tokyo prefecture is used to demonstrate the ideal population for Shanghai. As shown in Fig. 2.6, in 1953, the population of Tokyo prefecture exceeded its previous population peak in 1942 before the World War II, and average annual population increase stood at 208,400 during 1953–1973. Afterwards, the population of Tokyo prefecture remained slightly below 12 million for a long time.

Tokyo once went through a period of "dispersion of capital functions" in the 1990s, and consequently the population of Tokyo declined, along with its rate of development and international status. Academics consider this period as "a lost decade" (Wang 2003).

More interestingly, the agglomeration effect of population in the Tokyo prefecture has also affected overall economic growth in Japan. Data analysis in Fig. 2.7 indicates a positive relationship between the share of population in the Tokyo prefecture and Japan's economic growth rate since 1963. The population share of the prefecture reached at least 10.67 % (1973) in the year when Japan's economic growth rate was above 8 %, while it was up to 9.7 % (2003) in the year when

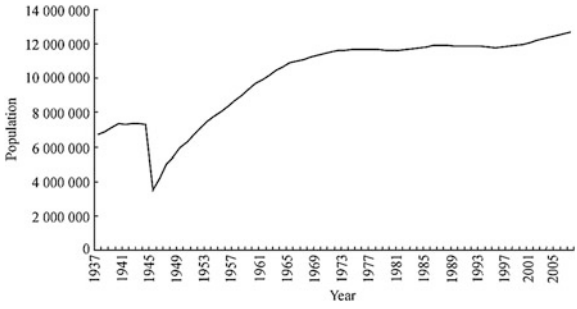

Fig. 2.6 Population growth of Tokyo prefecture (1937–2006)

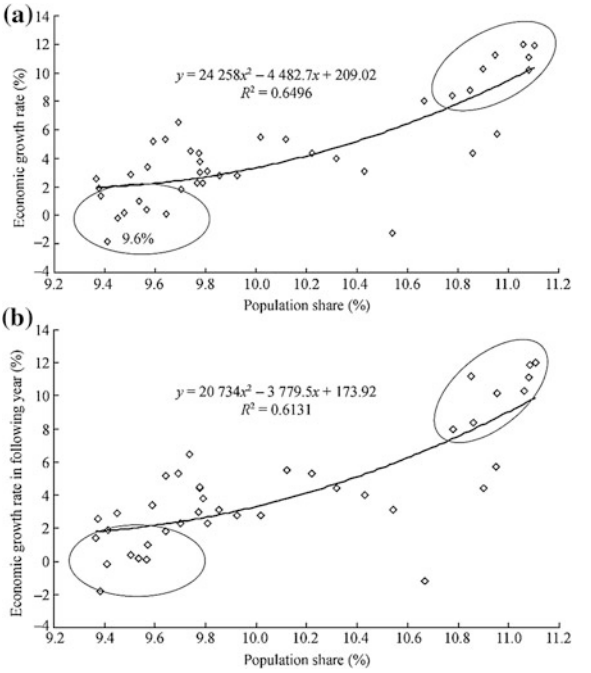

Fig. 2.7 Population shares of Tokyo prefecture in the national total and Japan's economic growth rates (1963–2004)

economic growth was below 2 % (see Fig. 2.7a). Tokyo's population share was still in positive correlation to economic growth as it was delayed by one year (see Fig. 2.7b). The population gross has entered a period of significant increase in recent years, and this has contributed to gradual economic recovery in Japan. During 1996–2006, the average annual population increase stood at 88,800, and showed no sign of slowing down.[20] In particular, the population of big city Osaka declined along with the growth of Tokyo, indicating that the agglomeration of economic activities and population in a few metropolises indeed embodies the objective law of city development.

As shown in Table 2.1, population with local hukou in Shanghai increased by 96,400 on annual average during 1978–2006, and by 56,200 during 1992–2006 when the economy grew rapidly. In 2006, the number of residents without local hukou who had lived in Shanghai for more than half a year reached 4,672,600. By including such population without local hukou in Shanghai's total population and supposing people without local hukou before the reform and opening-up was zero, the average annual population increase in Shanghai was 263,200 during 1978–2006 and 223,100 during 1992–2006. This growth rate is roughly equivalent to Tokyo

[20]Data about Japan and Tokyo prefecture are sourced from official websites of Japan Statistics Bureau and Tokyo Prefecture Statistics Bureau unless specifically stated. Data about Shanghai come from Shanghai Statistical Yearbook 2007 and Shanghai Municipal Statistics Bureau's website.

Table 2.1 Shanghai's population increase (1978–2006) (Unit: 10,000 persons)

Average annual population increase 1978–2006	9.64
Average annual population increase 1992–2006	5.62
Annual increase of permanent resident without local hukou 1978–2006	16.69
Average annual population increase l978–2006 (including immigrants without local hukou)	26.32
Average annual population increase l992–2006 (including immigrants without local hukou)	22.31

prefecture's in the period of Japan's rapid economic development. The population growth rate of Shanghai is very low given that its land area is three times the size of Tokyo's.

The share of the service industry in GDP exceeded 50 % for the first time in 1999 and the industry's share of employment passed 50 % for the first time in 2006, indicating that Shanghai was entering the post-industrialization stage. However, the city's service industry has grown very slowly since 1999. What is the optimal population size for Shanghai in the post-industrialization stage when the service industry is creating jobs and absorbing more foreign capital? The future population size of Shanghai is forecast in Table 2.2.

Table 2.2 Shanghai population size forecasts

	Area (10,000 km^2)	Permanent resident population (10,000 persons)	Population density (persons/km^2)	Population forecast (10,000 persons)	Population increase (10,000 persons)
High scheme				*Shanghai readies population density of Tokyo prefecture*	
Tokyo prefecture (2005)	0.22	1254.40	5819.80		
Shanghai (2006)	0.62	1815.08	2918.77	3619.13	1804.05
Medium scheme				*Shanghai and Jiangsu reach Japan's population density*	
Japan	10.87	1,2775.70	1175.58		
Shanghai (2006)	0.62	18,15,08	2918.77	2479.49	664.41
Jiangsu (2006)	10.26	7549.50	735.82	10,313.01	2763.51
Shanghai + Jiangsu (2006)	10.88	9364.5S	860.57	12,792.50	3427.92
Low scheme				*Shanghai and Suzhou reach population density of Tokyo circle*	
Tokyo circle (2005)	1.33	3447.20	2595.59		
Shanghai (2006)	0.62	1815.08	2918.77	2246.00	430.92
Suzhou (2006)	0.60	750.00	1247.92	928.06	178.06
Shanghai Suzhou (2006)	1.22	2565.08	2097.60	3174.05	608.97

Note Area of Shanghai and Suzhou refers to land area, and Japan's area is calculated by plain area (total area of 374,744 km^2)

Shanghai has maintained an annual per capita GDP growth rate of about 10–11 % in recent years. In 2006, the permanent resident without local hukou (including residents living there for more than six months) in Shanghai totaled 18,150,800, based on which per capita GDP in the city was converted into approximately US$7490 per person. Per capita GDP in Shanghai will be US $55,427.87 by 2027 based on an average annual growth rate of 10 %. It will be roughly equivalent to Tokyo's in 2003 (US$57,598.45). Shanghai's per capita GDP will surpass Tokyo's current figure by 2034 based on an average annual growth rate of 8 %. Population density in Tokyo prefecture under present development is 5819.80 persons per sq km. With an area of 621.49 km^2, the 23 core urban districts had a population of 8,489,700 in 2005 and population density of 13,660 persons per sq km. Comparatively, permanent resident population density in Shanghai was only 2918.77 persons per sq km in 2006. The population density of the 10 most densely populated districts, covering an area of 660.19 km^2 and a population of 8321,500, in Shanghai (excluding the large Pudong New Area) alone stands at 12,604.7 persons per sq km, which is still less than the population density of core districts in the Tokyo prefecture. Gross population will reach 36,191,300 based on Tokyo's population density (see Table 2.2 for population forecasts). This figure may be overrated because Shanghai is three times as large as Tokyo and population density of areas outside the central areas will be greatly lowered. However, gross population will amount to 9,018,000 when 10 districts with the highest population density reach Tokyo's population density, reserving a growth room of 700,000. Shanghai's gross population will be 24,403,700 based on Tokyo's population density for an area equivalent to Tokyo's and average population density for remaining areas.

Shanghai and Suzhou are compared with Tokyo circle in the low scheme in Table 2.2. The gross population of Shanghai and Suzhou with a combined area of 12,200 km^2, which is roughly equivalent to the area of Tokyo circle, will be 31,740,500 based on Tokyo circle's population density (2595.59 persons per sq km). The population of Shanghai is estimated to be 22,460,000 on the basis of population proportions of Shanghai and Suzhou. However, future population of Shanghai is underestimated in this way because population will be relatively more concentrated in Shanghai under the process of agglomeration and thus Shanghai's population will be larger.

Shanghai and Jiangsu are compared with Japan in the medium scheme. Japan covers 374,700 km^2, which includes a plain area of approximately 108,700 km^2. Population density will be 1175.58 persons per sq km based on the assumption that all Japanese people live in the plains. The combined area of Shanghai and Suzhou is 108,800 km^2, being roughly equivalent to Japan's plain area. Shanghai and Jiangsu should accommodate a population of 127,925,000 based on Japan's plain population density, and Shanghai should have a population of 24,794,900 based on the current population proportion of Shanghai and Jiangsu.

Therefore, the proportionate permanent resident population will be at least 25,000,000 and the annual permanent resident population will increase by approximately 228,300–342,500 when Shanghai reaches Tokyo's present

Table 2.3 Infrastructure comparisons between Tokyo prefecture (2005) and Shanghai (2012)

Road	Length (km)	Area (10,000 km^2)	Length per 10,000 persons (km)	Length per square kilometer (km)	Area per 10,000 persons (10,000 m^2)	Average area (10,000 square/km^2)
Tokyo	24,105.00	17,643.80	19.18	11.47	14.04	8.39
Shanghai	17,316.00	26,813.00	12.19	2.73	18.88	4.23

Subway	Mileage (km)	Passenger flow (10,000 persons per year)	Length per 10,000 persons (km)	Length per square kilometer (km)	Passenger flow per kilometer (10,000 persons per year)
Tokyo	279.40	2,087,921.90	0.22	0.13	7472.88
Shanghai	468.19	227,573.00	0.22	0.07	486.07

development level 20–30 years later. However, given that the population density of the central urban areas of Shanghai is very close to that of core districts in Tokyo, peripheral districts will dominate future increases in Shanghai's population. Gross population in Shanghai is even likely to reach 30,000,000 if the population density of central urban areas in Shanghai comes closer to the highest population density in the downtown area.

There are many concerns about Shanghai's population capacity, but these are actually static views. One worry is that Shanghai cannot accommodate a larger population because of its limited urban management and infrastructure capacity. It is noted that urban management and infrastructure capacity keep improving along with population growth and that urban development happens in this process when various problems are solved, echoing our view that giving up scale is giving up development.

Take infrastructure as an example. As shown in Table 2.3, in Tokyo, road length per sq km is 11.47 km and road length per 10,000 persons is 19.18 km. In Shanghai the respective figures are 2.35 and 8.05 km. Total subway length in Tokyo stands at 279.40 km,[21] with 0.13 km per sq km and 0.22 km per 10,000 persons, while the corresponding data in Shanghai in 2012 were 468.19, 0.07 and 0.20 km. Based on present subway capacity, passenger capacity per km is 74,728,800 persons per year in Tokyo, while in Shanghai it is 4,860,700 persons per year. Shanghai still has a lot of room for improvement in transport infrastructure, hardware and management.

Take social security as another example. Some observers say that an ever-expanding population will impose unbearable stress on social well-being in the big cities like Shanghai. As a matter of fact, statistics indicate lower average age, better health and lower unemployment rates for population without local hukou than the locally registered population. In other words, social security expenditure will be relatively reduced when the population without local hukou is included in

[21]This data excludes rail transits other than subway.

Shanghai's pension, medical and unemployment security system on equal terms with the hukou population, which will relieve rather than increase pressures on social well-being in Shanghai.

More importantly, Shanghai finds it difficult to control increases in non-hukou residents although it may relieve the growth rate of population with local hukou by administrative means, but increases in the non-hukou population at present are important to the city's economic development. The permanent resident population in Shanghai reached 18,580,000 by the end of 2007, an increase of 430,000 in 2006, which conforms to its strong economic growth. The Liberation Daily reported on February 27, 2008, that in 2007, the permanent resident population in Shanghai reached 18,580,000, with hukou population at 13,788,600 and the floating population at 6,660,000. On this basis, the non-hukou population in the permanent resident population has already reached 4,791,400 or 25.79 % of total permanent resident population. There will be serious potential hazards to social integration and harmonious development in Shanghai if such a high proportion of permanent residents do not enjoy equal rights with the hukou population during the city's sustained population increases in the future.

Population agglomeration constitutes a prerequisite for development of cosmopolises around the world. Chinese metropolitan circles may draw ideas and lessons from the history of Tokyo's population increases, decreases and then increases, as well as their relationship to economic growth in Tokyo and Japan at large. At present, Tokyo circle is one of the most dynamic regions in the world with a gross population of 35 million. Economists argue that low costs in 3 M—Time, Grime and Crime—namely convenient transport, an agreeable environment and social stability—constitute one of the secrets of harmonious development in city agglomeration when summarizing Tokyo's experience. Correspondingly, Chinese metropolises should seek development and improve their international status by actively addressing various issues in transport, environment and public security among others.

2.5 Toward Balanced Urban-Rural Development and Policy Adjustments

Because of the various misunderstandings just discussed, we argue that China should take a path that gives play to the spatial agglomeration effect and pays attention to balanced urban-rural development by aiming at social harmony in the cities during future urbanization and urban-rural development. How to promote social harmony in the city, give full play to the agglomeration effect and realize balanced development between urban and rural areas are discussed in this section from the policy perspective. We find that all these policies should be coherent with each other and require the government to end urban-rural segregation and achieve urban-rural integration.

First, promoting social harmony in the city. An important factor that may cause discord in cities during rapid urbanization is the formation of a dualistic society

caused by polarization between hukou and non-hukou populations, which is attributed to the household registration system. There is still no ready-made answer to criteria on social harmony in cities although the Chinese government has proposed the goal of building a harmonious society. We hereby attempt to put forward four criteria for harmonious society in cities: an interest appeal mechanism, wide social security coverage, discrimination-free public services and equal development opportunities. Interest appeal mechanism is a guarantee that the wishes of vulnerable groups can directly influence government decisions, and that these people will have channels of appeal when their interests are harmed or they are treated unequally. Wide social security coverage means the basic social security system should include all permanent resident populations in cities, regardless of local or urban household registration. Discrimination-free public services require the government to increase public fiscal investments to provide discrimination-free public services, especially children's education. Equal development opportunity means all people should enjoy equal development opportunities (in particular in investment in human capital and treatment in the labor market) by the system regardless of differences in identity and income.

Second, giving full play to the agglomeration effect in cities. Urbanization in China is yet to be greatly improved. Currently, most Chinese cities are in the stage when per capita GDP drives industry agglomeration, and increasing population density also helps to increase per capita GDP. To further give play to the city agglomeration effect, more rural laborers should flow to cities during urbanization, and people from the central and western regions should further concentrate in the eastern regions, while all big cities nationwide should continue to expand. Based on the development experiences of Asian cities, transport, environment, housing, security and other issues can be addressed during city development. One of the important contributors to the rapid economic recovery in East Asia in recent years was that the region fully seized the opportunity of economic globalization and integration and gave play to the agglomeration effect of the urban economy (Gill and Kharas 2007).

To further give play to the city agglomeration effect in the context of current economic and social development, the Chinese government should make a series of system adjustments which fall into two categories: (1) Lowering the institutional cost of population mobility. The government should relax control over labor flow, reduce discrimination in social security and children's education among other issues against urban residents without local hukou and at least provide permanent residents without local hukou who have been working in cities with equal access to local public services as local registered residents. To lower the institutional cost of labor flow, it is also necessary to build a national social security system that includes compatible social security services in different cities. In addition, the government should attach great importance to the rental market and give tenants equal rights with homeowners in residence registration applications and related local public services such as children's education. (2) Shifting government functions from micro-intervention to macro-management. As market economy is established in China stage by stage and the economy further develops, the

government should formulate rules for the market economy instead of directly intervening market choice, and shift its functions from micro-intervention to macro-management. Decreases in government intervention will help to relieve domestic market segmentation and administrative barriers and further give play to the agglomeration effect. Domestic market segmentation is further discussed in Chaps. 3 and 5.

Only by constantly giving play to economic agglomeration can China promote sustainable economic development. Only further population agglomeration in eastern coastal areas can help relatively backward rural areas obtain higher per capita resources and lay a solid foundation for balanced development between urban and rural areas.

References

Au, C-C, Henderson JV (2006a) Are chinese cities too small? Rev Econ Stud 73(3):549–576

Au, C-C, Henderson JV (2006b) How migration restrictions limit agglomeration and productivity in China. J Dev Econ 80(2):350–388

Cai F (ed) (2007) Chinese green book of population and labor 2007. Social Sciences Academic Press

Cai F, Du Y, Wang MY (2003) Political economics of labor flow. SDX Joint Publishing Company and Shanghai People's Publishing House, Shanghai

Chen Z, Lu M (2008) From segmentation to integration: political economies of urban-rural economic growth and social harmony. Econ Res J 1:21–32

Chen Z, Jin Y, Lu M (2006) Economic opening and industrial agglomeration in China. In: Fujita M, Kuchiki A (eds) Asian regional economic integration from the point of view of spatial economics. Joint Research Program Series No. 138. Institute of Developing Economies, pp 97–132

Chen Z, Lu M, Xu Zh (2008) Four misunderstandings in Chinese urban development. Orient Outlook 15:64–65

Chen Z, Lu M, Chen J (2012) Hukou system and residential segregation: a new challenge of urban public administration in China. Fudan J (Soc Sci Ed) 5:77–86

Fan JY (2006) Industry agglomeration and inter-regional gap in labor productiity. Econ Res J 11:72–81

Fan JY (2008) Research on industry agglomeration and China's regional gap. Gezhi Press, SDX Joint Publishing Company and Shanghai People's Publishing House

Fujita M (2007) Globalization, regional integration, and spatial economics: an introduction. In: Fujita M (ed) Regional integration in East Asia: from the viewpoint of spatial economics, Chap. 1. Palgrave Macmillan

Fujita M, Vernon Henderson J, Kanemoto Y Mori T (2004) Spatial distribution of economic activities in Japan and China. In: Henderson V, Thisse J-F (eds) Handbook of urban and regional economics, vol.4. North-Holland, pp 2911–2977

Gill IS, Kharas H (2007) An East Asian renaissance: ideas for economic growth. The International Bank for Reconstruction and Development, The World Bank

Glaeser E, Mare DC (2001) Cities and skills. J Labor Econ 19(2):316–342

Jin Y, Chen Z, Lu M (2006) Regional industry agglomeration in China: economic geography, new economic geography and economic policy. Econ Res J 4:79–89

Lu M, Chen Zh (2004) Urbanization, urban-biased policies and urban-rural income gap. Econ Res J 6:50–58

Lu M, Chen Z (2006) Market integration and industry agglomeration in regional economic development in China. SDX Joint Publishing Company and Shanghai People's Publishing House

Meng X, Lu M, Chen Z (2007) The era of 'Labor Shortage' has not yet come. Liberation Daily, 25 July 2007

Neary JP (2001) Of hype and hyperbolas: introducing the new economic geography J Econ Lit 39 (2):536–561

Ren Y (2004) Population urbanization and breaking urban-rural dual structure. Explor Free Views 3:24–25

Wang GX (2003) Population and development: comparisons between Shanghai and Tokyo. J Fudan Univ (Soc Sci Ed) 6:10–17

Yan W, Jiang N (2007) Land saving is necessary for urbanization acceleration. Social Sciences Weekly, 9 Aug 2007

Chapter 3
How Should China Maintain Growth While Balancing Regional Development

In the past three decades of the reform and opening-up, China has achieved a sustained and rapid economic growth that has rarely been seen in human history. This has occurred in the context of globalization, industrialization and urbanization. China's huge population has provided a large quantity of cheap and high-quality labor resources to the global production system and brought considerable market demands when it has fully integrated into economic globalization. China's participation has impacted on global industrial distribution, particularly in Asia, and China's manufacturing industry has rapidly spatially agglomerated in eastern coastal areas and many urban areas. Industry agglomeration helps to give play to the scale effect of economic growth, but by now also becomes an important reason for unbalanced development between urban and rural areas and among regions.

China has attached greater importance to balancing regional and urban-rural development by means of fiscal transfer in recent years because income gaps are unfavorable to sustained economic growth. The pursuit of moderate, balanced development instead of a one-sided emphasis on growth itself was a wise strategic adjustment made by the Chinese government. An inter-regional fiscal transfer policy that pursues balanced development is not necessarily contradictory with an agglomeration effect that gives full play to coastal developed regions. However, the government should rely not only on fiscal transfers to realize balanced development among regions and between urban and rural areas. A preliminary observation in this chapter indicates that simple fiscal transfer has not effectively turned around the trend of widening regional and urban-rural gaps. Therefore, the Chinese government should adjust fiscal transfer policies that focus on balancing development among regions and between urban and rural areas while giving full play to economic agglomeration effect. To be specific, the government should prevent regional market segmentation and promote labor concentration in the coastal regions and cities, while investing in infrastructure and human capital in undeveloped regions in a bid to make policies balancing regional and urban-rural areas conducive to sustained economic growth.

To analyze the relationship between regional and urban-rural development and their relationship with sustained economic growth, it is necessary to introduce the perspective of space and pay attention to the role played by spatial agglomeration in economic activities. This chapter examines the trend of industry agglomeration in

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9_3

China during globalization and urbanization based on inter-provincial and inter-city panel data. Generally, the industry agglomeration effect and scale effect of urban development are growing stronger. Meanwhile, it is also stated in this chapter that industry agglomeration is indeed accompanied by widening gaps across regions and between urban and rural areas and may adversely affect economic growth and social harmony. The Chinese government is confronted with a great challenge in trying to realize balanced development among regions and between urban and rural areas while continuously giving play to the agglomeration effect of economic growth.

The trend of cross-regional industry agglomeration in China since the reform and opening-up is demonstrated in Sect. 3.1, where the relationship between industry agglomeration and the processes of urbanization and globalization is discussed based on inter-provincial panel data and the positive impact of city scale economy is expounded based on inter-city panel data.[1] Section 3.2 presents changes to regional and urban-rural gaps as well as the adverse influence of income gaps on economic and social development. The history of adjustment of regional and urban-rural development policies are discussed in Sect. 3.3, where the expressions of such adjustment in the direction of central fiscal transfer and its influence on regional development are explored. Finally, conclusions and policy implications are discussed in the last section.

3.1 Industry Agglomeration and Regional Imbalance

Industry agglomeration is the most important factor behind unbalanced regional development in China since the reform and opening-up. As stated in Chap. 2, unlike traditional economic growth theories, new economic geography emphasizes the importance of space and regards the scale effect brought about by spatial agglomeration of economic activities as an important driving force of economic growth. The positive effect of economic agglomeration has been proven in some empirical studies around the world. However, many empirical studies on China focus on describing the trend of economic agglomeration or present analysis on determinant factors that influence the trend of economic agglomeration in different regions from the perspectives of geography, policy, history and scale effect, among others (e.g. Wen 2004; Lu and Tao 2006; Jin et al. 2006, Chen et al. 2006; Lu and Chen 2006; Fan 2004, 2006, 2008). It is difficult to analyze the sharing, matching and learning effects of economic agglomeration by econometric models. Au and

[1]Unless specially stated, inter-provincial panel data in Chap. 3 are sourced from Comprehensive Statistical Data and Materials on 50 years of New China (China Statistics Press 1999), Comprehensive Statistical Data and Materials on 55 years of New China (China Statistics Press 2005,) and China Statistical Yearbook 2006 (China Statistics Press 2006). Inter-city panel data are sourced from 50 Years of Urbanization in New China (Urban Social and Economic Survey Team, National Bureau of Statistics, Xinhua Publishing House, 1999) and China City Statistical Yearbooks (China Statistics Press, various years).

Henderson (2006b) demonstrate the role played by population agglomeration in promoting labor productivity based on China's inter-city panel data and point out that most Chinese cities are too small to give full play to scale effect. Fan (2006, 2008; Chap. 7) finds that employment density in one region can improve local labor productivity by analyzing cross-section data of 276 prefecture-level and sub-provincial cities. Zhu (2007) illustrates the positive effects of industry agglomeration and labor division through a very interesting case. She investigates Bianjiang Hotel in Urumqi, Xinjiang. The hotel began to receive businessmen from the Commonwealth of Independent States who travelled to Urumqi to purchase goods after the collapse of the Soviet Union in late 1991. Since then the hotel has grown into a foreign trade service enterprise that integrates accommodation, trade, warehousing and port facilities along with the development of frontier trade and service industries such as catering and entertainment in surrounding areas. However, more interestingly, this case of agglomeration development of the service industry is linked with a story of industry agglomeration. "Bianjiang Hotel's port trade is dominated by clothes, shoes and hats, 95 % of which come from inland areas, supplemented by a few featured goods specifically for minority groups that are locally produced in Xinjiang. Why do not manufacturers move their production workshops to Xinjiang? Because Xinjiang has no advantage in industrial division and agglomeration. An industry chain with fine labor division has taken shape in Zhejiang and Jiangsu, although parts needed for cloth, shoe and hat processing are not very complicated. As a result, lower manufacturing cost of intermediate goods, diversified options of various goods and high efficiency of goods supply are realized and product prices are cheaper than production in Xinjiang due to costs in the factories even with long-distance transport. The operator of Qiyi Cotton Mill in Xinjiang processed cowboy clothes and his products were RMB1 more expensive than similar products transported from inland areas. Consequently, the manufacturer finally failed in a competitive market due to the cost gap in fleet sales. It then engaged in trade in Kazakhstan and Russia" (Zhu 2007).

China invested in and deployed many industries in inland provinces before economic reform began in 1978 in consideration of balanced economic development across regions and military defense. Since 1978, the market has become a dominant force in economic development, and industrial layout has been concentrated in eastern coastal areas (Yangtze and Pearl River Delta in particular). At the same time, old industrial bases in Northeast China have become significantly less important, providing excellent examples for understanding economic growth, industry agglomeration and urban development. Since sea shipping is the main means of modern international trade, coastal areas are obviously closer to international markets. Comparatively, Shanghai and Hong Kong (and nearby Shenzhen) are the most important port cities in China, and thus the Yangtze and Pearl River Deltas have obtained more significant geographical advantages in coastal areas. With a long distance to the coastline, high transport costs but relatively low labor cost, it is appropriate for inland cities to produce bulk cargo, including resource products such as coal that can be transported by train and ship, or high value-added products, such as computer chips, that can be transported by plane (Gill and Kharas 2007).

3.1.1 Industry Agglomeration in the Process of Globalization and Urbanization

Chinese industry was still geographically scattered in 1978, which can be seen in the following four aspects: (1) the industrial share of eastern coastal areas and many central provinces in the national total was under 5 %; (2) three provinces in Northeast China enjoyed an important status in industry, with Liaoning ranked No.1 nationally by industrial share; (3) the industrial share of Gansu and Shaanxi in the inland western region only just exceeded 2 % and even that was higher than that of some central and eastern provinces; and (4) Beijing, Tianjin and Shanghai surpassed many other provinces in their high share of industry despite their small area (Jin et al. 2006; Chen et al. 2006).

Chinese provinces are divided into coastal and inland categories in Fig. 3.1 to depict their share of national industrial GDP from 1987 to 2005. Data comparisons in those years indicate a significant trend of industry agglomeration in China, with

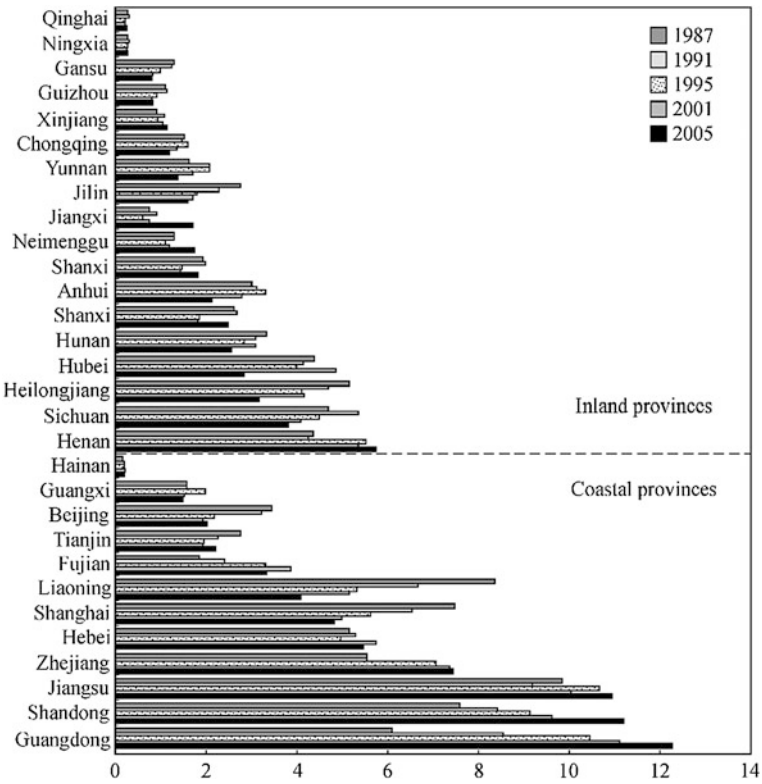

Fig. 3.1 Industrial shares of various provinces 1987–2005 (%). *Note* Beijing is included in coastal areas. Data are arranged by following the ascending sequence of coastal and inland industrial shares in 2005

the following concrete manifestations: (1) the industrial share of eastern coastal areas increased considerably, and the industrial share of the top four provinces of Guangdong, Shandong, Jiangsu and Zhejiang reached 12.27, 11.20, 10.93 and 7.43 % respectively; (2) the industrial status of three provinces in Northeast China significantly declined, with the shares of Liaoning, Heilongjiang and Jilin dropping to 4.09, 3.16 and 1.60 % respectively; (3) the industrial share of western provinces decreased as a whole; and (4) the industrial share of four municipalities directly under the central government sharply fell, and the industrial share of Shanghai, Tianjin, Beijing and Chongqing stood at 4.83, 2.21, 2 and 1.2 % respectively. Generally, the trend of industry agglomeration is also confirmed by the fact that only Liaoning and Jiangsu had industrial share of over 8 % in 1987, while the industrial share of 13 provinces was below 2 %. In 2005, three provinces occupied an industrial share above 8 % while 14 provinces had an industrial share below 2 %. Seven of 11 provinces that increased industrial share during 1987–2005 were in coastal areas, while 13 of 18 provinces that saw a decreased industrial share were in inland areas. The industrial share of the remaining coastal provinces, ignoring three municipalities directly under the central government, Liaoning and Guangxi, increased. Decline in the industrial share of the three municipalities directly under the central government is related to the post-industrialization they entered into, while the decrease in Liaoning's industrial share reflects the decline of industrial status of the northeastern region. The fall in industrial share of Guangxi is attributed largely to agglomeration of economic activities in neighboring Guangdong. Guangxi was also a target of the West Development Strategy due to its relatively undeveloped economy despite its coastal location.

The trend of spatial industry agglomeration is also clearly shown by industrial level. Lu and Tao (2006) develop an index that more accurately reflects the trend of industry agglomeration based on industriallevel data, observe the development trend of the degree of regional agglomeration of the Chinese manufacturing industry during 1998–2003 and discover the ascending stage of regional industry agglomeration in China. Fan (2008) computes the agglomeration trends of 29 two-digit industries (industrial categories that are roughly divided) in various provinces during 1981–2001. Based on the Gini coefficient of one industry in various provinces, only the figures for provincial regional distribution of two of 29 industrial categories declined, and only CR3 (share of top three rankings) of seven industrial categories decreased.

Change in industrial share has accompanied flow of labor (mainly surplus rural labor) to southeastern coastal areas. Analysis based on census data 2000 indicates that the destinations of labor flow were highly consistent with provinces with industry agglomeration in 2001 (see Figs. 3.2 and 3.3)[2] and that Jiangsu, Zhejiang and Shanghai in the Yangtze River Delta and Guangdong in the Pearl River Delta

[2]The gross number of rural migrant workers in the cities reached 150,000,000, which was widely quoted at the National People's Congress and Chinese People's Political Consultative Conference in March 2007.

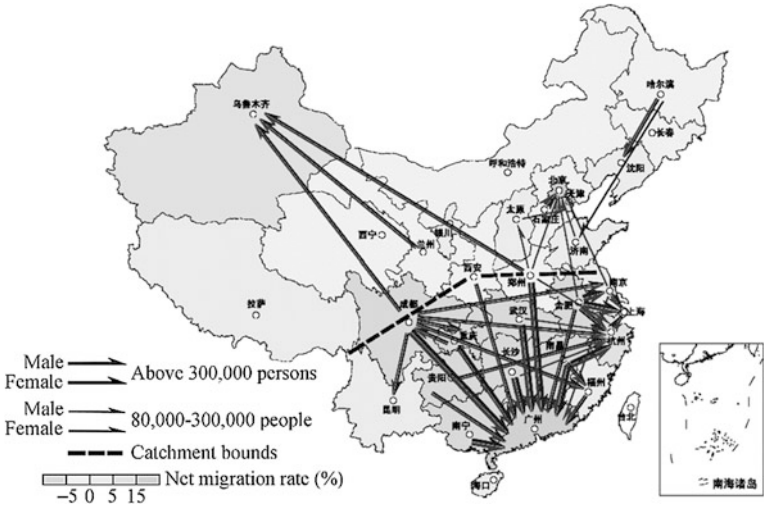

Fig. 3.2 Main flows and directions of interprovincial migration 1995–2000. *Data source* Ding et al. (2005)

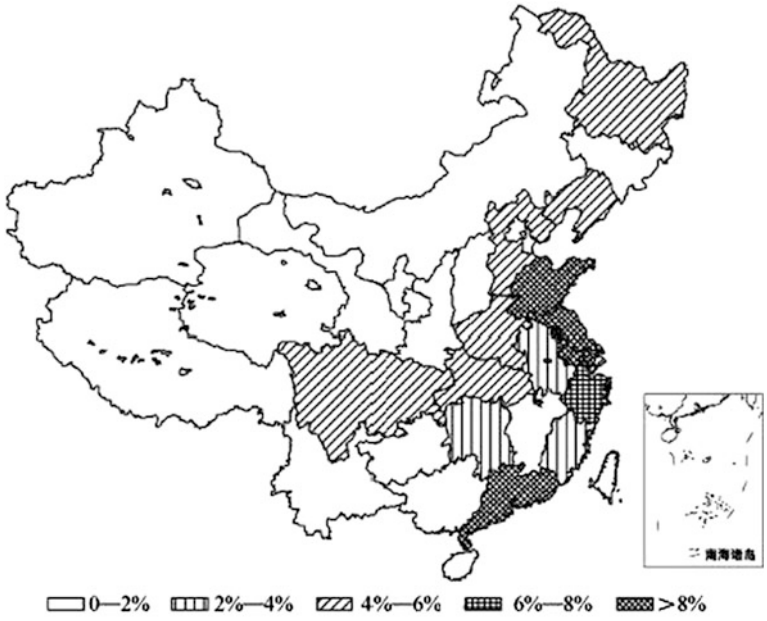

Fig. 3.3 Industrial share distribution of various provinces 2001. *Data source* Jin et al. (2006)

became the main destinations of cross-regional labor flow. Therefore, change to industrial share can intuitively reflect the trend of industry agglomeration and agglomeration in the Yangtze and Pearl River Deltas, in particular, in addition to differences in the speed of industrial development in different provinces.

Is industrial growth in various regions related to their involvement in globalization and urbanization? Our studies based on inter-provincial panel data show that economic opening-up and urbanization have promoted industry agglomeration. Provinces that are close to Shanghai and Hong Kong are economically successful, as are regions that were opened to the outside in the early years of the reform and which thus enjoy the advantages of industry agglomeration. Moreover, we find that provincial market potential (level of economic development), improvement in transport and communication infrastructure and less government intervention also contribute to industry agglomeration (Jin et al. 2006; Chen et al. 2006; Lu and Chen 2006). The opening of the goods and capital markets is the main indicator of globalization. The degree of opening of the capital market measured by per capita FDI and of the goods market measured by trade dependence show that eastern coastal areas are highly opened and that globalization is the most important reason behind the widening income gaps across regions (Wan et al. 2007). Finally, Fujita and Hu (2001), Kim and Knaap (2001) and Gao (2003) provide some evidence of industry agglomeration in eastern coastal areas that is attributed to differences in foreign investment and international trade across regions.

3.1.2 Regional Imbalance in the Process of Globalization, Industrialization and Urbanization

There is no doubt that industry agglomeration has indeed widened the development gaps among different regions in China. Regional imbalance in China must be analyzed in the context of global labor division during globalization. It is very clear that coastal areas inevitably enjoy greater advantages in participating in international trade when that trade is dominated by sea transport. Meanwhile, many multinational corporations have concentrated their manufacturing operations in coastal areas in China to facilitate shipping of products (parts or final consumption goods) to destinations around the world. The different impact of globalization on coastal and inland areas are analyzed in Chap. 4 to demonstrate that coastal areas have more outstanding performances in opening trade and attracting FDI than inland areas.

Differences in the process of globalization among eastern, central and western regions are also embodied in the process of urbanization, indicating that economic activities are mainly concentrated in the big cities in the east. The high growth of the Chinese economy has been accompanied by rapid urbanization since 1992, and this is shown by a sharp increase from 32 to 117 of cities with a population of more than 1 million during 1993–2006. Observations on the distribution of these big

Table 3.1 Number of cities with more than 1 million people in the eastern, central and western regions (1982–2006)

Year	1982		1993		2006	
	Qty	%	Qly	%	Qty	%
Total	20	100.0	32	100.0	117	100.0
Eastern region	11	55.0	15	46.9	54	46.2
Shanghai, Jiangsu and Zhejiang	2	10.0	3	9.4	16	13.7
Guangdong (including Hainan)	1	5.0	1	3.1	11	9.4
Fujian	0	0.0	0	0.0	4	3.4
Beijing, Tianjin. Liaoning, Shandong, Hehei	8	40.0	11	34.4	23	19.7
Central region	4	20.0	12	37.5	39	33.3
Western region	5	25.0	5	15.6	24	20.5

Data sources data for 1982 are sourced from China Statistical Yearbook 1983, data for 1993 from China City Statistical Yearbook 1993–1994, and data for 2006 from China Statistical Yearbook 2007

cities show considerable changes to the shares in eastern, central and western regions. Consistent with the trend of industry agglomeration, after 1993 the proportion of big cities in the eastern region has declined, mainly due to a decrease in the number of big cities in provinces in the Bohai Bay area and significant increases in Jiangsu, Zhejiang, Shanghai in the Yangtze River Delta and Guangdong in the Pearl River Delta. In that period, the proportion of big cities in central provinces increased by 13.3 %, while that in the western provinces decreased by 4.5 % (see Table 3.1).

3.2 Balanced Regional Development: Is There Trade-off Between Efficiency and Equalization?

China designed a development path at the beginning of the reform and opening-up to develop its eastern region first then drive the development of the whole nation. This strategy was a wise choice as China was then a poor, undeveloped country. It was like many people trying to escape from a desert island on only one lifeboat. The way to avoid sinking and losing all the passengers is to allow only the stronger passengers to leave first and for them to arrange help for those left behind. However, the challenge is to give the left-over people some hope.

3.2.1 Mechanism of Regional Balance

Globalization has contributed to growth in China but has widened the gap in economic development across regions. This widening gap is characterized by the following basic facts: (1) The income gap among provincial-level administrative

regions has been gradually widening. The Gini coefficient representing inter-regional per capita income has gradually risen except for slight declines in 1990 and during 1996–1998. It reached 0.238 in 2005 (see Fig. 6.2 in Chap. 6), and data for the average income of urban employees and per capita household income also indicate the increase in the interprovincial gap (Knight et al. 2006); (2) The income gap between eastern coastal areas and central and western regions has also been expanding, while income gaps in the three economic zones have shown a trend of "club convergence" (Zhang et al. 2001); (3) Data for the average income of urban employees and per capita household income suggest that the intra-provincial income gap is widening, while among some provinces it shows a trend of convergence, which has also existed at regional level (coastal-inland) and city level (Knight et al. 2006); (4) The convergence of the gap in economic development across regions after 1978 is attributed to the narrowing imbalance among coastal provinces rather than between coastal and inland provinces or among inland provinces (Jian et al. 1996). Raiser (1998) also obtains similar results.

Regional gaps in China show a trend toward expansion as a whole and the variations in inter-regional income gaps is very similar to that of the urban-rural income gap (see Fig. 6.2 in Chap. 6). It is no wonder the inter-regional income gap and the urban-rural income gap take on synchronous changes if the inter-regional income gap is mainly caused by urban-rural income (Wan 2006). Existing studies summarized the factors contributing to the inter-regional gap into the following categories: (1) Eastern coastal areas have integrated more successfully into the global economy (Démurger et al. 2002) and obtained more international direct investment (Wan et al. 2007) because they have enjoyed various preferential policies, in particular policies that promote economic opening and marketization by deregulation; (2) imbalanced development of the private economy and township enterprises (Wan 1998; Rozelle 1994; Wan et al. 2005, 2007); (3) fiscal transfer biased in favor of the eastern region (Raiser 1998; Ma and Yu 2003); (4) differences in infrastructure among various regions (Démurger 2001); (5) industry agglomeration in coastal areas (Yangtze and Pearl River Deltas and Bohai Bay, in particular) (Wen 2004; Lu and Chen 2006; Chen et al. 2006). According to the World Bank annual report, the widening inter-regional income gap has been caused in part by preferential government policies in trade and investment, but the root cause is that comparative advantages across regions in China were inhibited before the reform and opening-up, and since the reform began governments have implemented preferential policies for coastal areas to give play to inter-regional comparative advantages (World Bank 1996). The impact of geographic location on inter-regional gaps is also embodied in inter-city gaps. Leman (2005) studies gaps in per capita GDP among 53 big cities in China in 2000 and finds distance to port contributes 58 % to inter-city gaps in per capita GDP.

Foreign capital inflow and development of an export-oriented economy is a driving force behind developing inter-regional comparative advantages in opening-up to the outside world. The decomposition results of the income gap indicate that differences in inter-regional per capita FDI and trade dependence explain a great deal about inter-regional income gaps. Specifically, we try to

decompose income gaps to examine the various factors influencing inter-regional income gaps in and obtain the following findings: (1) The contribution made by indexes representing economic opening (per capita FDI and trade/GDP ratio) is significantly positive and has been reinforced over time. In 2001, 21.66 % of the overall inter-regional income gap was explained by economic opening-up; (2) Capital input constitutes a primary and increasingly important factor in inter-regional income gaps, contributing 19.11 % to these in 2001; (3) Different inter-regional progress in economic reform characterized by denationalization and reducing government intervention also significantly contributes to inter-regional income gaps. In 2001, privatization of SOEs accounted for 14.26 % of the differences across regions and reducing government intervention accounted for 14.07; and (4) Location, education, urbanization and population increase incomes in progressive regions, but their contributions are weakening (Wan et al. 2005, 2007).[3] Among all those factors relating with inter-regional development gaps the most fundamental factors are location and policies. They were the main causes of industry agglomeration in the Yangtze River Delta, Pearl River Delta and Bohai Bay areas and the consequent regional income gaps.

In China, widening inter-regional income gaps have been accompanied by market segmentation and local protectionism, which are unfavorable to sustained economic growth and scale effect. Before 1978, the central government made huge investments in industry in inland provinces to promote balanced development across regions and strengthen military security. After economic reform began in 1978, most fiscal transfer from the central government were directed at economically developed regions and priority was given to developing coastal areas. Backward regions received fewer payments. Meanwhile, governments at all levels received funding to develop local economic policies under the fiscal decentralization system, and subsequently gained incentives for market segmentation and protection of local disadvantaged enterprises in a short-term bid to increase local taxes and employment. Many recent empirical studies have found serious market segmentation in regions across China (Young 2000; Zheng and Li 2003). Some researchers believe the degree of inter-regional market segmentation is improving (Naughton 1999; Xu 2002; Gui et al. 2006; Lu et al. 2006; Lu and Chen 2006), as is the degree of inter-regional specialization (Bai et al. 2004). Others argue the degree of inter-provincial market segmentation in China is rising and is even higher than market segmentation across countries in the European Union (Poncet 2002, 2003).

Local governments' market segmentation might have some strategic reasons. In the economic decentralization system, backward regions can improve their bargaining power in obtaining central fiscal transfer and may even turn around comparative disadvantages by means of rapid "learning by doing" by investing in some emerging industries with local protectionism and may even finally overtake some developed regions. In terms of regional imbalance, the strategies used by backward regions cause a great deal of redundant construction and inefficient allocation of

[3]See Chap. 4 for details.

resources[4] and are unfavorable to economic agglomeration and sustainable economic growth, although they benefit local regions under certain conditions (Lu et al. 2004, 2007; Lu and Chen 2006). According to our empirical studies, China's domestic market shows a trend toward gradual integration, but intervention by local governments tends to increase market segmentation.[5] Government intervention measured by share of local government expenditure in local GDP has risen gradually since the mid 1990s, and this has delayed the full achievement of scale economy. Therefore, reducing government intervention and adopting policies to promote central fiscal transfer and balanced development help to promote labor division, collaboration, market integration and economic growth across regions (Lu and Chen 2006; Chen et al. 2007).

3.2.2 *Adjustment to Policies for Balanced Regional Development*

Admittedly, the widening inter-regional income gap is reasonable and manifests improved efficiency in the allocation of economic resources across regions. However, it will be difficult to form an integrated market nationwide and for China to gain advantages in development from scale economy in the whole country if all regions adopt policies to segment markets due to widening inter-regional income gaps. More importantly, differing interests across regions as a result of unbalanced development also pose political risks to federal states and adversely affect democratization (Shah et al. 2006). It is not hard to imagine that democratization is likely to aggravate the differences in interests from region to region and make it more difficult to form an integrated national market.

The Chinese government has obviously become aware of the necessity to adjust regional economic development policies. As put by Deng Xiaoping in his speech in 1986:"We will allow some regions and some people to get rich first for the purpose of eventually realizing common prosperity and preventing polarization. That's socialism."[6] China implemented economic opening-up policies for coastal areas for economic development in the early years of the reform and opening-up, and these policies had many positive effects but they did widen inter-regional gaps. "The socialist system should and can avoid polarization. One of the solutions is to ask regions that grow rich earlier to pay more taxes on their profits and to support the development of

[4]Wei (2001) provides many examples of redundant construction.

[5]Changes to determinant factors and influence on economic growth of domestic market segmentation in China since the reform and opening-up are specifically explored in Chap. 5.

[6]Selected Works of Deng Xiaoping (Vol. III), People's Publishing House 1993, p. 195.

poverty-stricken areas. Of course, it is infeasible to do so very early … We can plan to highlight and solve the problem at the end of this century when a well-off society has been built,"[7] said Deng in his celebrated South Tour Speech in 1992. The Chinese government has attached great importance to the goal of balanced regional and urban-rural development since the late 20th century as expected and designed by Deng. This was marked by a series of regional development strategies such as the West Development Strategy, the Strategy of Revitalizing the Old Industrial Bases in Northeast China and the Strategy of the Rise of Central China.

From the perspective of regional development, policies promoting economic opening are first implemented in well-located eastern coastal areas by mainly establishing special economic zones that enjoy special preferential policies. From 1979 to 1980, the government originally planned to build "special economic zones" by taking advantage of favorable conditions in Guangdong and Fujian, which are adjacent to Hong Kong and Macau, and finally determined that Shenzhen, Zhuhai, Shantou, Xiamen and Hainan (1988) would be the initial special economic zones. Consequently, coastal areas obtained policy support for priority development. Special economic zones are endowed with great power in economic management and are allowed to introduce foreign capital to establish joint ventures, cooperatives or wholly foreign-invested enterprises, which enjoy autonomy in management and preferential tax rates.[8] In 1984, the Chinese government decided to open up 14 more coastal cities and offered foreign investors and suppliers of advanced technologies preferential treatment and increased the autonomy of the cities so they could dynamically engage in foreign economic activities. In 1985, the Yangtze River Delta, the Pearl River Delta and the Xiamen-Zhangzhou-Quanzhou Delta in southern Fujian began to enjoy preferential policies similar to coastal economic zones, and Shanghai started to enjoy preferential policies as a coastal economic open zones and an open city. In 1988, the central government further expanded coastal economic open zones to cover 153 cities and counties in eight provinces and municipalities in East China. All of the first 14 national economic and technological development zones established during 1984–88 in eastern coastal areas. Open policies in those areas in the 1980s further widened the gap between coastal and inland regions while significantly promoting economic development in eastern areas.

Since the 1990s, the government has gradually come to consider balanced development across regions as an important goal. The year 1992 was characterized by major opening in many areas. The government approved 15 new open ports and 26 new open counties, taking the total to 167 open ports and 825 open counties and cities nationwide. Open policy was also implemented in inland regions in this

[7]Ibid. p, 374.

[8]China has often adjusted preferential policies for special economic zones. The Law of the People's Republic of China on Enterprise Income Tax, which came into effect on January 1, 2008, is considered to have ended "the last preferential policy" for special economic zones while integrating the income tax system for both foreign-invested and domestic enterprises.

period. In March 1992, the government approved the building of economic cooperation zones in four border cities in Northeast China and Inner Mongolia and established 14 national border economic cooperative zones, most of which were in central and western regions (see Table 3.2). In August 1992, the government announced the establishment of five open cities along the Yangtze River as well as in the provincial capitals of four border regions and 11 inland regions. Specific measures were used to increase the power of open cities in foreign economic cooperation, support open cities to introduce advanced technologies and management experience from foreign countries, implement preferential policies for foreign-invested enterprises and allow open suitable cities to build economic and technological zones. Many national economic and technological development zones and national hightech industrial development zones established during 1992–94 were located in central and western regions (see Table 3.2).

As mentioned above, the Chinese government has attached great importance to the goal of interregional balanced development and adopted several key strategies to achieve this. In 2000, it launched the West Development Strategy to accelerate infrastructure construction, strengthen ecological environmental protection, adjust industrial structure, speed up the cultivation of experts and intensify the reform and opening-up in the western region. Since then, the government has increased fiscal investments every year. By 2005, the accumulated central fiscal construction funds invested in western regions amounted to about RMB460 billion, accumulated fiscal transfer and special subsidies totaled more than RMB500 billion, and one-third of long-term treasury bonds for construction was allocated to those areas. The state assisted the western region in constructing 60 key projects with an investment of RMB850 billion, which included more than RMB270 billion in treasury bonds. In the same period, the western region absorbed more than RMB9 billion in FDI and actually used almost RMB15 billion FDI, including loans from international organizations and foreign governments. More than 10,000 enterprises from the eastern region invested and started businesses in the western region, with total investment of more than RMB300 billion.[9] The Chinese government also intensified efforts in construction of rural infrastructure and public utilities in the western region. In 2003, the government proposed to implement the strategy of revitalizing old industrial bases in Northeast China and announced it would deepen reform of the economy, promote the upgrading of the industrial structure, accelerate regional cooperation, speed up economic transformation of resource-exhausted cities, intensify efforts in ecological construction and environmental protection, expedite development of education, health, culture, sports and other social undertakings and introduce preferential policies in tax, national fiscal investment and foreign capital introduction in three northeastern provinces and Inner Mongolia. In 2004, the government explicitly put forward the important strategy of promoting the rise of central China and issued such a program in 2006. Most of the national economic and technological

[9]Data source: website of Western Development Leading Group Office of the State Council (http://www.chinawest.gov.cn).

Table 3.2 Evolution of open zones

Period	Type of opening	Year	Location			Sub-total
			Eastern region	Central region	Western region	
1978–1988	Special economic zone	1980	4 cities			5
		1988	1 province			
	Coastal open city	1984	14 cities			14
	National economic and technological development zone	1984	10 cities			14
		1985	1 cities			
		1986	3 development zones in Shanghai			
	Coastal economic open zone	1985/1988	7 provinces, 2 municipalities directly under the central government		1 province	10
1988–1998	Capital city, city along the Yangtze River	1992	1 city	11 cities	11 cities	23
	National border economic cooperative zone	1992	1 city	4 cities	9 cities	14
	National economic and technological development zone	1992	4 cities 2 development zones in Fujian			18
		1993	3 cities 2 development zones in Guangdong	4 cities	1 city	
		1994	1 city		1 city	
	National high-tech industrial development zone	1988	1 development zone in Beijing			53
		1991	10 cities 1 development zone in Shandong, Fujian and Guangdong	5 cities 1 development zone in Hubei	5 cities	
		1992	11 cities 1 development zone in Shanghai	7 cities	6 cities 1 development zone in Inner Mongolia	
		1996	1 city			
		1997			1 development zone in Shaanxi	

(continued)

Table 3.2 (continued)

Period	Type of opening	Year	Location			Sub-total
			Eastern region	Central region	Western region	
	National industrial park	1989–1994	1 park in Jiangsu, Shanghai, Zhejiang, Fujian and Hainan			5
	National boned zone	1990–2000	10 cities 1 park in Shanghai, Tianjin and Fujian			13
1998–2008	National economic and technological development zone	2000		4 cities	7 cities	17
		2001		1 city	3 cities	
		2002	1 city		1 city	
	National high-tech industrial development zone	2007	1 city			1

Notes

1. *Data source* http://www.cadz.org.cn/

2. The eastern region covers 11 provinces and municipalities directly under the central government—Beijing, Tianjin, Shanghai, Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong and Hainan. The central region covers eight provinces—Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan. The western region covers 12 provinces and municipalities directly under the central government—Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia, Xinjiang, Inner Mongolia and Guangxi

development zones and high-tech industrial development zones that have been established since 2000 were located in central and western regions (see Table 3.2).

Adjustment to Chinese regional and urban-rural development policies are more clearly embodied in fiscal transfer by the central government. The central fiscal transfer system has focused on eastern coastal areas and aggravated regional inequality for a long period since the reform and opening-up (Raiser 1998; Ma and Yu 2003), but this has changed in recent years. Figure 3.4 shows changes to the share of such payments for the eastern, central and western regions and three northeastern provinces and net central fiscal transfer payments.[10] The share of the

[10]Net central fiscal transfer is central subsidy revenue less turned-over central expenditure. Traditionally, China is divided into eastern, central and western regions. Three northeastern provinces are divided into a separate region to explore the influence of the Strategy of Revitalizing Old Industrial Bases in Northeast China. Liaoning and three provinces are generally included in the eastern region, while Heilongjiang and Jilin fall in the central region. Guangxi and Inner Mongolia are included in the western region in Fig. 3.3 in line with the Policy of Western Development.

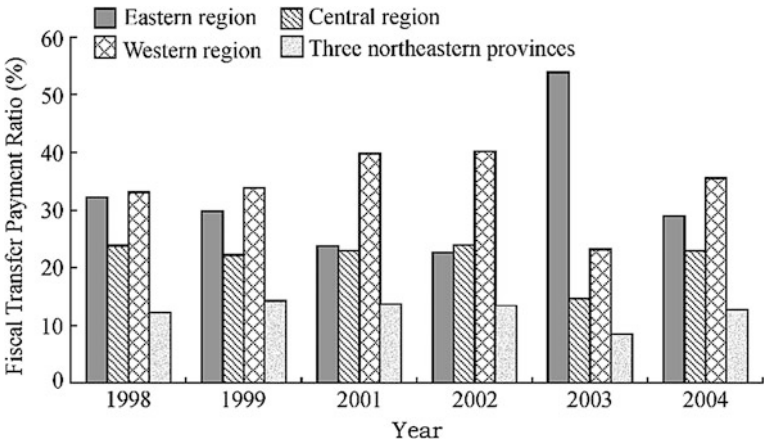

Fig. 3.4 Shares of four regions in net central fiscal transfer payments (1998–2004). *Notes* (1) Chongqing data 2002 is absent. (2) Guangxi and Inner Mongolia are included in western region because they are targets of west development policy. *Data sources* Finance yearbooks of China (China Finance Magazine Publishing House, various years) and authors' calculations

eastern region in those payments has declined. Eastern share suddenly rose in 2003 because Guangdong received 38.71 % of net central fiscal transfer payments. The western region's share of fiscal transfer payments significantly increased during 2000–02 after the implementation of the West Development Strategy in 2000. In respect to the Strategy of Revitalizing Old Industrial Bases in Northeast China implemented in 2003 and the Strategy for the Rise of Central China implemented in 2004, data 2004 and data 2002 are compared due to abnormal data 2003. No significant increase in shares of two regions in fiscal transfer payment is shown in Fig. 3.4.

The four regions are inadequate to observe changes to the direction of central fiscal transfer payment due to great differences in development levels among provinces in eastern, central, western and northeastern regions. The Chinese government has been considering further balanced development across regions in recent years. Is the consideration reflected in share of provinces' shares in central fiscal transfer payments? The share of one province is related to per capita GDP in Fig. 3.5, which shows that richer provinces had still obtained more transfer payments from the central government by 1998, that the relation basically disappeared in 1999 and that transfer payments were adjusted to favor poorer provinces in 2000.

Do more fiscal transfer payments produce higher growth? Figure 3.6 shows the relationship between fiscal transfer payments and economic growth rates during 1998–2004. The horizontal axis represents the share of one province in fiscal transfer in one year minus the mean value of shares in that year. The vertical axis stands for the economic growth rate minus the mean value of economic growth

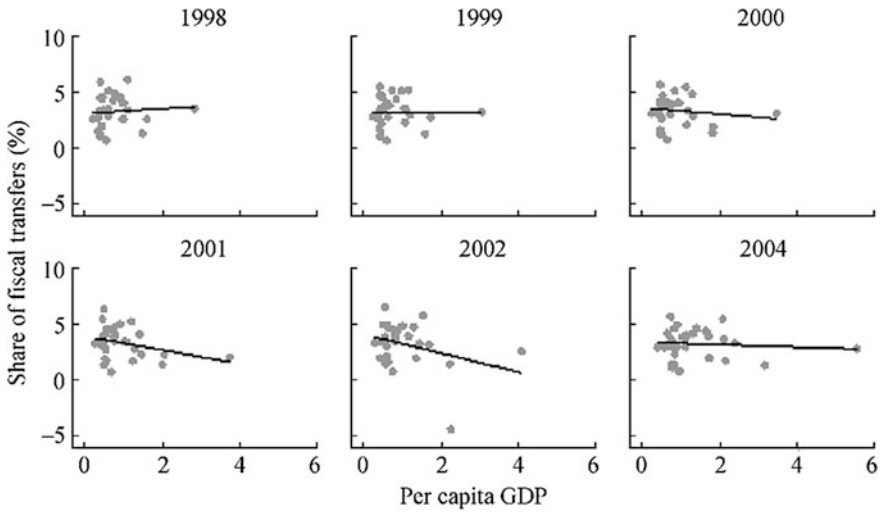

Fig. 3.5 Economic development level and share in net central fiscal transfer payments (1998–2004). *Data sources* Finance yearbooks of China (China Finance Magazine Publishing House, various years) and authors' calculations. Beijing had negative net transfer payments in 2002

rates in subsequent years. De-mean is used to eliminate the influence of fixed effect not changing with time when economic growth rate is explained. The first chart in Fig. 3.6 demonstrates the relationship between central fiscal transfer payments and economic growth rate and suggests that provinces receiving more payments have a slower growth rate. As those payments may contribute to or be the result of economic growth, the chart may not accurately reflect how fiscal transfer payments affect growth. On the contrary, provinces may receive more central fiscal transfer payments due to their slow economic growth rate. The vertical axis in the second chart shows the economic growth rate in the following year to account for the impact of two-way causality, which shows no higher economic growth brought about by a higher share of central fiscal transfer. In other words, central fiscal transfer only plays a role in income reallocation in the short term, and there is no evidence such payments can balance development. Continuous lag in explained variables indicates the positive effect of the share of fiscal transfer payments in economic growth three or four years later. However, negative correlation between share of central fiscal transfer payments and economic growth appears again six or seven years later. Relatively speaking, samples for analysis dramatically decrease and the accuracy of results correspondingly declines as the lag phase of the share of payments extends. Therefore, there is no strong evidence that central fiscal transfer payments can promote economic growth in backward provinces, but this is yet to be further explored by empirical studies.

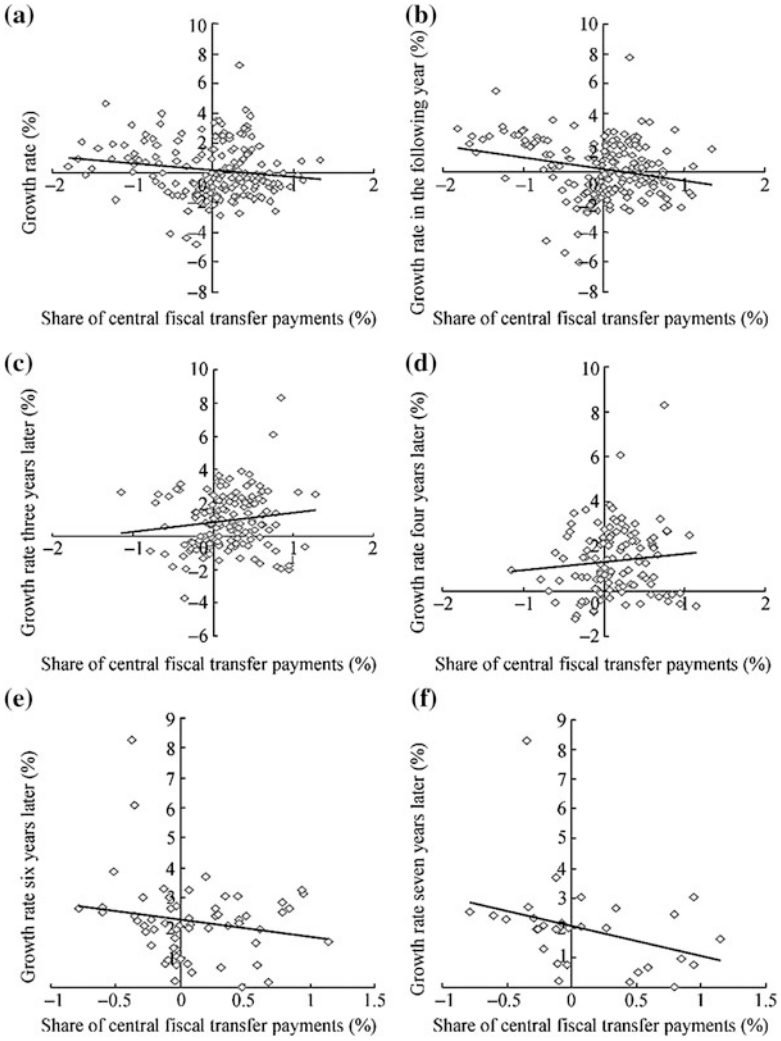

Fig. 3.6 Central fiscal transfer payments and economic growth. *Notes* Data of fiscal transfer payment share cannot be compared to those in other years because fiscal data for 2000 of Chongqing is unavailable. Data of the fiscal transfer payment share of Beijing in 2002 and of Guangdong in 2003 are outliers, and thus are removed in Fig. 3.5

3.3 Readjustment to Policies for Balanced Regional Development

The starting point of China's reform and opening-up was a planned economic system that had been in place for many years. The economy was characterized by balanced development across regions, which provides a good opportunity to observe industry agglomeration and regional economic development.

Soon after the reforms of 1978, a significant trend of industry agglomeration appeared in coastal areas (Yangtze River Delta, Pearl River Delta and Bohai Bay areas in particular), which was due to globalization, urbanization and economic policies biased to coastal areas. Future regional economic patterns in China will lead to further economic agglomeration and be dominated by the three big economic centers and metropolitan circles with nationwide influence in the Yangtze River Delta, Pearl River Delta and Bohai Bay areas. The Yangtze River Delta Metropolitan Circle has taken the lead and become the No. 6 metropolitan circle in the world and a globally influential manufacturing base. Guangdong in the Pearl River Delta ranks first in share of industry in China. In addition to the three metropolitan circles, China will build several regional economic and industrial centers in Wuhan, Chongqing and Xi'an, among others, to form a gradient regional development pattern. China will give fuller play to the agglomeration effect of economic development and over some decades will greatly relieve disparities between people and land as long as it can bring more than half of the population into the three economic zones and house more than 70 % of the population in cities.

Meanwhile, two obstacles to industry agglomeration remain. One is market segmentation by local governments and the other is limited cross-regional labor flow caused by the restrictions imposed by the household registration system and rural land property rights system. As a result of inadequate market integration and restricted labor flow, China's industry agglomeration has slowed down. Economic growth is adversely affected by artificially suppressed urbanization, small city sizes and scale gaps among cities (see relevant discussions in Chap. 2). Chinese policy-makers must realize that industry agglomeration is an indispensable part of economic development and that the country will lose the driving force of its sustained economic development and global competitiveness if it merely pursues regional balance by means of decentralized economic development before economic agglomeration has reached the optimal level.

Industry agglomeration becomes an important contributor to widen income gaps among regions and between urban and rural areas while considerably prompting economic growth. However, widening income gaps adversely affect sustained long-term economic growth. The Chinese government has become aware of the importance of balancing urban-rural and regional development and has shifted more fiscal transfer to relatively backward inland and rural areas. However, no evidence exists to support the idea that central fiscal transfer have played a role in driving faster economic growth in backward areas. Regional and urban-rural income gaps are still widening, possibly because market forces are greater than the role played

by government fiscal transfers in balancing development or because fiscal transfers alleviate widening income gaps but do not promote economic development. Balancing development among regions and between urban and rural areas while continuously giving play to the economic agglomeration effect is a great challenge.

Do economic agglomeration and regional gaps really constitute an inevitable contradiction? The answer is "No". First, we concede that economic agglomeration widens income gaps across regions, especially when agglomeration is promoted in coastal areas. However, we note that agglomeration is by no means infinite and that a "crowing effect" that offsets the agglomeration effect will appear along with agglomeration of population and economic activities, including traffic congestion, environmental pollution and rising land and labor costs. Optimal city size will be reached somewhere between the agglomeration and crowing effects (Au and Henderson 2006a). Second, reasonable labor flow helps to give full play to the scale effect of urban economic development and contributes to improving per capita hold of resources in backward and rural areas, which also plays a positive role in narrowing regional and urbanrural income gaps. Studies by the World Bank indicate that convergence of inter-regional income in the US, Chile and Pakistan is achieved by fuller factor mobility rather than special regional policies (Shang et al. 2006). Widening regional gaps also occurred in the history of developed countries such as the US and France, but they were followed a continuous decline. The evidence shows that only factor flow and sustainable development can finally help to narrow regional gaps. Globally, the richer a country is, the smaller the regional gap is (Uchida 2009). Third, if the agglomeration and crowing effects are concomitant, the difference in life quality will be far less than the difference in economic development between economic agglomeration areas and relatively backward areas, and people with different preferences may choose a suitable place of residence under conditions of free population flow. To put it simply, those people who require high incomes should sacrifice other aspects of quality of life while those who prefer quality of life should sacrifice income. Finally, only agglomeration can help China to achieve sustainable development, gain more fiscal revenue for cross-regional transfer, and implement policies for equal public service across regions. If China abandons agglomeration, development will slow down and consequently the government will lack the financial resources to implement balanced development policies across regions.

Of course, China should also prevent inter-regional gaps from widening by using transfer payments to improve equality and stability. However, inter-regional balanced development cannot depend too much on fiscal transfer. Transfer payments should not simply subsidize income, and balanced development among regions and between urban and rural areas is not necessarily achieved at the cost of economic efficiency. China should make policy adjustments in the following ways so as not to control urban-rural and regional income gaps at the cost of growth: (1) Since giving play to scale effect helps to drive economic growth, the Chinese government should break market segmentation, reform the systems for household registration and rural land property rights, facilitate cross-regional labor flow, improve urbanization and economic agglomeration and, in particular, promote moderate increases in urban population sizes in the Yangtze River Delta, Pearl River Delta and Bohai Bay areas.

(2) China should promote equalization of public services between urban and rural areas and among regions, and narrow wage gaps among public servants and public service staff (e.g. elementary and secondary school teachers) across regions instead of simply making transfer payments or unilaterally emphasizing equalization in hardware facilities, nor directing transfer payments to direct production investment in industries in the inland areas which do not have comparative advantages. (3) Much attention should be paid to strengthening infrastructure construction and investment in human capital in backward and rural areas when labor is yet to flow freely to create conditions for long-term economic growth and further agglomeration of economic activities in the coastal areas. (4) China should adjust the focus of balanced development policies to integrate the dual urban-rural economy, narrow urban-rural income gaps, in particular urban-rural income gaps in inland provinces, which will help to bridge income gaps between urban and rural areas and among regions.

The central government plays an irreplaceable role in balancing regional development. To be specific, the central government should play a role in at least the following aspects:

1. Maintaining a integrated domestic market. It is of vital importance for China to keep the integrated market at present. On one hand, an integrated market helps to give play to China's scale advantages in economic development, and on the other hand, China should rely on its large integrated market to give play to its position in the international community and develop some strategic industries such as large aircraft and GPS. To this end, China should enact legislation to prevent local governments from segmenting the commodity market.
2. Promoting cross-provincial regional cooperation. China as a large country should proceed from locality to build an integrated market. Currently, China should firstly facilitate cooperation in the three economic circles of Yangtze River Delta, Pearl River Delta and Bohai Bay. An obstacle to intra-regional cooperation, in addition to market segmentation policies by governments at all levels, is the barrier to labor flow as a result of incompatible intra-regional social security systems. Pioneering the regional integration of the social security system in the Yangtze River Delta area will contribute to breaking interregional market segmentation. Freeing the labor flow, however, may widen the development gap among various cities in the region in the short term. Therefore, the central government should consider establishing an interest balance and negotiation mechanism that is conducive to intra-regional market integration. Theoretically and practically, the Chinese government should promote cross-provincial regional cooperation by overriding the power of local governments.
3. Decentralizing the power of local governments. This should be done by weakening the model in which governments promote economic development and obtaining the driving forces for economic development by depending more on private forces. It cannot be denied that China has achieved rapid development by leveraging government impetus over the past 30 years. However, now it should pursue sustained economic growth by weakening the power of local governments to intervene in the economy. First, conditions should be created for the

establishment of a large integrated market by weakening the power of local governments. The central government is attempting to drive the development of backward areas through interregional cadre exchanges and to prevent excessive local power by appointing local officials for short tenures of several years. Consequently, unless the power of local government officials is weakened, they will continue to pursue short-term goals while ignoring the national goal of long-term sustainable development. Second, today's China do not rely on government to promote economic development that much as it did at the early stage of economic transititon. Infrastructure construction in China (in coastal areas in particular) has reached a high level and the relative importance of governments in driving infrastructure construction has decreased significantly. The private sector has gone from strength to strength and can now provide finance in the capital market, replacing the government as the chief investor in many significant projects. At the same time, as China's economy continues to develop, the necessary information has become increasingly complicated and government become less competitive in handling complicated market information.

4. Boosting equalization in local public services by means of a property tax. Some public services provided by local governments such as primary education mainly supported by local government. Economic theories and practices in various countries have indicated that the most efficient way of financing local public services is a property tax which can directly link service payments to service consumption. Such a tax should be introduced across China. China should take the path of balanced regional development in the future to realize moderate equalization in public services and quality of life while keeping differentiated levels of economic development across regions. Inter-regional moderate equalization in public services requires moderate equalization in the wages of public servants and the incomes of public service staff such as teachers engaging in primary education. This should be done alongside investment in the relevant hardware.

To this end, the central government might moderately share property tax with local government, which could be used for inter-regional equalization of the incomes of public servants and public service staff. In the future, China can provide local public services based on a fiscal system characterized by local decentralization, but the central government should consider provision of public services at the central level and spend more financial resources on moderate equalization in inter-regional public services.

References

Au CC, Henderson JV (2006a) Are Chinese cities too small? Rev Econ Stud 73(3):549–576

Au C-C, Henderson JV (2006b) How migration restrictions limit agglomeration and productivity in China. J Dev Econ 80(2):350–388

Bai ChE, Du YJ, Tao ZG, Tong YT (2004) Local protectionism and determinants and changing pattern of regional industrial concentration. Econ Res J 4:29–40

Chen Z, Jin Y, Lu M (2006) Economic opening and industrial agglomeration in China. In: Masahisa F Akifumi K (eds), Asian regional economic integration from the point of view of spatial economics. Joint Research Program Series No. 138, Institute of Developing Economies, pp 97–132

Chen M, Gui QH, Lu M, Chen Z (2007) How to maintain China's high growth rate via scale economy: an empirical study of economic opening and domestic market segmentation. China Econ J (Q) 7(1):125–150

Démurger S (2001) Infrastructure development and economic growth: an explanation for regional disparities in China? J Comp Econ 29(1):95–117

Démurger S, Sachs JD, Woo WT, Bao S, Chang G, Mellinger A (2002) Geography, economic policy, and regional development in China. Asian Econ Pap 1(1):146–205

Ding JH, Liu ZY, Cheng DM (2005) Regional differences and characteristics of population migration in China. J Geogr Sci 60(1):106–114

Fan JY (2004) Trends of market integration, regional specification and industry agglomeration—influence on regional gap. Soc Sci China 6:39–51

Fan JY (2006) Industry agglomeration and inter-regional gap in labor productiity. Econ Res J 11:72–81

Fan JY (2008) research on industry agglomeration and china's regional gap. Gezhi Press, SDX Joint Publishing Company and Shanghai People's Publishing House, Beijing

Fujita M, Hu D (2001) Regional disparity in China 1985–1994: the effects of globalization and economic liberalization. Ann Reg Sci 35:3–37

Gao T (2003) The impact of foreign trade and investment reform on industry location: the case of China. J Int Trade Econ Dev 11(4):367–386

Gill IS, Kharas H (2007) An East Asian renaissance: ideas for economic growth. The International Bank for Reconstruction and Development/The World Bank

Gui QH, Chen M, Lu M, Chen Z (2006) Trend of segmentation or integration in the domestic market in China—evidence based on relative price. J World Econ 2:20–30

Jian T, Sachs JD, Warner AM (1996) Trends in regional inequality in China. China Econ Rev 7 (1):1–21

Jin Y, Chen Z, Lu M (2006) Industrial agglomeration in China: economic geography, neweconomic geography and economic policies. Econ Res J (in Chinese) 4:79–89

Kim TJ, Knaap G (2001) The spatial dispersion of economic activities and development trends in China: 1952–1985. Ann Reg Sci 35:39–57

Knight J, Shi Li, Renwei Z (2006) Divergent means and convergent inequality of incomes among the provinces and cities of China. In: Kanbur R, Venables A, Wan G (eds) Spatial disparities in human development: perspectives from Asia. United Nations University Press, Tokyo, pp 133–157

Lu M, Chen Z (2006) Market integration and industry agglomeration in regional economic development in China. SDX Joint Publishing Company and Shanghai People's Publishing House, Beijing

Lu JY, Tao ZG (2006) Regional manufacturing agglomeration in china and international comparisons. Econ Res J 3:103–114

Lu M, Chen Zh, Yan Y (2004) Increasing returns, development strategy and regional economic segmentation. Econ Res J 1:54–63

Lu M, Chen Z, Chen M, Gui QH (2006) Regional differences in local protectionism and market segmentation in China. In: Shah A, Ch Shen L, Zou HF (editor-in-chief) Economic analysis on regional difference in China. People's Publishing House, Delhi, 356–397

Lu M, Chen Zh, Yang ZZ (2007) Equality and growth hand in hand: increasing returns, strategic behavior and efficiency loss in the division of labor. China Econ J (Q) 6(2):443468

Ma SY, Yu HX (2003) Fiscal transfer and regional economic convergence. Econ Res J 3:26–33

Poncet S (2002) Chinese market is moving towards "non-integration"—comparative analysis on degree of integration of chinese domestic market and international market. World Econ Pap 1:3–17

Raiser M (1998) Subsidising inequality: economic reforms, fiscal transfers and convergence across Chinese provinces. J Dev Stud 34(3):1–26

Rozelle S (1994) Rural industrialization and increasing inequality: emerging patterns in China's reforming economy. J Comp Econ 19(3):362–391
Shah A, Shen CL, Zou HF (editor-in-chief) (ed) (2006) Economic analysis on regional difference in China. People's Publishing House, Beijing
Shang K, Shah A (2006) Narrow economic gap—'scorecard' of policies for narrowing regional income gap. In: Shah A, Shen CL, Zou HF (editor-in-chief) (eds) Economic analysis on regional difference in China. People's Publishing House, Beijing, pp 21–50
Uchida H (2009) Rising density, economic growth and disparities. In: Indermit Gill (eds.) World Development Report 2009. The World Bank, United States
Wan GH (1998) Empirical analysis on changes to resident income gap among rural regions in China. Econ Res J 5:36–41
Wan GH (2006) Economic development and income inequality: methodology and evidence. SDX Joint Publishing Company and Shanghai People's Publishing House, Beijing
Wan GH, Lu M, Chen Z (2005) Globalization and regional income gap: empirical evidence from within China. Soc Sci China 3:17–26
Wan G, Lu M, Chen Z (2007) Globalization and regional income inequality: empirical evidence from within China. Rev Income Wealth 53(1):35–59
Wei HK (Editor-in-chief) (ed) (2001) From redundant investment to orderly competition—research on redundant construction and cross-regional asset restructuring in China. People's Publishing House, Beijing
Wen M (2004) Relocation and agglomeration of Chinese industry. J Dev Econo 73(1):329–347
Zhang Z, Liu A, Yao S (2001) Convergence of China's regional income, 1952–1997. China Econ Rev 12(2–3):243–258
Zheng YS, Li CG (2003) Efficiency loss in local market segmentation in China. Soc Sci China 1: 64–72
Zhu L (2007) Impressions of Xinjiang: dynamic port trade. Teahouse Economists 5:45–50

Chapter 4
Globalization and Regional Income Inequality in China

China's recent accession to the WTO is expected to accelerate its integration into the world economy, which aggravates concerns over the impact of globalization on the already rising inter-region income inequality in China. This chapter discusses China's globalization process and estimates an income generating function, incorporating trade and FDI variables. It then applies the newly developed Shapley value decomposition technique to quantify the contributions of globalization, along with other variables, to regional inequality. It is found that (a) globalization constitutes a positive and substantial share of regional inequality and the share rises over time; (b) domestic capital, however, emerges as the largest contributor to regional inequality; (c) economic reform characterized by privatization exerts an increasingly significant impact on regional inequality; and (d) the relative contributions of education, location, urbanization and dependency ratio to regional inequality have been declining.

4.1 Globalization and Income Inequality

How globalization affects inequality is under heated debate (Fischer 2003, p. 5). Stiglitz (1998) and Hurrell and Woods (2000), among others, argue that globalization leads to increases in inequality because trade increases differentials in returns to education and skills, globalization marginalizes certain groups of people or geographic regions, and liberalization is not complemented by development of adequate institutions and governance. This view is supported by evidence from China and some transitional economies that are experiencing significant increases in inequality after their opening up to the outside world (Mazur 2000; Birdsall 1999). In developed countries, rising inequalities are being attributed to trade growth or international specialization as well. On the contrary, Srinivasan and Bhagwati (1999) and Ben-David (1993) conclude that globalization helps to reduce inequality. This is also supported by evidence from a number of countries where inequality decreased when they liberalized their economies (Wade 2001). In between these two opposing views, Sala-i-Martin (2002a, b) and Lindert and Williamson (2001) find that a significant globalization-inequality relationship does

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9_4

not exist. Krugman and Venables (1995) deduce a U-shaped pattern between inequality and trade (p. 859).

A number of factors can explain these mixed findings. First, inequality is measured differently, not only by employing alternative indices. While some consider inequality among individuals, others focus on inequality between countries. Some explore inequality of a country or a few countries, others discuss inequality of the globe. Second, there exist differences in the analytical techniques. Most studies use cross-country regressions; but some simply rely on partial correlations between inequality and globalization defined in various ways.[1] Correlation analysis cannot control for other causal variables and cross-country regressions may produce different results when different control variables or different model specifications are used. Finally, sample coverage (selection of countries and time periods) differs from study to study.

The exercise we did here contributes to the literature by examining the impact of globalization on regional income inequality in China. Focusing on China requires little justification, especially given China's importance in determining the global inequality trend. In addition, it can help alleviate the heterogeneity and data comparability problems often encountered in cross-country studies (Atkinson and Brandolini 2001; Srinivasan and Bhagwati 1999). To enhance the robustness of our empirical results, we first characterize the underlying income generating process by the flexible Box-Cox model and then quantify the globalization impact under all conventional measures of inequality. In decomposing total inequality into components associated with relevant determinants, the Shapley value framework of Shorrocks (1999) is combined with the estimated income generating function. The Shapley methodology is based on the cooperative game theory and is being recently used by Kolenikov and Shorrocks (2005), and Wan (2004).

To elaborate further, we seek to answer two questions: how globalization and regional income inequality are related in China? And how much does globalization contribute to regional inequality in China? The first question has received some attention. Kanbur and Zhang (2005) obtain a positive relationship between openness (measured by effective tariff rate and the trade/GDP ratio) and interregional inequality. Xing and Zhang (2004) find the same using FDI as a measure of globalization. However, Wei and Wu (2001) conclude with a negative relationship between urban-rural disparity and the trade/GDP ratio. With respect to the second question, little has been published with the exception of Zhang and Zhang (2003). Zhang and Zhang (2003) estimate a labor productivity (GDP/labor ratio) function and decompose inequality (measured by the log variance) in labor productivity into a number of components, including those associated with openness. The log

[1]The concept of globalization has many dimensions, ranging from interdependence of economic activities in different countries to flows of ideas across national borders. In this paper, we focus on economic globalization through exchanges of goods and services, and flows of foreign capital. Flows of labor, information, ideology, culture and living styles are not considered as relevant data are unavailable or incomplete. To be more precise, we use openness (trade/GDP ratio) and per capita FDI to represent globalization in this paper.

variance measure, however, violates the crucial principle of transfers and the GDP/labor ratio does not necessarily relate to personal income in China (Lin and Liu 2003). Bourguignon and Morrisson (2002) appeal for the use of income rather than GDP data in analyzing inequality.

4.2 China's Journey to Globalization and Regional Inequality

As an active participant of the third globalization process, China is fast integrating into the world economy at a pace as remarkable as her economic growth. After over 20 years of opening up, China has become the largest recipient of foreign direct investment (FDI) and the fifth largest trader in the world since 2002.

4.2.1 Growing International Trade

Before 1979, international trade was under the plan of the central government, which controlled more than 90 % of trade by monopolizing the imports and exports of over 3000 kinds of commodities. These commodities can be classified into two categories: plan-commanded goods (both the value and volume of trade were strictly controlled) and plan-guided goods (only the value of trade was controlled). In 1985, the number of goods under these categories was cut to about 100 each. By 1991, almost all exports were deregulated, with only 15 % controlled by specially appointed trading companies. Imports have also been deregulated. The proportion of plan-commanded imports in the total import volume was reduced from 40 % in 1985 to 18.5 % in 1991. By 1994, almost all planning on imports and exports was abolished with a few exceptions where extremely important goods were traded by specially appointed trading companies.

In pre-reform China, tariff was high and represented the only form of protection. When China initiated significant trade reforms in 1992, the rates of tariff remained high, averaged at 44.05 %. Since 1992, China has cut its tariff rates substantially every year. The average tariff rate fell to 17.1 % in 1998 (Yin 1998, p. 126). On the other hand, non-tariff barriers were introduced in the early 1980s. Subsequently, an increasing number of goods were placed under licensed trading and quota. In 1992, some 25 % of imports and 15 % of exports were managed under licenses. However, the scope of license and quota management has been narrowed down since 1992. By 1997, only 384 categories of imports, a mere 5 % of the total, were managed under quota and licenses (Yin 1998, p. 129).

Both exports and imports have experienced remarkable growth. The growth trend was maintained even during the Asian financial crisis. In 1978, China ranked 32nd in the world in terms of international trade. The ranking improved to 15th in

1989, 10th in 1997 and 6th in 2001. The ratio of international trade to GDP also rose from 9.85 % in 1978 to as high as 42.78 % in 2001. In 2002, total trade exceeded US$600 billion, representing more than 50 % of China's GDP.[2] This places China as the 5th largest trader in the world. In passing, it is noted that export of manufactured goods has accounted for a larger and larger share since the mid-1980s, while the corresponding import has declined though at a slow rate. Clearly, China has been industrializing and is becoming a major exporter of manufactured commodities.

4.2.2 Increasing Cross-Boarder Capital Flows

In 1979, three Special Economic Zones (SEZs) were set up in Guangdong for attracting FDI.[3] However, not until 1984 did FDI start to pour in. In the same year, twenty-four additional SEZs were opened. Since that time, more and more SEZs are developed to attract FDI and technology transfer, and to enhance exports. The second wave of FDI inflow occurred in 1992 when Deng Xiaoping made the well-known tour of South China.

For many years China was the largest recipient of FDI among developing countries, and the second largest in the world since 1993, next to the United States. In 2002, China attracted US$52.743 billion of FDI and became the number one in the world. The ratio of FDI to GDP was as high as approximately 4 % in 2001. Meanwhile, a large amount of foreign loans has been utilized in various areas of development.[4] Also, China has seen an impressive growth of capital outflows in recent years, owing to the rapid growth of domestic enterprises. China's investment abroad nearly tripled from US$2562.49 million in 1997 to US$6885.398 million in 2001.

4.2.3 Further Opening up After WTO Accession

Since becoming a member of the WTO, China has taken several steps to promote globalization. On 1 January 2002, China cut import tariffs for more than 5000 goods. The average tariff rate was reduced to 12 % from a level of 15.3 % in 2001. The rate for manufacturing goods was reduced from 14.7 to 11.3 %, while that for agricultural goods, except aquatic products, from 18.8 to 15.8 %. At the same time, China abolished quota and license arrangement for grains, wool, cotton, chemical

[2]Unless indicated otherwise, data quoted in this section are all from the National Bureau of Statistics or NBS (various years).

[3]See Table 3 in Démurger et al. (2002) for the timeline of policy initiatives.

[4]Stock market represents another avenue for attracting foreign capital.

fertilizers, and so on. In addition, China modified or abolished those laws and regulations that are inconsistent with WTO rules. New laws on anti-dumping and anti-subsidy have been implemented since 1 January 2002. Looking into the future, the average tariff rate will be cut from 12 % in 2002 to 9.3 % in 2005. Non-tariff barriers will be removed for most manufacturing goods by the end of 2004. Small- and medium-sized enterprises and foreign-owned companies will be entitled to participate directly in international trade.

Around China's entry into the WTO, China issued new laws and regulations concerning service trade, covering legal service, telecommunication, financial institution, insurance, audio and video products, and tourism, etc. Laws regarding entry of foreign sales companies and joint ventures of stock exchange are being drawn up. Also, measures have been taken to ensure compliance with rules of the WTO on intellectual property, foreign investment, and information transmission.

4.2.4 Globalization and Regional Inequality

Clearly, China as a whole has gone a long way in globalization. However, there exist significant differences in the pace and extent of globalization across regions. This is particularly true when China is divided into three areas: the east, central and west. Figures 4.1 and 4.2 plot the ratios of regional per capita FDI and regional

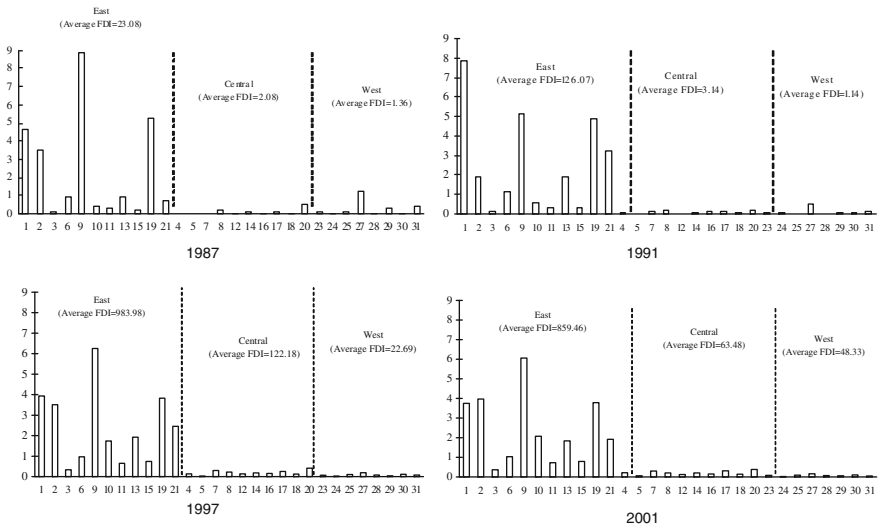

Fig. 4.1 Ratio of regional per capita FDI to the national average. *Notes* Eastern: *1* Beijing, *2* Tianjin, *3* Hebei, *6* Liaoning, *9* Shanghai, *10* Jiangsu, *11* Zhejiang, *13* Fujian, *19* Guangdong, *21* Hainan; Central: *4* Shanxi, *5* Inner Mongolia, *7* Jilin, *8* Heilongjiang, *12* Anhui, *14* Jiangxi, *15* Shandong, *16* Henan, *17* Hubei, *18* Hunan, *20* Guangxi; Western: *23* Sichuan, *24* Guizhou, *25* Yunnan, *27* Shaanxi, *28* Gansu, *29* Qinghai, *30* Ningxia; *31* Xinjiang

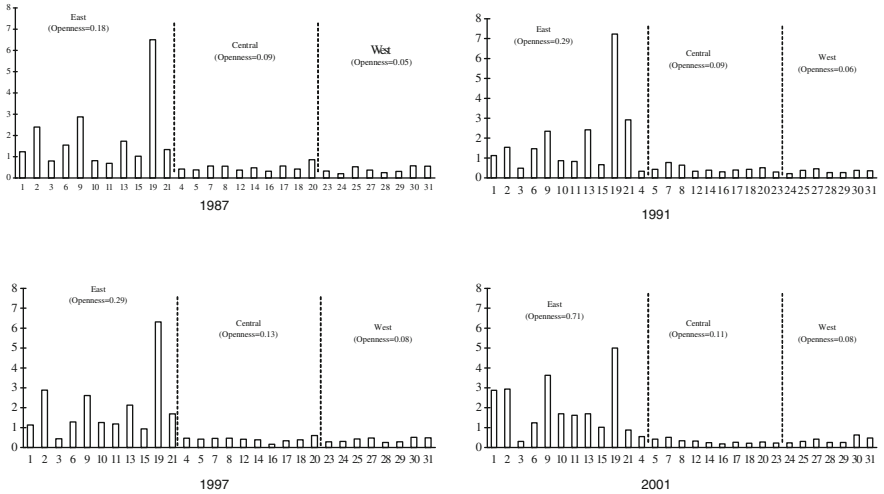

Fig. 4.2 Ratio of regional openness to the national average (openness = trade/GDP). *Notes* Eastern: *1* Beijing, *2* Tianjin, *3* Hebei, *6* Liaoning, *9* Shanghai, *10* Jiangsu, *11* Zhejiang, *13* Fujian, *19* Guangdong, *21* Hainan; Central: *4* Shanxi, *5* Inner Mongolia, *7* Jilin, *8* Heilongjiang, *12* Anhui, *14* Jiangxi, *15* Shandong, *16* Henan, *17* Hubei, *18* Hunan, *20* Guangxi; Western: *23* Sichuan, *24* Guizhou, *25* Yunnan, *27* Shaanxi, *28* Gansu, *29* Qinghai, *30* Ningxia, *31* Xinjiang

openness index to the national averages (selected years). It is clear that east China attracts much more FDI and trade than the central and the west, although convergences appear to have taken place within each area. This pattern also applies to other variables such as income, capital and extent of privatization. Therefore, disparity in globalization is largely an inter-area issue and it is justified to include area dummies in the income generating functions to be considered later.

Such differences in globalization may arise through a number of mechanisms and are expected to affect regional inequality. First, some regions have location advantages thus can better exploit benefits of trade (close to ports, Hong Kong, Macau, Russia, and Vietnam). Second, some regions possess more family ties to overseas investors thus would attract more FDI and associated spill-over effects. Third, some regions are endowed with more or better resources (infrastructure, human capital, market potential) thus can better attract FDI and develop trade. Finally, local culture, customs and traditions differ from region to region. These non-economic factors are embedded in the leadership styles of the regional and local governments thus make regional economies more or less receptive to foreign capitals and technologies. All the above differences lead to different paces of globalization in different regions, despite the uniform national policy of opening up and the appeals of the central government for local governments to actively embrace globalization.

Needless to say, globalization comes with both benefits and costs, which are not evenly distributed among regions or individuals. It is thus imperative to analyze the

impact of globalization on income inequality before policy measures can be designed and implemented to curb the fast rising regional income inequality in China.

4.3 Accounting for China's Inter-regional Income Inequality

4.3.1 Variables of Income Generating Function

As the first step of the regression-based decomposition, an income generating function must be obtained. Specification of such a function usually relies on the human capital theory. However, for modelling regional average income in China, consideration must be given to both human capital theory and production theory. This is because variables other than human capital are important in determining income levels across regions in China. These variables include capital input as argued by Yang (1994), government support as argued by Ma and Yu (2003), and deregulation or reform as argued by Démurger et al. (2002). Capital will be represented by per capita capital stock, government support by fiscal expenditure excluding administrative fees, and reform or deregulation by privatization index defined as the proportion of non-state-owned enterprises employees in total labor force. Meanwhile, it is accepted that geography is important in affecting regional economic development in China. Thus dummy variables for east, central and west China will be used to control for geography and infrastructure (Démurger 2001). Further, urbanization differs from region to region and such differences affect regional per capita income and thus inequality. This can be controlled by an urbanization index, defined as the proportion of non-agricultural population. Finally, the conventional variables of labor and education must be considered. Given labor surplus in China and the linear relationship between the variables of labor and dependency ratio, we chose to include the latter. The converging trend in the dependency ratio implies a declining contribution of this variable to inequality.

The observations on capital stock are taken from Zhang et al. (2004, ZWZ hereafter). ZWZ do not include inventory as capital stock while Zhang and Zhang (2003, ZZ hereafter) do, although both studies use the same data estimation technique. Also, ZWZ construct the time series of capital stock as from 1952 rather than 1978 as in ZZ. Since inventory represents only potential not effective production input and biases in the estimate decrease as time interval expands between the initial year and the current year, data from ZWZ will be used in this paper. Other data are compiled from Comprehensive Statistical Data and Materials for 50 Years of New China, as well as various issues of China Statistical Yearbook, both published by the National Bureau of Statistics (NBS). See "Appendix" for details on data construction.

Largely due to the incompleteness of FDI statistics, the modelling exercise is confined to the period of 1987–2001. With Taiwan, Hong Kong and Macao excluded, there are 31 provinces or regions in China, including four autonomous municipal cities. Chongqinq—the youngest region in China—was created in 1997 and is merged with Sichuan. Tibet is excluded because of lack of complete data. Therefore, a total of 29 regions will be covered in this study.

In summary, the following variables are included in the underlying income generating function: per capita income (*Y*), per capita capital input (*K*), dependency ratio as an alternative of labor (*Dep*),[5] average years of schooling (*Edu*), per capita FDI (*FDI*), trade/GDP ratio (*Trade*), reform or privatization defined as proportion of labor force working in the non-state-owned enterprises (*Reform*), urbanization defined as the proportion of non-agricultural population (*Urb*) that also serves as a proxy for industrialization, location dummies (*Central* and *West*),[6] and dummies for the period 1992 onwards (*D92*) and 1996 onwards (*D96*). *D92* is used to capture the effects of Deng Xiaoping's South-China tour and *D96* to capture a number of significant reforms initiated in 1996, especially the labor market reform characterised by the large-scale laying-off of redundant workers (*Xiagang*). Finally, government support is represented by per capita government expenditure excluding administrative fees (*Gov*). This is a proxy of government involvement in economic activities in general and in public investment in particular. All observations in value terms are deflated by regional CPIs.

4.3.2 Form of Income Generating Function

Regarding functional form, most empirical studies in human capital theory adopt the semi-log form or the Mincer model. If one relies on the production theory, Cobb-Douglas (double log), CES (constant elasticity of substitution) or translog specifications are the possible candidates (see Wan 1996; Wan and Cheng 2001). In the inequality decomposition literature, Fields and Yoo (2000, p. 145) did not explicitly provide theoretical arguments supporting their semi-log specification, except making the casual remark—"based on human capital theory or some other underlying theoretical model". Tsui (2007) did exactly the same, with a different remark—"to render the estimation manageable". On the other hand, Morduch and Sicular (2002, p. 101) simply used a strictly linear function without much

[5]We tried to add per capita labor input or household size, but neither of them is significant.

[6]Consistent with most studies, central provinces refer to Shanxi, Guangxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan, and western provinces include Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

justification. In this paper, we decide to adopt the combined Box-Cox and Box-Tidwell model in order to minimize misspecification error:

$$Y^{(\lambda)} = a_0 + a_1 X_1^{(\theta)} + a_2 X_2^{(\theta)} + \cdots + a_K X_K^{(\theta)} + dummy\ terms + u, \tag{4.1}$$

where λ and θ are transformation parameters; other notations are self-explanatory. In this specification, $Y^{(\lambda)} = \frac{Y^{\lambda}-1}{\lambda}$ and $X_k^{(\theta)} = \frac{X_k^{\theta}-1}{\theta}$. As λ approaches 0, the limit of $\frac{Y^{\lambda}-1}{\lambda}$ is $Ln\ Y$ by L'Hopital's rule. Hence, $Y^{(\lambda)} = Ln\ Y$ when $\lambda = 0$ (Judge et al. 1988). The same arguments apply to $X_k^{(\theta)}$. Model (1) encompasses many functional forms, including the semilog income-generating function of Fields and Yoo (2000) and Tsui (2007) if $\lambda = 0$ and $\theta = 1$, and the standard linear function of Morduch and Sicular (2002) if $\lambda = \theta = 1$. In the case that $\lambda = \theta = 0$, a double-log equation, as used by Zhang and Zhang (2003) is obtained. When $\lambda = -1$ or $\theta = -1$, the relevant variable becomes its reciprocal. Clearly, one can restrict each of the two transformation parameters to be 0, 1, −1 or unrestricted. The 4 by 4 combinations produce 16 different functional forms. Moreover, one can impose $\lambda = \theta$ although they are not restricted to a particular numerical value. Clearly, our specification (4.1) is more general and flexible than what has been used in the inequality decomposition literature as it encompasses at least 17 different models.

These 17 models are fitted to the Chinese data using Shazam, which employs an iterative maximum likelihood (ML) estimation procedure.[7] Model selection can be easily undertaken using the conventional χ^2 test where the test statistic is twice the difference in the loglikelihood values of model (1) and its restricted versions. As reported in Table 4.5 of "Appendix", the test results indicate rejections of all models with two exceptions. The first case involves imposing $\lambda = 0$ while θ remaining being a free parameter. This amounts to a log-nonlinear model (the *X*s are subject to a nonlinear transformation). The second case involves restricting $\lambda = 0$. Statistically speaking, these two models are equivalent to (4.1) and either of them can be used for inequality decomposition. We choose to use the log-nonlinear model largely because it is consistent with the human capital theory where almost all empirical studies apply logarithm transformation to the dependent variable in modeling the wage or income generating process.

Could the log-nonlinear model be spurious? After all, the panel data we use contain fifteen years of time series observations thus the variables may be non-stationary. Employing the popular unit-root test of Im et al. (2003) or IPS test

[7]Ideally, one should estimate these models for each region or for every year. Due to the limited sample size and also given the flexibility of our functional form, we choose to pool the data for model estimation. As shown later, a re-estimation by GMM under the specification of a dynamic panel data model supports our choice.

for heterogeneous panel data, we found that FDI and education are stationary, but all other variables are non-stationary. Consequently, it is necessary to test for co-integration (McCoskey and Kao 1999). The literature on co-integration test in panels is large and fast growing. Baltagi and Kao (2000) provide a comprehensive survey. For a more recent review, see Breitung and Pesaran (2005). Consequently, many testing procedures are available and each has its own merits and disadvantages. We chose to employ the residual-based test of Im et al. (2003) or IPS due to its popularity.[8] Relying on IPS, the residual is found to be stationary when the order of lag is set to two. The test statistic is found to be −1.71 while the critical value is −1.66, indicating rejection of the null hypothesis of unit roots. According to this test result, the log-nonlinear model we obtained earlier can be said to represent a valid long-run regression relationship.[9]

One may argue that one or more of the independent variables could be endogenous, such as trade and FDI. Consequently, we re-estimate the log-nonlinear model using the generalized method of moment or GMM technique of Blundell and Bond (1998) and then apply the Hausman test (Hausman 1978). The resultant χ^2 statistic is 0.86, indicating absence of endogeneity in our log-nonlinear model. It is noted that all GMM estimates except that for government support (*Gov*) possess the same signs as the ML estimates, confirming the robustness of the latter. However, most GMM estimates including that for *Gov* are insignificant. This is not surprising as GMM estimation can only guarantee consistency but not efficiency. Consequently, we disregard the GMM estimation results hereafter as ML estimation of our model is both efficient and consistent.

Table 4.1 reports ML estimation results for the log-nonlinear model. No *t*-ratio is reported for the θ coefficient as it is obtained by grid search. Earlier rejection of the double-log model implies that θ is significantly different from zero. It is clear that the model fits the data quite well as indicated by the high R^2. All parameters are different from 0 at the 1 or 5 % level of significance. Further, the signs of all parameter estimates are consistent with expectations. In particular, the coefficient estimates for the location dummies match the fact that western regions are poorer than central regions, which, in turn, are poorer than eastern regions. In terms of elasticity estimates, income growth is quite responsive to reform, education, government support, urbanization and domestic capital. The low elasticity of FDI is acceptable given its small sample mean value (517 yuan) relative to domestic capital (4403 yuan). Since per capita domestic capital is 8.5 times that of per capita FDI, the marginal impact of FDI on income is 45 % larger than that of domestic capital, which corroborates well with conventional wisdoms.

[8]IPS is the only unit roots test for panel models that is coded in TSP and Stata.

[9]Caution must be exercised here as the IPS test, as with many other co-integration tests, cannot guarantee co-integration in all units/groups in the panel when the null hypothesis of unit roots is rejected.

Table 4.1 Estimated income generating function (sample size = 435)

Variable	Coefficient estimate	t-ratio	*p*- value	Elasticity at means	Loglikelihood value	Adj-R^2
Capital	0.034	4.612	0.000	0.105		
Dependency	−0.064	−4.299	0.000	−0.118		
Education	0.151	2.545	0.011	0.195		
Government	0.054	4.976	0.000	0.110		
FDI	0.008	2.405	0.017	0.018		
Trade	0.038	4.350	0.000	0.058		
Reform	0.123	9.024	0.000	0.188	−2533.22	0.935
Urbanization	0.082	4.940	0.000	0.128		
Central	−0.072	−3.297	0.001	−0.025		
West	−0.168	−6.996	0.000	−0.046		
Year 92	0.083	4.818	0.000	0.056		
Year 96	0.170	9.527	0.000	0.068		
Constant	4.796	32.950	0.000	4.796		
θ	0.133					

4.3.3 Decomposing Income Inequality

To analyze inequality of income rather than inequality of logarithm of income, it is necessary to solve the estimated log-nonlinear income generating function for the income variable *Y*:

$$Y = \exp(\hat{a}_0) \cdot \exp\left(\hat{a}_1 X_1^{(\theta)} + \hat{a}_2 X_2^{(\theta)} + \cdots + \hat{a}_K X_K^{(\theta)}\right) \cdot \exp(dummy\,terms) \cdot \exp(\hat{u}), \tag{4.2}$$

The term $\exp(\hat{a}_0)$ is a scalar in (4.2) and can be removed from the equation without any consequence when relative measures of inequality are used, as in this exercise. By the same token, year dummy terms can be removed since inequality will be measured and decomposed on a year-by-year basis.

To decompose total inequality in *Y* using (4.2), the first step is to identify the contribution of the residual term û. This can be achieved by adopting the before-after principle of Cancian and Reed (1998). In other words, the contribution can be calculated as the difference between inequality of the original income *Y* and that of income given by (4.2) when assuming $\hat{u} = 0$. Denote this income by $\tilde{Y}$ and an inequality index by *I*, the residual contribution is simply equal to $I(\mathrm{Y}) - I(\tilde{Y})$, where:

$$\tilde{Y} = \exp(\hat{a}_0) \cdot \exp(\hat{a}_1 X_1^{(\theta)} + \hat{a}_2 X_2^{(\theta)} + \cdots + \hat{a}_K X_K^{(\theta)}) \cdot \exp(\text{dummy terms}) \tag{4.3}$$

Table 4.2 Total inequality and explained proportion

Year	Total Gini	Contribution by		Proportion explained[a] = 100 × (1 − |Residual|/Total)
		Independent variables	Residual	
1987	0.172	0.159	0.013	92.4
1988	0.176	0.163	0.012	93.2
1989	0.183	0.167	0.016	91.3
1990	0.174	0.173	0.001	99.4
1991	0.182	0.172	0.011	94.0
1992	0.187	0.172	0.014	92.5
1993	0.201	0.178	0.022	89.1
1994	0.206	0.187	0.019	90.8
1995	0.210	0.198	0.012	94.3
1996	0.206	0.202	0.004	98.1
1997	0.203	0.206	−0.003	98.5
1998	0.199	0.204	−0.004	98.0
1999	0.206	0.209	−0.003	98.5
2000	0.208	0.211	−0.003	98.6
2001	0.214	0.210	0.003	98.6

[a]A negative (positive) residual contribution implies that variables not considered are (dis-) equalizing forces. As discussed in the paper, the ratio of the absolute value of residual contribution to the total inequality indicates the proportion of inequality not explained and 1 minus this proportion can be defined as the explained proportion

Again, the year dummy terms and $\exp(\hat{a}_0)$ can be removed from (4.3) without affecting the analytical results. In passing, it is noted that $\tilde{Y}$ differs from the usual predicted Y under a semilog econometric model by a factor of $\exp(0.5\,\hat{\sigma}^2)$, where $\hat{\sigma}^2$ is the estimated variance of the error term (see Wan 1996).

Using the Gini index as an example measure, total income inequality and the residual contribution for China are tabulated in Table 4.2 (for results using other measures, see Tables 4.6, 4.7, 4.8 and 4.9 in "Appendix"). The total inequality displays a clear upward trend, increased over 24 % from 1987 to 2001. This increase is also evident when other inequality indices are used. The values of Gini may appear smaller than some would expect. This is because they represent the between component—inequality between regions only, excluding the within component. To calculate the latter requires data at the individual or household level. Also, deflation by regional CPIs produces smaller regional inequality estimates (Wan 2001).

To a large extent, the residual contribution can be interpreted as that part of inequality not accounted for by the included variables. That is, it represents the effect on inequality of excluded variables. In a hypothetical though unrealistic situation where all variables are included and there exists no model misspecification, the residual would disappear so that exactly 100 % of total inequality is

explained.[10] Generally speaking, it is a rule rather than exception that the residual contribution is non-zero. Both negative and positive residual contributions indicate some lack of explanatory power of the estimated model. A positive (negative) contribution implies that the effects of excluded variables are more beneficial to the rich (poor).[11] It is thus reasonable to use the ratio of the absolute value of the residual contribution over total inequality to indicate the proportion of inequality not explained. Consequently, one minus this proportion can be defined as the explained proportion, which reflects the quality of the modeling work. When the model fits the data poorly, the explained proportion would be low and the corresponding research findings would be of little value as policy initiatives based on these findings would be ineffective.[12] From this perspective, our modeling exercise is quite successful as we can explain up to 99.4 % of total inequality (last column of Table 4.2). Even in the worst case of 1993, almost 90 % of total inequality is explained.

The difference between the total inequality and the residual contribution equals the contributions of those independent variables included in the income generating function. To obtain contributions of individual variables, the Shapley value procedure of Shorrocks (1999) is adopted here.[13] The full decomposition results are presented in Table 4.4 and in "Appendix" as Tables 4.6, 4.7, 4.8 and 4.9, with inequality measured respectively by the Gini coefficient, the generalized entropy measures (GE_0 and GE_1), the Atkinson index, and the squared coefficient of variation (CV). As expected, the decomposition results differ depending on the indicator of inequality used. This is not surprising because different indicators are associated with different social welfare functions and presume different aversions to inequality. They also place different weights to different segments of the underlying Lorenz curve. It is noted, however, that the squared CV violates the principle of transfer and the Atkinson index is ordinally equivalent to the GE measures as its entire family can be expressed as a monotonic transformation of the latter (Shorrocks and Slottje 2002). Consequently, we only use results under the Gini, the Theil Index (GE_1) and the mean logarithmic deviation (GE_0) in the following discussions.

[10]An identity, expressing total income as a sum of source incomes, can be thought of as a special income generating function (not an econometric function) with no residual term. In this case, our decomposition can explain 100 per cent of the total inequality.

[11]It is possible, at least hypothetically, that the residuals are all positive for the poor and negative for the rich. In this case, the contribution of the residual term must be negative as it is an equalizing factor.

[12]It can be shown that when $R^2 = 1$ or 0, the explained proportion is 100 or 0 %. In the case that CV^2 is used as the measure of inequality, the explained proportion is always identical to the R^2.

[13]For this purpose, a Java programme is developed by the World Institute for Development Economics Research of the United Nations University (UNU-WIDER). This programme allows decomposition of inequality of a dependent variable into components associated with any number of independent variables and under any functional form. Readers interested in the Shapley procedure should consult Shorrocks (1999) for technical details and Wan and Zhou (2005) for an intuitive explanation.

Although pointing to a similar increasing trend in total inequality, different indicators of inequality rank individual variables differently (Table 4.3). Nevertheless, they are largely consistent in ranking the less important contributors. For example, all three indices show that dependency ratio is the least important variable and they are broadly consistent in ranking FDI and education as the second and third least important factors. Further, some agreement is seen with respect to capital and urbanization as the most important contributors. In the early years, consistent ranking is evident for reform and trade, even government support. In later years, differences in the ranking emerge regarding contributions of variables such as location and government support for economic development.

Faced with the inconsistency, one can either choose a particular measure or take the average across different indicators (only applicable to the percentage contributions, not absolute contributions) and then proceed to interpretation and discussions. We chose to report the decomposition results under the Gini coefficient in Table 4.4. The contributions are calculated using the total explained portion as the denominator thus they sum to 100 %. According to Table 4.4, the least important variable is still the dependency ratio. This is attributable to the converging trend in this variable, partly driven by the nation-wide policy of birth control. This result also reflects the fact of surplus labor in China, thus differences in dependency ratio across regions are of little significance in income generation. It must be noted that this is only true at the highly aggregate level. Labor input and dependency ratio are still important for income generation at the household level.

Table 4.3 Ranks of inequality contribution by alternative inequality measures

Year	K	Dep	Edu	Gov	FDI	Trade	Reform	Urb	Location
1987	3	9	7,7,6	4	8	5	6,6,7	1	2
1988	3	9	7,7,6	4	8	5	6,6,7	2,1,1	1,2,2
1989	3,3,2	9	7,7,6	4	8	5	6,6,7	2,1,1	1,2,3
1990	3,3,2	9	7,7,6	5,5,4	8	4,4,5	6,6,7	2,1,1	1,2,3
1991	3,3,2	9	7	5,5,4	8	4,4,5	6	2,1,1	1,2,3
1992	3,1,1	9	7,8,8	5,4,4	8,7,7	4,5,5	6	2,3,2	1,2,3
1993	2,1,1	9	7	6,4,4	8	5	4,6,6	3,3,2	1,2,3
1994	2,1,1	9	8	5,4,4	7	6,6,5	4,5,6	3	1,2,2
1995	1	9	8	4,3,2	7	6	3,5,5	5,4,4	2,2,3
1996	1	9	8	4,3,2	7	6	3,5,5	5,4,4	2,2,3
1997	1	9	8	3,2,2	7	6	4,4,5	5,5,4	2,3,3
1998	1	9	8	3,2,2	7	6,5,5	4,6,6	5,4,4	2,3,3
1999	1	9	8	5,2,2	7	4,3,3	3,5,5	6	2,4,4
2000	1	9	8	4,2,2	7	5,3,3	2,4,4	6	3,5,5
2001	1	9	8	5,3,2	7	4,2,3	3,4,4	6	2,5,5

Note One number indicates consistent ranking. Three numbers indicate ranks by Gini, GE_0 and GE_1, respectively

Table 4.4 Inequality decomposition results, Gini index

Year	K	Dep	Edu	Gov	FDI	Trade	Reform	Urb	Location
Relative contribution (%)									
1987	13.49	3.85	6.56	13.35	4.45	11.66	11.03	17.92	17.69
1988	14.16	3.73	6.47	13.06	5.08	12.11	10.38	17.36	17.63
1989	14.67	3.34	6.38	12.59	5.49	12.42	10.43	17.05	17.62
1990	14.92	3.16	7.40	11.97	5.60	12.70	10.45	16.46	17.34
1991	15.39	3.10	6.24	11.91	6.04	12.67	10.64	16.40	17.61
1992	15.90	3.29	6.25	11.44	6.32	12.19	10.91	15.97	17.74
1993	16.04	3.23	6.96	11.29	6.30	11.81	11.87	15.26	17.23
1994	16.19	3.37	5.74	12.57	6.66	11.51	13.07	13.92	16.98
1995	16.72	3.05	5.80	13.51	6.75	10.96	13.85	13.12	16.23
1996	17.18	2.93	5.39	13.59	6.71	11.33	13.98	12.75	16.13
1997	17.30	2.69	5.32	14.20	6.81	11.66	13.94	12.20	15.88
1998	17.95	2.55	5.26	14.43	7.07	11.89	12.54	12.28	16.04
1999	18.08	0.81	5.10	13.72	6.94	13.77	14.28	11.92	15.38
2000	17.82	0.49	4.38	14.37	6.85	14.17	15.27	11.44	15.20
2001	18.37	0.90	4.77	13.32	6.98	14.34	14.77	11.44	15.12
Absolute contribution									
1987	0.021	0.006	0.010	0.021	0.007	0.019	0.018	0.029	0.028
1988	0.023	0.006	0.011	0.021	0.008	0.020	0.017	0.028	0.029
1989	0.024	0.006	0.011	0.021	0.009	0.021	0.017	0.028	0.029
1990	0.026	0.005	0.013	0.021	0.010	0.022	0.018	0.028	0.030
1991	0.026	0.005	0.011	0.020	0.010	0.022	0.018	0.028	0.030
1992	0.027	0.006	0.011	0.020	0.011	0.021	0.019	0.027	0.031
1993	0.029	0.006	0.012	0.020	0.011	0.021	0.021	0.027	0.031
1994	0.030	0.006	0.011	0.024	0.012	0.022	0.024	0.026	0.032
1995	0.033	0.006	0.011	0.027	0.013	0.022	0.027	0.026	0.032
1996	0.035	0.006	0.011	0.027	0.014	0.023	0.028	0.026	0.033
1997	0.036	0.006	0.011	0.029	0.014	0.024	0.029	0.025	0.033
1998	0.037	0.005	0.011	0.029	0.014	0.024	0.026	0.025	0.033
1999	0.038	0.002	0.011	0.029	0.015	0.029	0.030	0.025	0.032
2000	0.038	0.001	0.009	0.030	0.014	0.030	0.032	0.024	0.032
2001	0.039	0.002	0.010	0.028	0.015	0.030	0.031	0.024	0.032

The stock of physical capital has always been important. Its importance increased over time and it now constitutes almost 20 % of total inequality, making it the largest contributor since 1995. On the other hand, urbanization was the number one or two factor until 1992, but its role quickly declined. It dropped to the third or fifth position and finally settled at the sixth position. This reflects well the converging trend in urbanization across China. Despite so, urbanization still contributes about 12 % to total inequality. Sharing a similar trend with urbanization, location has become less important with its ranking dropped from the first until 1994

(second in 1987) to the second position since 1995. The declining contribution does not necessarily mean narrowing gaps in factors associated with location (natural resources, weather, proximity to markets and ports). It means that other factors become more unequally distributed across China.

It is clear that FDI ranks the second least important determinant of regional inequality in China till the early 1990s. However, it has gained importance in recent years. The impact of trade on total inequality has been moderate. If one combines trade and FDI as an overall indicator of globalization, the contribution is quite substantial, particularly in the later years. The combined contribution was around 16 % earlier but now around 22 %, surpassing the capital variable. It is important to note that this finding is robust to inequality measures. Therefore, globalization does deserve serious consideration owing to its large and increasing effects on regional inequality, which has implications for poverty and poverty reduction in China. The increasing contribution of globalization is a result of increased trade and FDI inflow.

Over time, a number of factors gained prominence. Reform or privatization was in the sixth position but moved up to third position, highlighting the unequal pace in privatizing state-owned entities and the importance of privatization on income growth. It is interesting to observe that government support for economic development is diverging. The positive contribution implies less (more) developed areas provide less (more) support. The diverging trend may have to do with the taxation reform initiated in 1994 which significantly enhances the budgeting and spending power of local governments. The reform allows rich regions to collect more taxes and fees to finance economic activities.

The small and stable contribution of education is likely attributable to the many years of public provision of basic education in China, particularly in the urban areas. A surprising result is that the contribution of education only ranks the second or third from the last, a finding not inconsistent with ZZ. Conversely, the impacts of reform and urbanization on inequality are expected to decline in the long run because slow reformers or late comers are bound to catch up. After all, these two variables have a maximum value of 100. It should be noted that the role of location will diminish as technology development in transportation and communications are helping to downplay the importance of physical isolation or distance. This diminishing role is reinforced by the historical campaign of western development characterized with huge amounts of infrastructure investment in the location-disadvantageous regions. As known, the effects of infrastructural investment on development are typically lagged.

It is worth noting that a declining percentage contribution does not necessarily mean a decreasing absolute contribution. A careful examination of Tables 4.4, 4.6, 4.7, 4.8 and 4.9 reveals that apart from the dependency ratio and urbanization, all other variables contribute more and more to total inequality. Dependency ratio is the only variable with declining contribution in both relative and absolute terms. Urbanization more or less maintained its absolute contribution but displayed a declining relative contribution because of the increasing trend in the total inequality.

It may seem sensible to discuss our findings in relation to ZZ. However, this is not appropriate for a number of reasons. First, we focus on income inequality while ZZ on partial labor productivity. Second, ZZ employ a double log model which is rejected in this paper. Third, ZZ relies on the logarithmic variance as the only measure of inequality. Our results are robust to inequality measures and based on a flexible modeling strategy. An indication of inadequacy of ZZ lies in that domestic capital is more productive than FDI, which is difficult to justify.

4.4 Concluding Remarks

This chapter provides an accounting for China's regional income inequality, with a special emphasis on the impact of globalization. Relying on a carefully constructed panel data set, the flexible Box-Cox specification is adopted to minimize modelling errors. The income generating function is estimated successfully and the decomposition results are based on a recently developed methodology of Shorrocks (1999). It is found that (a) globalization constitutes a positive and substantial share of China's regional inequality and the share rises over time[14]; (b) capital is one of the largest and increasingly important contributor to regional inequality; (c) economic reform characterized by privatization exerts a significant impact on regional inequality; and (d) the relative contributions of education, location, urbanization and dependency ratio to regional inequality have been declining.

A number of major policy implications are readily derivable from our empirical results. Further globalization will lead to higher regional inequality in China unless concerted efforts are devoted to promote trade in and FDI flows to west and central China. Policy biases which promoted trade and FDI but are gradually phasing out in coastal China should be implemented in other parts of China. Market potential and location consideration place the poor regions in a disadvantageous position in attracting FDI and promoting trade. However, a converging trend in FDI and trade is encouraging. More important is the domestic capital; equalization of which across regions will cut regional inequality by 20 %. To narrow down gaps in capital possession, it is necessary though difficult to break the vicious circle existing in capital formation. This calls for development of financial market in China, especially in poor rural areas. Again, policy support for investment in the poor regions is needed in terms of tax concession and bank lending. In particular, continued financial reforms are necessary in order to eliminate discriminations against small farmers and rural activities. Finally, changes are needed in the collection and allocation of fiscal

[14]One of the referees suggested confirming this conclusion by running a regression of inequality on a set of regressors. This useful suggestion was not taken up because we can only have a total of fifteen observations on regional inequality (one for each year) for this kind of regression. Even with five or six explanatory variables, the degrees of freedom would drop below ten. Such a model is rather unreliable. More importantly, our decomposition results are sufficient for gauging the impact of globalization on regional inequality in China.

resources which so far have favoured the developed regions. An equalization in fiscal support would lead to an almost 15 % drop in regional inequality and a progressive fiscal scheme would result in a much larger impact. Adding together, these three variables contribute over half of the total regional inequality in China.

Data Appendix

1. Unless indicated otherwise, data for the period 1987–1998 are all from *Comprehensive Statistical Data and Materials for 50 Years of New China* (NBS 1999). Data for years 1999–2001, unless indicated otherwise, are from *China Statistical Yearbook, 2000, 2001 and 2002* (NBS various years).
2. *Income*: Regional income is the weighted average of urban and rural per capita incomes, with non-agricultural and agricultural population shares as weights. Both urban and rural incomes are deflated by regional urban and rural CPIs. For Shanghai, Beijing and Tianjin, urban and rural CPIs are the same.
3. *Capital*: Using perpetual stock method, Zhang et al. (2004) constructed capital stock data at the 1952 price. They provide estimates for 1952–2000, and the authors extend the data to 2001. Capital stock in 1952 is given by

$$K_0 = \frac{I_0}{\delta + r}$$

where K_0 is the capital stock in 1952, I_0 investment in the same year, δ depreciation rate, and r average growth rate of real investment before 1952.

4. *Dependency*: Dependency ratio is computed as:

$$Dependency = \frac{total\ population - employment}{employment} \times 100\,\%$$

5. *Education* (*edu*): *China Population Yearbooks* report regional population by education attainment as from 1987. Unfortunately, such data were not published for 1989, 1991 and 1992, and data for 1987 and 1988 are incomplete as illiterate population are not reported. Also, unlike data for other years, the 1994 data did not consider population below the age of 15. To estimate data for these years, we compute average years of schooling using data for the other years and then fit the model:

$$\ln(edu) = f(\cdot) + \mu,$$

where *edu* is per capita years of schooling, $f(\cdot)$ is simply a linear function of time trend and regional dummies, μ the error term. This model is estimated by GLS technique, allowing for heteroskedasticity in the panel data. The R^2 of the estimated equation is 0.966. Denote the predicted value by ^, we have:

$$\widehat{edu} = \exp\left[\ln\left(\widehat{edu}\right)\right]\exp\left(0.5\,\hat{\sigma}^2\right),$$

where $\ln(\widehat{edu})$ denotes the predicted values of $\ln(edu)$ and $\hat{\sigma}^2$ is the estimated variance of μ. Data for 1987–1989, 1991, 1992 and 1994 are estimated by the above model.

6. *FDI*: *FDI* is defined as per capita FDI. The 1987–1989 data for Sichuan are from *China Statistical Yearbook*. The Qinghai data for 1988 and 2000 are the average of the neighboring two years. FDI data are converted into RMB, using medium exchange rate available in *China Statistical Yearbooks*.
7. *Trade*: *Trade* is computed as the trade/GDP ratio. Trade data are converted into RMB.
8. *Reform*: *Reform* is computed as the proportion of workers and staff in non-state-owned entities.
9. *Urbanization*: Urbanization is defined as the proportion of non-agricultural population in the total. Except for Hebei, Heilongjiang and Gansu, 1999–2001 data of agricultural and non-agricultural population are from provincial statistical yearbooks. Total population of Hebei, Heilongjiang and Gansu in 2000 are from *China Statistical Yearbook, 2001*. For these three regions, the 1999 population data are the averages of the neighboring two years, and the 2001 data are forecast based on data in 2000 and the growth rate during 1999–2000.
10. *Gov*: This is per capita government expenditure excluding administration fees, deflated by regional CPI (see Tables 4.5, 4.6, 4.7, 4.8 and 4.9).

Table 4.5 Results of χ^2 test with H_0: Model 1 = Each of Models 2–17

Model	Restrictions		Loglikelihood value	χ^2-value	Test result*
	Λ	θ			
1	Unrestricted	Unrestricted	−2531.93		
2	1	1	−2597.98	132.10	Reject H_0
3	0	1	−2549.73	35.60	Reject H_0
4	−1	1	−2626.91	189.96	Reject H_0
5	Unrestricted	1	−2548.54	33.22	Reject H_0
6	1	0	−2736.61	409.36	Reject H_0
7	0	0	−2538.43	13.00	Reject H_0
8	−1	0	−2639.73	215.60	Reject H_0
9	Unrestricted	0	−2537.98	12.10	Reject H_0
10	1	−1	−2881.56	699.26	Reject H_0
11	0	−1	−2623.64	183.42	Reject H_0
12	−1	−1	−2616.71	169.56	Reject H_0
13	Unrestricted	−1	−2585.36	106.86	Reject H_0
14	1	Unrestricted	−2590.62	117.38	Reject H_0
15	0	Unrestricted	−2533.22	2.58	**Not Reject H_0**
16	−1	Unrestricted	−2626.87	189.88	Reject H_0
17	$\lambda = \theta$		−2532.72	1.58	**Not Reject H_0**

Note *level of significance = 1 %

Table 4.6 Inequality decomposition results, GE_0

Year	K	Dep	Edu	Gov	FDI	Trade	Reform	Urb	Location
Relative contribution (%)									
1987	14.94	4.38	7.05	14.27	4.80	11.73	7.35	18.82	16.65
1988	15.53	4.14	6.91	13.85	5.47	12.20	7.06	18.15	16.69
1989	16.06	3.67	6.79	13.36	5.88	12.40	7.39	17.79	16.66
1990	16.24	3.42	7.79	12.60	6.01	12.62	7.82	17.12	16.37
1991	16.59	3.35	6.58	12.50	6.41	12.57	8.31	16.98	16.70
1992	16.99	3.55	6.53	12.09	6.66	12.07	8.86	16.46	16.79
1993	16.99	3.51	7.10	11.73	6.56	11.71	10.42	15.68	16.29
1994	17.06	3.71	5.85	13.45	6.87	11.52	11.60	14.21	15.73
1995	17.58	3.43	5.88	14.56	6.90	10.94	12.45	13.41	14.85
1996	18.13	3.17	5.49	14.69	6.90	11.30	12.56	13.01	14.75
1997	18.24	2.90	5.32	15.42	7.02	11.63	12.50	12.44	14.52
1998	18.94	2.62	5.27	15.61	7.29	11.83	11.19	12.57	14.68
1999	19.04	0.33	5.26	14.80	7.16	14.11	13.15	12.20	13.96
2000	18.81	−0.24	4.52	15.27	7.11	14.57	14.32	11.71	13.94
2001	19.34	0.25	4.84	14.17	7.24	14.65	14.16	11.55	13.80
Absolute contribution									
1987	0.006	0.002	0.003	0.006	0.002	0.005	0.003	0.008	0.007
1988	0.007	0.002	0.003	0.006	0.002	0.005	0.003	0.008	0.007
1989	0.007	0.002	0.003	0.006	0.003	0.005	0.003	0.008	0.007
1990	0.008	0.002	0.004	0.006	0.003	0.006	0.004	0.008	0.008
1991	0.008	0.002	0.003	0.006	0.003	0.006	0.004	0.008	0.008
1992	0.008	0.002	0.003	0.006	0.003	0.006	0.004	0.008	0.008
1993	0.009	0.002	0.004	0.006	0.003	0.006	0.005	0.008	0.008
1994	0.010	0.002	0.003	0.008	0.004	0.006	0.006	0.008	0.009
1995	0.011	0.002	0.004	0.009	0.004	0.007	0.008	0.008	0.009
1996	0.012	0.002	0.004	0.009	0.004	0.007	0.008	0.008	0.010
1997	0.012	0.002	0.004	0.010	0.005	0.008	0.008	0.008	0.010
1998	0.012	0.002	0.003	0.010	0.005	0.008	0.007	0.008	0.010
1999	0.013	0.000	0.004	0.010	0.005	0.010	0.009	0.008	0.010
2000	0.013	0.000	0.003	0.011	0.005	0.010	0.010	0.008	0.010
2001	0.014	0.000	0.003	0.010	0.005	0.010	0.010	0.008	0.010

Table 4.7 Inequality decomposition results, GE_1

Year	K	Dep	Edu	Gov	FDI	Trade	Reform	Urb	Location
Relative contribution (%)									
1987	15.42	4.91	7.04	14.74	4.99	11.62	6.28	19.01	16.00
1988	16.01	4.57	6.90	14.33	5.64	12.11	6.05	18.34	16.06
1989	16.52	4.10	6.80	13.85	6.05	12.26	6.45	17.96	16.01
1990	16.73	3.87	7.78	13.06	6.13	12.42	6.95	17.33	15.73
1991	17.06	3.76	6.62	12.91	6.52	12.34	7.51	17.19	16.09
1992	17.42	3.96	6.56	12.51	6.75	11.84	8.13	16.66	16.17
1993	17.36	4.00	7.05	12.10	6.62	11.50	9.86	15.88	15.62
1994	17.39	4.16	5.85	13.93	6.90	11.38	10.97	14.44	14.98
1995	17.89	3.92	5.89	15.06	6.91	10.81	11.82	13.64	14.06
1996	18.47	3.61	5.54	15.22	6.89	11.16	11.92	13.26	13.92
1997	18.61	3.32	5.31	16.01	7.00	11.49	11.87	12.71	13.67
1998	19.33	3.02	5.20	16.20	7.26	11.67	10.68	12.84	13.80
1999	19.35	0.48	5.33	15.34	7.13	14.06	12.71	12.45	13.16
2000	19.16	−0.09	4.56	15.74	7.09	14.50	13.95	11.95	13.14
2001	19.63	0.41	4.83	14.71	7.21	14.56	13.85	11.74	13.05
Absolute contribution									
1987	0.007	0.002	0.003	0.007	0.002	0.005	0.003	0.008	0.007
1988	0.007	0.002	0.003	0.007	0.003	0.006	0.003	0.008	0.007
1989	0.008	0.002	0.003	0.007	0.003	0.006	0.003	0.009	0.008
1990	0.008	0.002	0.004	0.007	0.003	0.006	0.004	0.009	0.008
1991	0.008	0.002	0.003	0.006	0.003	0.006	0.004	0.009	0.008
1992	0.009	0.002	0.003	0.006	0.003	0.006	0.004	0.008	0.008
1993	0.009	0.002	0.004	0.007	0.004	0.006	0.005	0.009	0.008
1994	0.010	0.003	0.004	0.008	0.004	0.007	0.007	0.009	0.009
1995	0.012	0.003	0.004	0.010	0.005	0.007	0.008	0.009	0.010
1996	0.013	0.003	0.004	0.011	0.005	0.008	0.008	0.009	0.010
1997	0.014	0.002	0.004	0.012	0.005	0.008	0.009	0.009	0.010
1998	0.014	0.002	0.004	0.012	0.005	0.008	0.008	0.009	0.010
1999	0.015	0.000	0.004	0.012	0.005	0.011	0.010	0.009	0.010
2000	0.015	0.000	0.004	0.012	0.005	0.011	0.011	0.009	0.010
2001	0.015	0.000	0.004	0.011	0.006	0.011	0.011	0.009	0.010

Table 4.8 Inequality decomposition results, Atkinson index (e = 0)

Year	K	Dep	Edu	Gov	FDI	Trade	Reform	Urb	Location
Relative contribution (%)									
1987	14.93	4.38	7.04	14.27	4.79	11.73	7.37	18.83	16.66
1988	15.53	4.13	6.89	13.84	5.46	12.20	7.08	18.16	16.70
1989	16.06	3.66	6.78	13.36	5.87	12.39	7.41	17.79	16.67
1990	16.24	3.42	7.78	12.60	5.99	12.62	7.84	17.13	16.39
1991	16.60	3.34	6.57	12.50	6.40	12.57	8.32	16.99	16.71
1992	17.00	3.54	6.51	12.08	6.65	12.06	8.87	16.46	16.81
1993	17.01	3.51	7.09	11.72	6.54	11.71	10.43	15.69	16.31
1994	17.08	3.70	5.84	13.45	6.85	11.51	11.62	14.21	15.74
1995	17.60	3.42	5.86	14.56	6.88	10.93	12.46	13.41	14.86
1996	18.16	3.16	5.47	14.69	6.89	11.29	12.58	13.01	14.76
1997	18.27	2.89	5.31	15.43	7.01	11.62	12.51	12.44	14.53
1998	18.96	2.62	5.25	15.62	7.27	11.82	11.20	12.56	14.70
1999	19.07	0.34	5.24	14.79	7.14	14.11	13.16	12.19	13.97
2000	18.83	−0.23	4.50	15.27	7.09	14.56	14.33	11.70	13.95
2001	19.37	0.25	4.82	14.17	7.22	14.65	14.17	11.54	13.81
Absolute contribution									
1987	0.006	0.002	0.003	0.006	0.002	0.005	0.003	0.008	0.007
1988	0.007	0.002	0.003	0.006	0.002	0.005	0.003	0.008	0.007
1989	0.007	0.002	0.003	0.006	0.003	0.005	0.003	0.008	0.007
1990	0.007	0.002	0.004	0.006	0.003	0.006	0.004	0.008	0.008
1991	0.008	0.002	0.003	0.006	0.003	0.006	0.004	0.008	0.008
1992	0.008	0.002	0.003	0.006	0.003	0.006	0.004	0.008	0.008
1993	0.008	0.002	0.003	0.006	0.003	0.006	0.005	0.008	0.008
1994	0.009	0.002	0.003	0.007	0.004	0.006	0.006	0.008	0.009
1995	0.011	0.002	0.004	0.009	0.004	0.007	0.008	0.008	0.009
1996	0.011	0.002	0.003	0.009	0.004	0.007	0.008	0.008	0.009
1997	0.012	0.002	0.003	0.010	0.005	0.008	0.008	0.008	0.009
1998	0.012	0.002	0.003	0.010	0.005	0.008	0.007	0.008	0.009
1999	0.013	0.000	0.004	0.010	0.005	0.009	0.009	0.008	0.009
2000	0.013	0.000	0.003	0.010	0.005	0.010	0.010	0.008	0.009
2001	0.013	0.000	0.003	0.010	0.005	0.010	0.010	0.008	0.009

Table 4.9 Inequality decomposition results, Squared CV

Year	K	Dep	Edu	Gov	FDI	Trade	Reform	Urb	Location
Relative contribution (%)									
1987	15.90	5.47	7.06	15.20	5.18	11.52	5.12	19.19	15.36
1988	16.49	5.02	6.94	14.83	5.82	12.02	4.93	18.53	15.42
1989	16.99	4.55	6.85	14.35	6.23	12.11	5.41	18.15	15.36
1990	17.22	4.33	7.81	13.54	6.28	12.19	6.00	17.55	15.08
1991	17.54	4.19	6.70	13.33	6.63	12.08	6.63	17.42	15.47
1992	17.85	4.38	6.63	12.95	6.85	11.59	7.31	16.89	15.54
1993	17.73	4.52	7.06	12.49	6.69	11.26	9.23	16.10	14.91
1994	17.70	4.65	5.89	14.44	6.94	11.21	10.26	14.71	14.19
1995	18.18	4.43	5.95	15.57	6.92	10.65	11.12	13.92	13.25
1996	18.78	4.10	5.65	15.78	6.89	10.99	11.20	13.56	13.05
1997	18.95	3.79	5.34	16.63	7.00	11.29	11.18	13.04	12.78
1998	19.67	3.46	5.18	16.81	7.24	11.46	10.13	13.17	12.88
1999	19.65	0.60	5.46	15.91	7.12	13.94	12.18	12.78	12.36
2000	19.48	0.04	4.66	16.25	7.09	14.38	13.48	12.29	12.33
2001	19.90	0.54	4.88	15.28	7.21	14.42	13.45	12.04	12.28
Absolute contribution									
1987	0.016	0.005	0.007	0.015	0.005	0.011	0.005	0.019	0.015
1988	0.017	0.005	0.007	0.015	0.006	0.012	0.005	0.019	0.016
1989	0.018	0.005	0.007	0.015	0.007	0.013	0.006	0.019	0.016
1990	0.019	0.005	0.009	0.015	0.007	0.014	0.007	0.020	0.017
1991	0.019	0.005	0.007	0.015	0.007	0.013	0.007	0.019	0.017
1992	0.020	0.005	0.007	0.014	0.008	0.013	0.008	0.019	0.017
1993	0.021	0.005	0.008	0.015	0.008	0.014	0.011	0.019	0.018
1994	0.024	0.006	0.008	0.020	0.009	0.015	0.014	0.020	0.019
1995	0.028	0.007	0.009	0.024	0.011	0.016	0.017	0.021	0.020
1996	0.030	0.007	0.009	0.025	0.011	0.018	0.018	0.022	0.021
1997	0.032	0.006	0.009	0.028	0.012	0.019	0.019	0.022	0.022
1998	0.032	0.006	0.009	0.028	0.012	0.019	0.017	0.022	0.021
1999	0.035	0.001	0.010	0.028	0.013	0.024	0.021	0.022	0.022
2000	0.035	0.000	0.008	0.029	0.013	0.026	0.024	0.022	0.022
2001	0.035	0.001	0.009	0.027	0.013	0.025	0.024	0.021	0.022

References

Atkinson AB, Brandolini A (2001) Promise and pitfalls in the use of 'Secondary' data-sets: income inequality in OECD countries as a case study. J Econ Lit 39(3):771–799

Baltagi BH, Kao C (2000) Nonstationary panels, cointegration in panels and dynamic panels: a survey. Centre for Policy Research working paper no. 16, Syracuse University

Ben-David D (1993) Equalizing exchange: trade liberalization and income convergence. Quart J Econ 108(3):653–679

Blundell R, Bond S (1998) Initial conditions and moment restrictions in dynamic panel data models. J Econometrics 87:115–143
Bourguignon F, Morrison C (2002) Inequality among world citizens: 1820–1992. Am Econ Rev 92(4):727–744
Breitung J, Pesaran MH (2005) Unit roots and cointegration in panels. Discussion paper series 1: economic studies no. 42/2005, Deutsche Bundesbank
Birdsall N (1999) Globalization and the developing countries: the inequality risk. In: Remarks at overseas development council conference, International Trade Center, Washington, DC
Cancian M, Reed D (1998) Assessing the effects of wives earning on family income inequality. Rev Econ Stat 80:73–79
Démurger S (2001) Infrastructure development and economic growth: an explanation for regional disparities in China? J Comp Econ 29(1):95–117
Démurger S, Sachs JD, Woo WT, Bao S, Chang G, Mellinger A (2002) Geography, economic policy, and regional development in China. Asian Econ Pap 1(1):146–205
Fischer S (2003) Globalization and its challenges. Am Econ Rev 93(2):1–30
Fields GS, Yoo G (2000) Falling labor income inequality in Korea's economic growth: patterns and underlying causes. Rev of Income Wealth 46(2):139–159
Hausman J (1978) Specification tests in econometrics. Econometrica 46:1251–1271
Hurrell A, Woods N (2000) Globalization and inequality. In: Richard H (ed) The new political economy of globalization. Edward Elgar, Cheltenham
Im KS, Pesaran MH, Shin S (2003) Testing for unit roots in heterogeneous panels. J Econometrics 115:53–74
Judge G, Hill R, Griffiths W, Lütkepohl H, Lee T (1988) Introduction to the theory and practice of econometrics, 2nd edn. Wiley, New York
Kanbur R, Zhang X (2005) Fifty years of regional inequality in China: a journey through central planning, reform and openness. Rev Dev Econ 9(1):87–106
Kolenikov S, Shorrocks A (2005) A decomposition analysis of regional poverty in Russia. Rev Dev Econ 9(1):25–46
Krugman P, Venables A (1995) Globalization and the inequality of nations. Quart J Econ 110 (4):857–880
Lin YF, Liu PL (2003) China's economic development strategy and regional income gap. Econ Res J 3:19–25
Lindert PH, Williamson JG (2001) Does globalization make the world more unequal. NBER working paper 8228
Ma SY, Yu HX (2003) Fiscal transfer and regional economic convergence. Econ Res J 3:26–33
Mazur J (2000) Labor's new internationalism. Foreign Aff 81(1):79–93
McCoskey S, Kao C (1999) Testing the stability of a production function with urbanization as a shift factor. Oxford Bull Econ Stat 61:671–690
Morduch J, Sicular T (2002) Rethinking inequality decomposition, with evidence from rural China. Econ J 112(476):93–106
NBS (National Bureau of Statistics) (various years) China statistical yearbook. China Statistical Publishing House, Beijing
NBS (National Bureau of Statistics) (1999) Comprehensive statistical data and materials for 50 years of new China. China Statistical Publishing House, Beijing
Sala-i-Martin X (2002a) The disturbing 'rise' of global income inequality. NBER Working Paper 8904
Sala-i-Martin X (2002b) The world distribution of income. NBER Working Paper 8933
Shorrocks AF (1999) Decomposition procedures for distributional analysis: a unified framework based on the Shapley value. Department of Economics, University of Essex (Unpublished manuscript)
Shorrocks AF, Slottje D (2002) Approximating unanimity orderings: an application to Lorenz dominance. J Econ, Supplement 9:91–117
Srinivasan TN, Bhagwati J (1999) Outward-orientation and development: are revisionists right? Economic growth center discussion paper 806, Yale University

Stiglitz JE (1998) More instruments and broader goals: moving toward the post-Washington consensus. WIDER Annual Lecture 2
Tsui KY (2007) Forces shaping China's interprovincial inequality. Rev Income Wealth 53(1):60–92
Wade RH (2001) The rising inequality of world income distribution. Financ Dev 38:4
Wan GH, (1996) Measuring input substitution and output expansion effects: a nonparametric approach with application (Chap. 4). Empirical Economics 21(3):361–80
Wan GH (2001) Changes in regional inequality in rural China: decomposing the Gini index by income sources. Aust J Agricu Res Econ 45(3):361–382
Wan GH (2004) Inequality and economic development in transition economies: are nonlinear models needed? World Econ Pap 4:1–13
Wan GH, Cheng EJ (2001) Effects of land fragmentation and returns to scale in the Chinese farming sector. Appl Econ 33(2):183–194
Wan G, Zhangyue Z (2005) Income inequality in rural China: regression-based decomposition using household data. Rev Dev Econ 9(1):107–120
Wei S, Wu Y (2001) Globalization and inequality: evidence from within China. NBER working paper 8611
Xing Y, Zhang KH (2004) FDI and regional income disparity in host countries: evidence from China. Int Econ 57(3):363–379
Yang KZ (1994) Research on change to regional economic differences in China. Econ Res J 12:19–33
Yin X (1998) The procedure and effects of China's reform of international trade (in Chinese). Shanxi Economic Publishing House, Shanxi
Zhang X, Zhang KH (2003) How does globalization affect regional inequality within a developing country? Evidence from China. J Dev Stud 39(4):47–67
Zhang J, Wu GY, Zhang JP (2004) Estimation of provincial capital stock in China: 1952–2000. Econ Res J 10:35–44

Chapter 5
Economic Opening and Domestic Market Integration

Does economic opening lead to international as well as domestic market integration? The objective of this chapter is to examine whether China's policy of opening promotes domestic economic integration. Do the growing external links work against the local protectionism and market segmentation? Particularly since the beginning of the Chinese economic reformation, regional protectionism and segmentation have blocked a unified national market, brought about inefficiency in inter-regional resource allocation, distorted the market mechanism and disturbed the price signal. Ultimately, they weaken macroeconomic policies. Therefore, it is necessary to understand the causes of domestic market segmentation and to find the ways of dealing with them.

This chapter examines the determinants of segmentation of the Chinese inter-regional goods market on the basis of provincial panel data, focusing on the impact of economic opening—a fundamental component of Chinese economic reform, driving privatisation and deregulation. The correlation between international and domestic integration is explored, and the analysis predicts a continuing trend of domestic market integration in China.

There has been academic contention over whether there has been a tendency towards inter-provincial integration or segmentation in post-reform China. The process through which it happens still requires theoretical and empirical analysis. Empirical research in this field is recent (Poncet 2005; Bai et al. 2004a). There can be further development in measuring market segmentation, the selection and definition of independent variables, and increased sophistication in regression analysis. This chapter makes three contributions. First, in order to measure China's inter-provincial segmentation, we use Chinese provincial retail price index (RPI) data instead of industrial concentration or trade flow data. Second, we focus on the effect of economic opening on market segmentation. In addition, our approach captures the effects of employment pressure, government consumption, inter-regional technology differentials and geography. Third, the methodology improves on previous papers by attempting to eliminate endogenous bias, including simultaneity bias and omitted-variables bias.

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9_5

5.1 What Do We Know About Market Integration in China?

What has influenced Chinese domestic market integration? Bai et al. (2004a) and Poncet (2005) reached some pertinent conclusions in their empirical research. Bai et al. (2004a) estimated the overall level of geographic concentration of China's industries and factors influencing changes. He used the Hoover coefficient as the dependent variable, and examined the impacts of local protectionism, scale of economy and externalities on industrial concentration. The data supported the hypothesis that industries with a higher tax-plus-profit ratio in the past and those with a higher share of state-owned enterprises tended to have a higher degree of local protectionism, and therefore a lower level of industrial concentration. There is significant negative correlation between the output share of state-owned enterprises and local industrial concentration (Hoover coefficient), so he concluded that local protectionism could lead to market segmentation.

Poncet (2005) applied a gravity model (Head and Mayer 2000) for estimation of the domestic border effect in inter-provincial and intra-provincial trade flows for 1992 and 1997. She used an index representing the degree of domestic market segmentation. She then examined the relationship between endogenous protection and the border effect on trade. She also argued that local protectionist policy was an outcome of demand (by private agents and interest groups) and supply (politicians and government), which eventually caused increased domestic segmentation. Hence, her independent variables include fiscal expenditure, public consumption (the supply factors) and the unemployment rate (the demand factor). The regression results showed that an increase in the unemployment rate and government intervention enhanced market segmentation.

This literature is pioneering in this area, but needs further development.

First, the effect of economic opening has not been given adequate emphasis.[1] The fact is, in China, economic reform virtually coincided with the new openness to international trade. The open economy could change the integration of the domestic market profoundly, by affecting inter-regional trade flows, the behaviour of local governments, the strategies of enterprises and people's thoughts. For example, some variables in Bai et al. (2004a) and Poncet (2005), such as the share of state-owned enterprises and public consumption, are influenced by economic opening.[2]

[1]Poncet (2004) argued that the volume of intra-provincial trade flow are not influenced by the parallel evolution of international trade. But her former paper (2003b) stated Chinese provinces' greater involvement in international trade went hand in hand with a decrease in domestic trade flow intensity between 1987 and 1997.

[2]In our data, the economic opening has negative correlation with the share of state owned enterprises and public consumption.

Furthermore, opening led to nationalization descending and government retreating from economy. Therefore, simply putting opening into unobserved residuals might generate the omitted-variables bias in estimate.[3]

Second, the measurements used represented poorly the magnitude of domestic market integration. Bai et al. (2004a) investigated the coefficient of industrial concentration as a substitute for integration. However, there is no necessarily positive correlation between industrial concentration and market integration. This needs to be analysed more closely.

Similarly, the 'border effect' derived from trade flows (Poncet 2005) needs more analysis. It is hard to distinguish other economic effects, such as resource endowment or scale economics from those of integration on trade flows. For example, little difference between resource endowments or scale of economy makes the border effect noisy. Additionally, if the products of two areas are highly substitutable, a small rise in trade costs could lead to a large reduction in inter-regional trade volume (Parsley and Wei 2001a). Therefore, these two measurements have their limitations.

Third, the two studies emphasized local protectionism, but this is extremely difficult to evaluate. Bai et al. (2004a) argued that local governments benefitted from inter-regional trade barriers, so they tended to protect industries with higher past tax-plus-profit ratios and with a higher share of state-owned enterprises. Therefore, the two ratios represented the degree of local protectionism. This is doubtful, however, because local governments have incentives to protect some lower tax-plus-profit enterprises (Lin and Liu 2004).[4] Poncet (2005) claimed that local protectionism pursued a dual objective: fiscal revenue maximisation, and social stability and economic equity. She looked at the demand and supply of local protectionism, which comes from employment (unemployment rate), fiscal autonomy (fiscal expenditure) and intervention power (public consumption). Yet none of these variables equates directly to local protectionism. The unemployment rate is particularly controversial. On one hand, much of the literature debates whether China's unemployment statistics badly underestimated the real situation (Wang et al. 2004; Cai et al. 2004; Xue and Wei 2004). On the other hand, provincial governments engaged in maintaining existing employment in state-owned industries, which is a latent unemployed group, rather than helping the unemployed to find new jobs.

[3]Moreover, these two papers partially overlooked the simultaneity bias. However, in most studies of this field, the variables of government policy are usually correlated with the market integration to different degrees, the simple way to mitigate this kind of bias is using the lagged explanatory variables. The treatment of these two papers was incomplete. Bai et al. (2004b) only considered the lagged tax-plus-profit ratio and Poncet (2004) only considered the lagged rate of unemployment and the share of public sector in total consumption.

[4]Theoretically higher tax-plus-profit ratio might be the result rather than the motive of local protectionism, so Bai et al. (2004b) used lagged tax-plus-profit ratio to mitigate this type of endogeneity bias.

By comparison, this chapter has three innovations. First, we use the Chinese provincial RPI to abstract the measure of China's provincial market segmentation. Second, we investigate the effects of economic opening, employment pressure, government consumption, inter-regional technology differentials and geographic distance on market segmentation. Existing studies have provided several explanations of how economic opening impacts on domestic integration. Poncet (2002, 2003b) pointed out that international trade substituted for national trade, thus economic opening fragmented the domestic market. Li et al. (2003) set up a model demonstrating that when tariffs were sufficiently low, opening made the domestic market more competitive and improved market integration. We provide new evidence on the relationship between them. Third, we eliminate simultaneity bias by putting in lagged policy variables. As for economic opening, we also use instrument variables to reduce simultaneity bias and omitted-variable bias.

In addition, our segmentation index is developed from a convincing theoretical foundation (Parsley and Wei 1996, 2001a, b). It presents new evidence of an integrated Chinese domestic goods market, consistent with the findings of Naughton (1999), Xu (2002) and Bai et al. (2004a), but differs from those of Young (2000) and Poncet (2002, 2003b).

The heated debate about market segmentation in China began with Young (2000), who found that provincial economic structures were increasingly similar after examining the structure of gross domestic product (GDP) and manufacturing output, per capita output of main products and some price data. The explanation was that inter-regional competition and local protection led to fragmentation of the domestic market and distortion of regional production away from local comparative advantage. Relying on the evidence that Chinese provinces were more involved in international trade with a decrease in domestic trade flow, Poncet (2002, 2003b) concluded that China's provincial borders increasingly segmented the whole country. Numerous analyses, however, took a sceptical view of such claims. The prevalent criticism was that Young's (2000) indices were too simple to capture the tendency of domestic segmentation. As we have already discussed, the measure derived from trade flow (Poncet 2002, 2003b) was noisy because many factors, such as resource endowment and scale of economy, could change the trade flow. Still a small cost of trade could lead to a large reduction in trade volume if the substitution effect was strong (Parsley and Wei 2001a).

Naughton (1999) compared the commodity composition of inter-provincial trade between 1987 and 1992. He revealed that the increase of trade volume was caused mainly by the rise in intra-industry trade within manufacturing (final goods), rather than the trade of intermediate inputs. This coincides with the observed competition among producers in different regions. Xu (2002) decomposed provincial sectoral real value-added growth into common national effects, industry-specific effects and province-specific effects by an error components model. The empirical analysis for the period from 1991 to 1998 showed that with significant co-movements in the long term, even province specific factors still accounted for 35 % of the variance of short-term real output growth. His results suggested that the provincial economy was integrated incompletely under the reforms. Finally, the findings of Bai et al.

(2004a) also supported an increase in Chinese market integration: in the period from 1985 to 1997, the concentration of Chinese industries fell initially, and then increased significantly. As we pointed out, however, industrial concentration is not equivalent to market integration.

These debates have relied on indirect measures from production structure, trade flow, prices and industry concentration. In fact, the previous literature has used 'relative prices' to abstract direct indices of integration in two ways. Fan and Wei (2006) first applied the Augmented Dickey-Fuller (ADF) test to time series of each category of Chinese goods, then used the MW Test (Maddala and Wu 1999) on unbalanced panel data as a whole. According to the parameters of the model, they estimated the half-life for price convergence, which offered strong evidence of price convergence and market integration in China. Such a finding sits well with the view that China's transition to a market economy has been quite successful during the past two decades. Nevertheless, their analysis illuminated only the status of competition in the domestic market and not the course of convergence, so it cannot be extended to further research on causes of integration.

In this paper, we follow Parsley and Wei's model (1996, 2001a, b) to observe the variance of relative price, $Var(P_i/P_j)$, where small $Var(P_i/P_j)$ implies that relative price is falling. We can take the relative price as a dynamic index of market integration. The details will be demonstrated later in this chapter.

5.2 The Determinants of China's Domestic Integration

In this section, we summarize the potential determinants of domestic integration for our empirical models. Numerous publications have argued that Chinese market integration is affected by the behaviour of local governments. After decentralisation and taxation system reform, local governments had the chance to obtain rents from local firms' profits, so they had an incentive to reinforce regional segmentation. Hence, we group the potential determinants into three categories. The first is economic opening, the key of this chapter. The second includes factors related to government behaviour. The last covers other factors that need to be controlled.

To the best of our knowledge, economic opening has multiple impacts on market integration, some of which are positive, and others negative. First of all, in a relatively closed economy marked by low-level opening and a high tariff rate, local governments can implement segmentation policies to protect their industries. In this sense, a decrease in inter-provincial trade intensity is accompanied by rapid international trade opening (Poncet 2002, 2003b, 2005). As the economy opens further and tariff rates fall, however, the cost of local protection and segmentation augments this because of competition, and eventually international trade liberalisation restrains local protectionism (Li et al. 2003). Second, by influencing the external situation that local governments face, economic opening accelerates integration indirectly. For example, when the economy opens further, more foreign investments enter and the behaviour of individuals is transformed in diversified enterprises. As a

result, the power of non-state enterprises increases and the economic intervention of the government fades.

Meanwhile, much foreign capital is invested in joint ventures. Jointly operated industrial groups need to cooperate with local governments. Furthermore, opening has an irreversible effect on people's thinking, such as their understanding of government: the public pushes local governments to remedy their welfare functions and to facilitate domestic integration. Therefore, there might be a non-linear correlation between economic opening and domestic integration. In this story, when opening is in its initial stages, it could strengthen market segmentation, but further opening could enhance domestic market integration. Finally, opening promotes domestic integration. The evidence for this will be shown in the next sections.

There are also some issues concerning local governments. Briefly, Chinese local governments have dual objectives: to optimise their benefits and to maximise the utilities of residents. For the first goal, they tend to implement segmentation policies for increased fiscal revenue. For the second one, they engage in maintaining employment and developing strategic industries. Therefore, we pay attention to the following determinants in our empirical model.

(1) Economic intervention of local government. In a planned economy, the fiscal system is highly centralised. Since 1978, fiscal decentralisation of revenue, taxation, control of enterprises, investment and financing has strengthened the capability of official intervention. Under this system, policymakers gain benefits from the local economy, so they have an incentive to participate in economic activities directly. Our hypothesis is that provinces with a larger share of fiscal revenue relative to the size of the economy are more willing than others to segment inter-regional markets to protect their industries.

(2) Economic nationalisation. In a transitional economy such as China's, maintaining employment is always a primary government objective. China's employment pressure comes directly from local state-owned industries. Historically, the pre-reform employment system disguised large urban unemployment in the state-owned sector. In the 1990s, a shortage of capital brought about increasing deficiency of non-labour investment. There were more and more redundant workers in state owned enterprise as a result of intense goods market competition, shrinking demand, wage rises in non-state-owned counterparts and the constraint of reducing the number of employees (Dong and Putterman 2002). So, we take the state-owned employment share as the weight of the nationalised economy, which shows the employment pressure and therefore the pressure of domestic segmentation. The noteworthy point is that there are some alternative explanations for the correlation between economic nationalisation and domestic segmentation, such as state-owned capital being commanded by local governments (Ping 2004), or local governments benefitting from state-owned enterprises (Bai et al. 2004a).

(3) The inter-regional technology differential. Lu et al. (2004) argued that the fiscal target and employment goal was not the only explanation for duplicative industries and inter-regional economic segmentation. If high-tech industries

have increasing returns, less-developed regions will not specialise according to static comparative advantage but will raise their bargaining position by inter-regional segmentation and by developing 'strategic' industries. Thus, they could gain a higher bargaining position in the future and even catch up with the rich regions. Therefore, we expect that the less-developed regions prefer a segmented economy and protect local strategic industries.

The last but not least, two factors must be controlled for in the empirical models: (1) Geographic distance. In general, long distances mean high transportation costs, then more transaction costs. Even if governments are neutral, the commodity flow is still restricted by geographic space. We think distance might 'create' market segmentation. (2) The stage of marketisation reform. China's marketisation could be divided into two stages. Before 1994, the process was relatively sluggish. In 1993, the third session of the fourteenth Congress of the Communist Party of China enacted a decision to establish a socialist market economy. Taxation system reform, unification of exchange rates, financial system reform, state-owned enterprise reform and some other reforms began the next year. Therefore, 1994 was the starting point of the new phase of China's marketisation reform. From then on, the evolution of domestic goods market integration might be different from the pattern demonstrated in the period before 1994.[5] We hypothesise that the post 1994 reforms saw an increased level of market integration.

5.3 Measuring Market Segmentation for Chinese Domestic Goods

How to find a credible measure of integration or segmentation is the most difficult part of empirical studies. Given the drawbacks of the existing approaches—production, trade flow and the specialisation index—we construct the panel data of the inter-regional segmentation index using regional RPI of consumer goods by the method of Parsley and Wei (2001a, b).

5.3.1 Data and Index Computing

The logic of measuring market segmentation by relative prices is based on the iceberg model (Samuelson 1954), which amends the original Law of One Price (LOP) theory. Generally, there are certain kinds of transportation costs, such as freight costs, that are consumed during transactions like an iceberg melting. Only a

[5]Some literatures chose 1992, when Xiaoping Deng toured south China, as the start point of new reform stage. But considering the execution time of policies, we think 1994 is the better division standard.

fraction of the goods' value survives. This implies that perfect arbitrage requires only the relative price fluctuating within a range but not being constant. Suppose Pi is the price of a product in location 'I', and P_j is its price in location 'j'. The proportional transaction cost (wastage occurring as commodities are traded between two regions) is 'c' ($0 < c < 1$). The necessary condition for the existence of arbitrage is $P_i(1 - c) > P_j$ or $P_j(1 - c) > P_i$, in which trade occurs. Otherwise, the relative price of product P_i/P_j falls into a non-arbitrage range $[1 - c, 1/(1 - c)]$. Here, the transaction cost in a broad sense includes all sorts of factors that wear down the value of goods in the process of trade, such as physical geography or institutional arrangements. Under this principal, a reduction of freight costs or a decrease in institutional trade barriers reduce transaction costs and improve market integration; correspondingly, the range of fluctuation of the relative price shrinks.

Our primary data is "Retail Price Indices of Commodities by Region" obtained from *China Statistical Yearbook* for various years. We compute 17 years (1985–2001) of 61 pairs of conjoint provinces' relative price variances $\mathrm{Var}(P_i^t/P_j^t)$. The total number of observations is 1037(=17 × 61). Because $\mathrm{Var}(P_i^t/P_j^t)$ data are time series for every conjoint province pairs, we can observe their movements by region. The evolution of time series reflects the tendency of goods market integration. Additionally, Parsley and Wei's approach has another virtue. By synthesizing the price information of various goods, we get the estimate of goods market segmentation.

Our study starts with relative price variances of conjoint province pairs, because these kinds of data can be synthesised to provincial segmentation indices (see the next section). In the real story of national trade, the provincial trade policy is generally consistent between neighbouring and other provinces, so when domestic integration increases, the trend might be shown first in conjoint province pairs. Such common sense is, however, difficult to prove.

We focus on the absolute value of relative price $\left|\Delta Q_{ijt}^k\right|$, where $\Delta Q_{ijt}^k = \mathrm{Ln}(P_{it}^k/P_{jt}^k) - \mathrm{Ln}(P_{it-1}^k/P_{jt-1}^k)$[6] is the first order difference of percentage price difference of identical product k in two conjoint provinces, i and j, at time t. We construct this form of relative price index from "Retail Price Indices of Commodities by Region" according to the formula (5.1), it demonstrates how indices P_{it}^k/P_{it-1}^k and P_{jt}^k/P_{jt-1}^k transform to ΔQ_{ijt}^k,

$$\Delta Q_{ijt}^k = \ln(P_{it}^k/P_{jt}^k) - \ln(P_{it-1}^k/P_{jt-1}^k) = \ln(P_{it}^k/P_{it-1}^k) - \ln(P_{jt}^k/P_{jt-1}^k) \tag{5.1}$$

[6]There are three forms of relative price in empirical studies of "iceberg" melting model. The other two forms are: (1) the direct price ratio between two places, P_{it}^k/P_{jt}^k. (2) The logarithm of price ratio $Q_{ijt}^k = \mathrm{Ln}\left(P_{it}^k/P_{jt}^k\right)$. The main improvement of the latter form is the estimator of independent variable is independent of the unit of measurement, furthermore, logarithm can mitigate the disturbance of heteroscedasticity and skewness (Wooldridge 2003). The details about the relative price forms are introduced by Parsley and Wei (1996, 2001a, b).

Further, when a market is segmented it is the extreme case that iceberg cost c reaches maximum, eventually Q_{ijt}^{k} will converge along with ΔQ_{ijt}^{k}. In this aspect, Q_{ijt}^{k} is equivalent to ΔQ_{ijt}^{k} in describing the process of segmentation. The problem is, for any province-pair or time period, ΔQ_{ijt}^{k} may be positive or negative. In fact, with the same year and the same province-pair, take price of i province or that of j province as numerator, our computing results are opposites of each other, i.e. $\Delta Q_{ijt}^{k} = -\Delta Q_{jit}^{k}$. That is to say, the order of provinces affects the value of $\mathrm{Var}(\Delta Q_{ijt})$. The absolute value avoids this kind of inconsistency. Looking back at the iceberg model, the logarithm of non-arbitrage interval $[1 - c, 1/(1 - c)]$ is symmetrical, $[\mathrm{Ln}(1 - c), -\mathrm{Ln}(1 - c)]$. It implies that the opposite number of ΔQ^{k} reveals the same extent of relative price fluctuation, but arbitrage happens in the reverse direction with different signs of ΔQ^{k}.

The method of relative price analysis requires a three-dimensional database (t × m × k), where the indices 't', 'm' and 'k' represent time, province and goods respectively. Our primary data are the retail price indices of commodities by region, three-dimensional panel data (17 × 28 × 9) covering 17 years from 1985 to 2001, 28 provinces, municipalities or autonomous regions and nine commodities. Our filtration rules of goods are as follows.

(1) 1985 is the starting year, because there were no RPI statistics by region before 1985, and 1985 was the first year of the price reform after the third session of the twelfth Congress of the Communist Party of China. From then on, prices were decided mainly by the market. (2) Three provinces—Hainan, Chongqing and Tibet —are excluded due to incomplete data.[7] (3) The old commodity categories listed only before 1985 are excluded. Therefore, the data in this chapter include nine types of goods with continuous records: grain; fresh vegetables; beverages, tobacco and liquor; garments, shoes and hats; traditional Chinese and Western medicines; newspapers and magazines; stationery and sports goods; daily use articles; and fuel. (4) There was a commodity reclassification after 1987 with minor adjustments, so in order to get as much data as possible, we fill in the data for beverages, tobacco and liquor; garments, shoes and hats; traditional Chinese and Western medicines; newspapers and magazines; stationery and sports goods in 1985 and 1986 with data for tea, tobacco and liquor; clothes; medicines and medical equipment; newspapers and magazines; stationery and entertainment goods, respectively.

According the computation above, we get the vectors of differential relative price index $\left|\Delta Q_{ijt}^{k}\right|$ containing 9333(9 × 61 × 17) observations without missing data. It is a little far from the segmentation index yet. We need calculate the cross-sectional variance with respect to goods. Under our assumption, a higher variance means a

[7]The earliest data of Hainan, Chongqing and Tibetan begin in 1988, 1997, 1999 respectively. Before 1987, statistics of Guangdong covered that of Hainan. Before 1997, data of Sichuan included that of Chongqing.

wider arbitrage interval and implies more serious segmentation.[8] With the purpose of abstracting regional effects, we must remove the goods-specific effects first. For instance, in a certain period, the grain market experiences significant price fluctuation within two locations, i and j. The cause may be divided into two parts. One is related to the nature of grain market. For example, the price of grain changes largely, since the yield of grain is easier to be influenced by natural conditions. The other part is independent of goods characteristics, but determined by market conditions between locations i and j, or some random factors. For instance, location i was hit by a natural calamity, so grain's price jumped, or i's local government of strengthens trade barriers. If we calculate the variance without filtering the goods-specific effects from $\left|\Delta Q_{ijt}^{k}\right|$, the result may overrate the real value caused by interregional trade barrier. Practically, we use de-mean to remove the goods-specific effect, let $\left|\Delta Q_{ijt}^{k}\right| = a^{k} + \varepsilon_{ijt}^{k}$ (Parsley and Wei 2001a, b), where a^{k} is a kind of fixed effects of goods k and ε_{ijt}^{k} regional specific effects between locations i and j. In fact $a^{k} = \overline{\left|\Delta Q_{t}^{k}\right|}$, the mean of $\left|\Delta Q_{t}^{k}\right|$ for 61 province pairs at time t and goods k. Then de-mean yields $\left|\Delta Q_{ijt}^{k}\right| - \overline{\left|\Delta Q_{t}^{k}\right|} = \left(a^{k} - \overline{a^{k}}\right) + \left(\varepsilon_{ijt}^{k} - \overline{\varepsilon_{ijt}^{k}}\right)$. Let $q_{ijt}^{k} = \varepsilon_{ijt}^{k} - \overline{\varepsilon_{ijt}^{k}} = \left|\Delta Q_{ijt}^{k}\right| - \overline{\left|\Delta Q_{t}^{k}\right|}$.[9] At last, our segmentation index is the variance of q_{ijt}^{k}, defined as $\mathrm{Var}\left(q_{ijt}^{k}\right)$. As preceding notes, q_{ijt}^{k} is only related with regional specific effects and other random effects and we have totally 1037(61 × 17) observations.

5.3.2 The Integration of Chinese Domestic Goods Market

Based on our segmentation index, we can summarise the integration evolution process of each region and the whole country. In the first place, we compute the average segmentation level for regions by year. The result is a time series containing 17 years' data. We can detect an oscillatory path in the period 1985–2001 in Fig. 5.1. The aggregate segmentation index first rises and eventually falls, which demonstrates that China's goods market is integrating gradually. This is the opposite finding to Young (2000) and Poncet (2002).

The purpose of this chapter is to verify that economic opening and other variables will affect domestic market integration via the behaviour of local governments. Thus we need to transform the data by 61 province pairs to data by province.

---

[8] A formal discussion was presented in Parsley and Wei (2001a, b).

[9] Alternatively, Parsley and Wei (2001a, b) used OLS regressions to remove fixed effects of $\left|\Delta Q_{ijt}^{k}\right|$, the model was $\left|\Delta Q_{ijt}^{k}\right| = \beta\overline{\left|\Delta Q_{t}^{k}\right|} + \varepsilon$, the residual was $q_{ijt}^{k} = \left|\Delta Q_{ijt}^{k}\right| - \hat{\beta}\overline{\left|\Delta Q_{t}^{k}\right|}$, which is inexplicable term of $\overline{\left|\Delta Q_{t}^{k}\right|}$. Practically, we can get the same result through these two approaches.

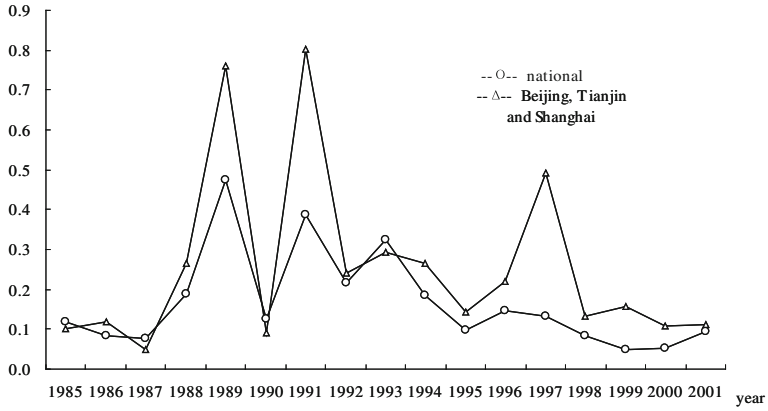

Fig. 5.1 Domestic good market segmentation (1985–2001)

For example, the segmentation index of Shanghai is the mean of the inter-regional index of Shanghai–Jiangsu and Shanghai–Zhejiang. Other regional segmentation indices are created following the same logic, so we get 476(28 × 17) observations. They present the movement of goods market segmentation of 28 regions in 17 years. Authentically, the provincial segmentation index captures the magnitude of integration between this province and all its neighbours. Figure 5.2 depicts the individual region's segmentation indices. There is a great diversity of movements, some of which are insignificant in certain regions such as Sichuan (23) and Guizhou (24), but as a whole, the trends coincide with that of the whole country: most regions' goods markets are converging to a certain level of integration.

Finally, we calculate the average index for years by region. As Table 5.1 shows there is great diversity across different areas. A noticeable point is the three municipalities of Beijing, Tianjin and Shanghai—rank first, second and fourth respectively. Some municipalities enjoy special policies, have a better economy and a smaller area, so local government interventions work better. Hence, their market integration is relatively slower than others. Focusing on the rankings between 1985 and 2001, another point of view is that the ranks of most regions change dramatically.

5.4 Data and Estimation

Now we turn to the theoretical frame and determinants discussed in Sect. 5.3. We begin our formal investigation with the following basic model

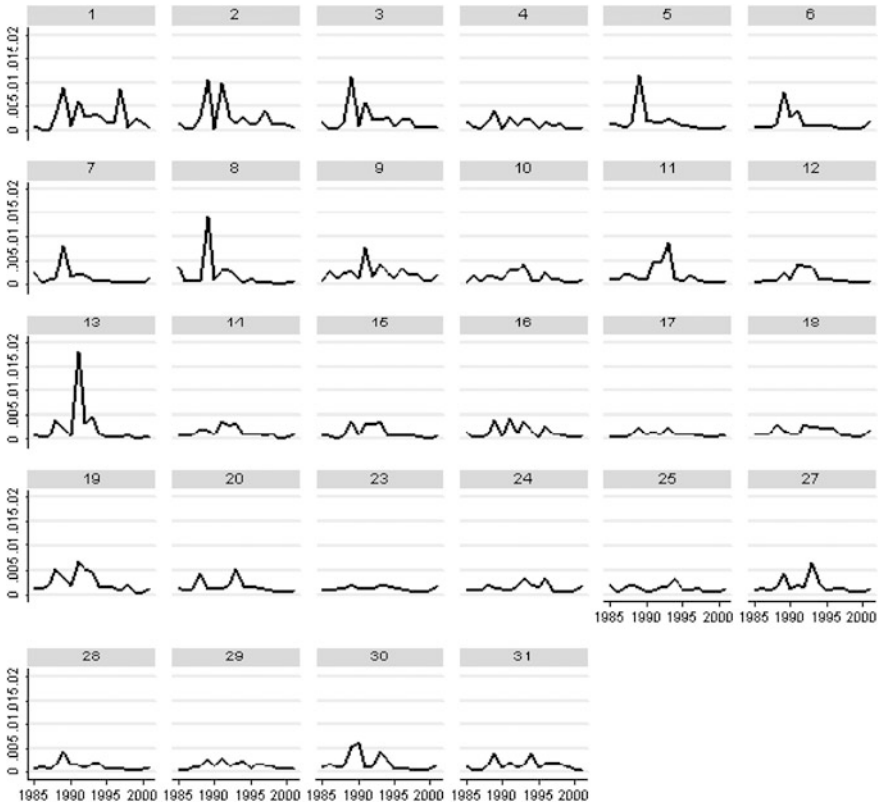

Fig. 5.2 Market segmentation index by region (1985–2001). *1* Beijing, *2* Tianjin, *3* Hebei, *4* Shanxi, *5* Neimenggu, *6* Liaoning, *7* Jilin, *8* Heilongjiang, *9* Shanghai, *10* Jiangsu, *11* Zhejiang, *12* Anhui, *13* Fujian, *14* Jiangxi, *15* Shandong, *16* Henan, *17* Hubei, *18* Hunan, *19* Guangdong, *20* Guangxi, *21* Hainan, *23* Sichuan, *24* Guizhou, *25* Yunnan, *27* Shanxi, *28* Ganshu, *29* Qinhai, *30* Ningxia, *31* Xinjiang. *Note* The trade/GDP ratio with one year lag is used as an explanatory variable in the regression. To make the figure readable, the original data multiplied by 100 are reported. *Source* Authors' calculations

$$\mathrm{Segm}_{it} = c + \sum \beta_k X_{kit-1} + \gamma_1 \mathrm{Area} + \gamma_2 \mathrm{Dummy94} + \alpha_i + \varepsilon_{it} \qquad (5.2)$$

Let Segm_{it} be the segmentation index of region 'i' at time 't'. As we mentioned, it is a dimensionless variable, so our final dependent variables are 100 times the original ones; this treatment helps us get larger estimated parameters. The improvement of integration occurs with the smaller Segm value. So, variables with negative parameters promote integration; those with positive parameters impede integration.

The right hand side of Eq. (5.2) lists our independent variables. The primary data in period of 1985–1998 are obtained from *Comprehensive Statistical Data and Materials in 50 Years of New China,* the rest in 1999–2001 are obtained from

Table 5.1 Ranking of segmentation index by region

Province	Means over 17 years	Rank	1985	Rank	2001	Rank
Beijing	0.273	1	0.099	14	0.057	22
Tianjin	0.260	2	0.152	7	0.078	14
Fujian	0.240	3	0.102	13	0.051	25
Shanghai	0.233	4	0.05	26	0.195	1
Guangdong	0.233	5	0.135	9	0.091	11
Hebei	0.217	6	0.164	6	0.046	27
Zhejian	0.197	7	0.092	16	0.074	17
Heilongjiang	0.194	8	0.393	1	0.068	20
Neimengggu	0.175	9	0.117	10	0.108	8
Ningxia	0.166	10	0.074	21	0.141	6
Hunan	0.166	11	0.087	17	0.191	2
Shanxi	0.164	12	0.076	19	0.104	10
Henan	0.157	13	0.182	4	0.072	19
Liaoning	0.153	14	0.081	18	0.169	4
Guangxi	0.152	15	0.142	8	0.074	16
Jiangxi	0.148	16	0.113	11	0.089	12
Jiangsu	0.147	17	0.038	27	0.087	13
Xinjiang	0.143	18	0.092	15	0.033	28
Jilin	0.142	19	0.244	2	0.124	7
Anhui	0.141	20	0.035	28	0.055	23
Guizhou	0.137	21	0.108	12	0.185	3
Shanxi	0.134	22	0.174	5	0.049	26
Shandong	0.131	23	0.075	20	0.052	24
Qinhai	0.124	24	0.063	23	0.064	21
Yunnan	0.115	25	0.206	3	0.105	9
Ganshu	0.113	26	0.056	25	0.074	18
Sichuan	0.109	27	0.067	22	0.169	5
Hubei	0.106	28	0.059	24	0.076	15

China Statistical Yearbooks. Our sample covers 28 regions. The data of Sichuan province does not include Chongqing's.[10] The statistics of Hainan, Tibet, Chongqing are incomplete in period 1985–2001, so not in our sample.

'X' is the vector of policy variables influencing local government decisions. These variables are endogenous due to simultaneity bias, for which we use the one-year lag of Xs to treat. The entries of X include following variables.

[10]In *Comprehensive Statistical Data and Materials in 50 Years of New China*, all data of Sichuan peel off that of Chongqing, so Sichuan's explanatory variables do not contain the portion of Chongqing. But the dependent variable of Sichuan comes from the RPI that covered Chongqing before 1996. We suppose the RPI of one area will not change much if only peeling off portion of it. For more sample numbers, we keep these 11 components.

(1) *Trade*, the share of total international trade in GDP, or dependency ratio of international trade,[11] denotes the degree of economic opening. Considering that the effect is in non-linear form, we construct the quadratic term of opening (*Tradesq*) in our model. Figure 5.3 presents the uptrend of dependency ratio on international trade from 1985 to 2001. It is coherent with the increasing economic opening. The prominent case is Guangzhou province. Both in terms of level and the rate of change, this province exceeds that of other regions obviously. As we deduced in Sect. 5.3, there could be a non-linear effect of economic opening, so that the coefficient of the linear term could be positive, and that of the quadratic term could be negative.

(2) *Govcons*, the ratio of government consumption to GDP. It is the proxy of fiscal objective of local government, an important motive to local protection, so we expect to detect a positive correlation between this variable and the segmentation. In empirical studies, an alternative of government interference is the ratio of provincial government expenditures to GDP.[12] We tried it in our regression, and the result was consistent but less significant, so we only report the estimates with *Govcons*.

(3) *SOE*, the share of state-owned employees in total employees. As we mentioned in Sect. 5.3, this is an indicator for both employ pressure and the public authority in local economy. The coefficient could be positive.

(4) *Techdiff,* the ratio of GDP per worker of a region with that of its neighbors, which is a proxy of technology difference. The GDP per worker of neighbors is the simple arithmetic mean of that of all conjoint regions, which assigns each neighbor with the same weighting coefficients. Lu et al. (2004) presented a theoretical framework to prove that the less-developed regions have motive to set segmentation, but better-developed regions pursue market integration. In this logic, the coefficient of *Techdiff* could be negative.

We also included the following two important control variables in our regression model.

(5) *Area*, the average size of a region and its neighbors. We use this variable to indicate the average physical distance of local and conjoint provinces roughly. *Area* = local size + (total area of neighbors ÷ the number of neighbors).

[11]The data of imports and exports are the values in RMB transferred by middle prices of RMB-dollar. The exchange rates are obtained from *China Statistical Yearbooks*.

[12]In literature of Economic growth, government expenditure to GDP ratio, expenditures for education and national defence subtracted, is commonly used as the proxy of government interference. But Chinese local governments have no statistics about national defence, and there is no separate category of education, but only total numbers of expenditures for culture, education, research and health, so we subtracted the share of expenditures for culture, education, research and health from total government expenditures.

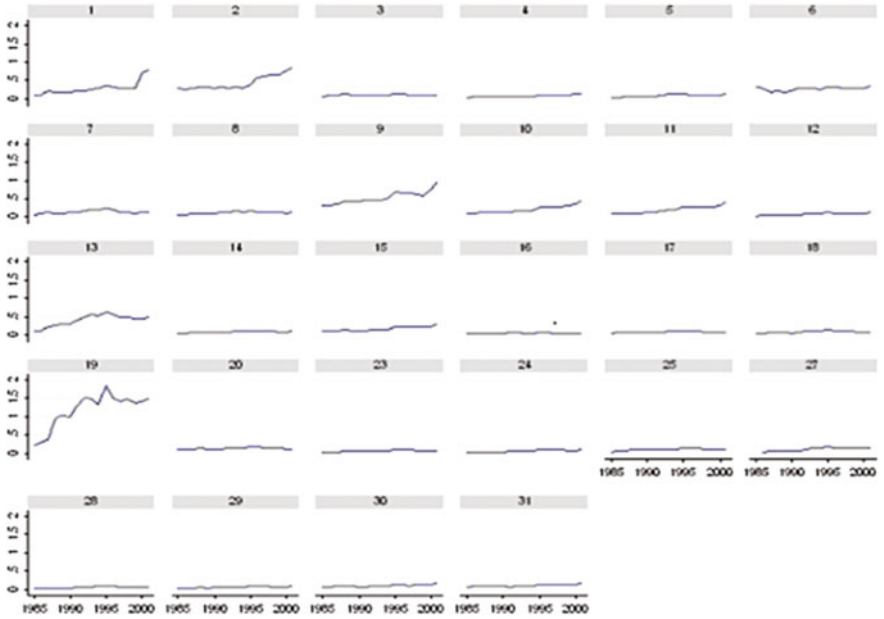

Fig. 5.3 The ratio of dependence on international trade by region (1985–2001). *1* Beijing, *2* Tianjin, *3* Hebei, *4* Shanxi, *5* Neimenggu, *6* Liaoning, *7* Jilin, *8* Heilongjiang, *9* Shanghai, *10* Jiangsu, *11* Zhejiang, *12* Anhui, *13* Fujian, *14* Jiangxi, *15* Shandong, *16* Henan, *17* Hubei, *18* Hunan, *19* Guangdong, *20* Guangxi, *21* Hainan, *23* Sichuan, *24* Guizhou, *25* Yunnan, *27* Shanxi, *28* Ganshu, *29* Qinhai, *30* Ningxia, *31* Xinjiang. *Note* The trade/GDP ratio with one year lag is used as an explanatory variable in the regression. *Source* Authors' calculations

Because most provinces have several neighbors, so the simple straight-line distance cannot capture the nature of geographic distance. The anticipated sign of this variable is positive.[13]

(6) *Dummy94*, the dummy variable of time—let them be one after 1994, otherwise they equal zero. After the implementation of a series of reforms in 1994, integration could be strengthened significantly. Therefore, this variable could be negatively related with the segmentation index.

In our model, α_i is unobservable provincial fixed effect, which is constant over time and specific to the province, 'i', and ε_{it} the disturbance. Since the unobservable term α_i may be correlated with some independent variables, the OLS estimates could be biased. One of the general ways to reduce the bias caused by omitted variables represented by the constant α_i is the method of de-mean imposed to all

[13]The study of Head and Mayer (2002) measured the distance by $0.376\sqrt{\text{Area}}$, where 'Area' denoted the numerical value of area. The calculation strategy was based on the assumption of Uniform Distribution of consumers. We also used this index in regressions. And the conclusions were the same as the ones we report.

variables before regressions, which is the fixed effects (FE) approach. If α_i is uncorrelated with the other regressors, Random Effects (RE) model is more efficient and we can test the fixed and random effects regressions by Hausman Test to decide which of the two alternatives is better. If two coefficient estimators differ systematically, α_i is correlated with one of explanatory variables and only the fixed effects treatment is consistent. Otherwise, that the individual effect α_i is uncorrelated with the other regressors cannot be rejected, the efficient estimators of random effects model are better.

However, that α_i is constant over time is a very strong assumption. Unobserved time-varying factors may cause estimators inconsistent, so instrument variable estimation is helpful. The results could also be tested by Hausman Test. If the estimate of instrument variable model is significantly different from that of OLS estimation, the hypothesis that some of the regressors are endogenous cannot be rejected, the instrument variable estimation is consistent, and otherwise, the original OLS estimation is more efficient.

In Table 5.2, we report the results of these methods. The regression (1) begins with explanatory variables *Trade, Govcons, SOE*, *Area* and *Dummy94*. Hausman Test rejects the random effect estimation. So we cannot estimate the effect of physical distance, *Area*. In this model, both *Govcons* and *SOE* strengthen segmentation, and the estimate of *dumy94* shows, after 1994, the accelerated marketizaton reform abated segmentation. Our focus, the coefficient of economic opening is positive, in this point of view, trade opening raises segmentation. For the sake of examining the effect of economic opening more precisely, we add *Tradesq* in regression (2) to capture a potential non-linear effect. Hausman test rejects the random effects approach. Compared with (1) coefficient estimates of *Govcons* and *SOE* change slightly with this specification, but with the significant positive estimate of *Trade* and negative estimate of the quadratic term, *Tradesq*, model (2) is more compatible to our theoretical framework. The effect of opening is non-linear. At its initial stage, opening strengthens market segmentation, but further opening enhances domestic market integration. Numerically, the critical point is Trade = 1.272. Before this point, economic opening increases segmentation, after it increases integration. The value 1.272 falls into the observable interval and the data of Guangdong province exceeded this level after 1991.

In the next step, *Techdiff* is added in model (3). The estimate of *Techdiff* is insignificant, but the sign is negative as the theory predicts. The negative coefficient means that lagged regions have a smaller index of *Techdiff*, and more serious market segmentation, while the better-developed regions with higher *Techdiff* have smaller segmentation magnitude. The insignificant estimate is reasonable here. Firstly, the technology difference theory works better in high-tech industries with increasing turns (Lu et al. 2004), but our explanatory variables are set up from price indices of ordinary consumer goods. Secondly, the technological difference has a long-term effect, so our one-year lagged model cannot capture this characteristic. Thirdly, like the effect of opening, the technological difference could influence segmentation in a non-linear form, but our model has only a linear term of technology.

Table 5.2 Market segmentation and its determinants

Dependent variable	Segm				
	All regions			Guangdong excluded	Beijing, Tianjin and Shanghai excluded
	(1)	(2)	(3)	(4)	(5)
Independent variables	FE	FE	RE	RE	FE
Trade	0.2621*** (0.0864)	0.7180*** (0.2073)	0.5653*** (0.1216)	0.6944*** (0.1707)	0.7831*** (0.2216)
Tradesq	n.a.	−0.2821** (0.1167)	−0.2711*** (0.0769)	−0.4773** (0.2422)	−0.3067** (0.1200)
Govcons	1.0059*** (0.3835)	0.9019** (0.3838)	0.3449 (0.2648)	0.3405 (0.2694)	0.9589** (0.3733)
Soe	0.9279*** (0.2174)	1.0085*** (0.2187)	0.7199*** (0.1960)	0.6481*** (0.2227)	0.9876*** (0.2235)
Techdiff	n.a.	n.a.	−0.0104 (0.0192)	−0.0075 (0.0212)	−0.0430 (0.1060)
Area	(Dropped)	(Dropped)	−2.4197 (2.0891)	−2.1790 (2.1210)	(Dropped)
Dummy94	−0.0831*** (0.0221)	−0.0957*** (0.0226)	−0.0969*** (0.0209)	−0.1012*** (0.0219)	−0.1028*** (0.2252)
Constant	−0.8533*** (0.2350)	−0.9692*** (0.2386)	−0.5702*** (0.2039)	−0.5125** (0.2234)	−0.9187*** (0.2494)
Within R^2	0.1441	0.1554	0.1463	0.1351	0.1812
F-value	18.35	16.01	n.a.	n.a.	14.24
Wald chi2	n.a.	n.a.	90.68	78.82	n.a.
Hausman test	15.12	9.72	9.76	10.20	14.64
P-value	0.0045	0.0835	0.1352	0.1158	0.0232
No. of obs.	468	468	468	451	417
No. of regions	28	28	28	27	25

Notes Standard errors in parentheses; ***, **, * denote significance at 1, 5, 10 % level; the null hypothesis of the Hausman test has no systematic difference between FE and RE models

Looking back at the results so far, we extend the study on the critical value of the inversed-U shape of the effects of economic opening. In regression (2), the point is *Trade* = 1.272, but in regression (3), the point is *Trade* = 1.043. Although these two values are within our sample, only Guangdong has exceeded that level of economic opening. We worry that the non-linear effects of opening are due only to the outliers in our sample. So the next step is to drop all observations in Guangdong from our sample, and repeat the regression (3); we get the result in column (4). The basic finding is similar, but the critical value drops to *Trade* = 0.7273, a value within our new sample. Now, we can draw the convincing conclusion that a non-linear relationship exists between economic opening and market segmentation.

Finally, considering the extraordinarily high values of the segmentation indices in the three municipalities, we drop them, and repeat the estimation. Table 5.2,

Table 5.3 Market segmentation and its determinants (instrumental variable estimation)

Dependent variable	Segm			
	All regions		Guangdong excluded	Beijing, Tianjin and Shanghai excluded
	(6)	(7)	(8)	(9)
Independent variables	IV-FE	IV-RE	IV-RE	IV-FE
Trade	3.1001*** (0.9308)	0.7202 (0.6589)	0.5060* (0.2629)	3.0345*** (0.9454)
Tradesq	−1.5240*** (0.5826)	−0.4635 (0.5879)	−0.3350 (0.4245)	−1.6581*** (0.6054)
Govcons	0.3820 (0.4838)	0.3113 (0.2996)	0.3623 (0.2763)	0.5508 (0.4604)
Soe	1.7757*** (0.3898)	0.5382* (0.2795)	0.5487* (0.2989)	1.2645*** (0.3160)
Techdiff	n.a.	−0.0138 (0.0383)	−0.0030 (0.0282)	−0.2533 (0.1702)
Area	(Dropped)	−1.6967 (3.9994)	−3.0731 (2.2910)	(Dropped)
Dummy94	−0.1551*** (0.0358)	−0.1089*** (0.0304)	−0.1010*** (0.0236)	−0.1616*** (0.0352)
Constant	−1.9349*** (0.4459)	−0.3974 (0.2717)	−0.4038 (0.2860)	−1.1359*** (0.3761)
Within R^2	.	0.1236	0.1316	.
Between R^2	0.5373	0.4085	0.4409	0.3016
IV	portrate	trad78rate	trad78rate	portrate
Hausman test	8.29	1.17	1.34	6.11
P-value	0.1410	0.9916	0.9874	0.4111

Notes Standard errors in parentheses; ***, **, * denote significance at 1, 5, 10 % level; the null hypothesis of the Hausman test is that there is no systematic difference between IV estimation and original models; the within R^2 of (6) and (9) are too small, so Stata does not report them

column (5) reports the random effect estimates, the coefficients of regressors meet our expectation and most of them are statistically significant, except *Techdiff*.

The estimates in Table 5.2 might be biased if omitted variables contain time-varying ones. In that case, the FE and the RE are inconsistent. Table 5.3 presents the test results of instrument variable estimations. Our goal is to find the unbiased estimator of economic opening, so we implement three instrument variables: (1) The pre-reform opening index in 1978, denoted as *trade78*. It is the international trade share in GDP in 1978 and represents the historical influence. (2) The minimum railway distance from the capital region to main ports of China, Hongkong or Shanghai, (denoted as *port*).[14] This instrument variable represents the geographic effect and is the valid instrument variables for opening in Wei and Wu

[14]Shenzhen is one of the largest ports of China, which is close to Hongkong, so the distance form provincial capitals to Hongkong are that to Shenzhen and Hongkong both. These data are collected from *China Electronic Mapfor Transportation and Travel* (Beijing Tuling Software Ltd.).We acknowledge Yu Jin's help for data collecting.

(2001). We only compare the distances to Hongkong or Shanghai because they are two biggest ports in China, located in Pearl River Delta and Yangtse River Delta, respectively, and their throughputs are far beyond others'. (3) The exchange rate (denoted as *rate*) determines the international relative price directly and affects the volume of international trade of each province accordingly, but it does not influence integration directly, so it is a valid instrumental variable.

Exchange rate and international trade interplay mutually, so we use the lagged *rate* as the IV of opening. In our regression model, opening is a one-year lagged trade variable, so the *rate* IV in estimation is the two-year lagged exchange rate. The problem is, in Table 5.2, columns (2) and (5) are all FE models; IVs constant over time are eliminated in the de-mean process. So we set up two interaction terms, the interaction of *trade78* and *rate* (*trade78rate*), and the interaction of *port* and *rate* (*portrate*). These two instruments are composed of time-varying exchange rate and time-fixed regional specific or historical effects. The justification for using the interaction terms as instruments is that the effects of the instruments on economic opening depend on each other. In more concrete terms, the effects of history and geography on opening will be greater if the price of international trade is more advantageous, and the exchange rate will have more significant effects on opening in regions with better geographic and historical conditions. We have used both instrumental variables in the model alternately. All results of the Hausman Test do not reject the null hypothesis of no systematic difference between IV and the original models. Table 5.3 reports the corresponding IV models of columns (2)–(5) in Table 5.2, and the models with alternative IVs that we do not report here also reject the endogeneity of opening, so the estimates in Table 5.2 are convincing.

5.5 Conclusions

Many studies on the Chinese domestic market have provided evidence in support of the general trends of market integration as a result of economic transformation. The existence of domestic market segmentation, however, and the negative effects of local protectionism can hardly be rejected (Zhen and Li 2003; Poncet 2003a). For this reason, examining the determinants of domestic market integration is still an important issue facing researchers as well as decision makers in China.

Our empirical results answer two questions. First, has the domestic goods market become more integrated since the reforms? The segmentation index constructed by Chinese RPI data shows a different tendency from that found by Young's (2000) and Poncet's (2002) findings. The main finding is that the trend of market integration is persistent and increases over time, although such a trend also experiences serious short-term aberrations, and until now the progress in market integration has varied across different provinces.

Second, did more integrated international trade substitute inter-provincial trade and intensify domestic market segmentation, as stated by Poncet (2002, 2003b)? We investigated the incidence of trade opening, which has been a primary policy

focus in Chinese economic reform. Our study captures a nonlinear correlation, meaning that the opening policy could worsen the extent of market segmentation in its initial stage of development, but further opening enhances and strengthens the process and the extent of domestic market integration. Such findings endorse the view that moving towards an open economy is fundamentally conducive to the objective of building an integrated market system in China.

We also analysed the influence of geography, pressure for employment, government consumption and technology differentials. Evidence reveals that employment pressure and government consumption worsen market segmentation.

In conclusion, economic opening benefits domestic market integration. However, most provinces still have a long way to go to be integrated more into the national market system. Meanwhile, institutional reforms, such as those aimed at constraining local government intervention and continual privatisation, will help to further enhance the process of market integration in China.

References

Bai CE, Du Y, Tao Z, Tong SY (2004a) Local protectionism and regional specialization: evidence from China's industries. J Int Econ 63(2):397–417

Bai CE, Du YJ, Tao ZG, Tong YT (2004b) Local protectionism and the determinant and trend of industrial concentration. Econ Res J 4:29–40

Cai F, Wu YW, Giles J, Albert P (2004) How does economic integration affect urban employment and welfare. China Lab Econ 1(1):1–32 (China Labors & Social Security Publishing House)

Dong XY, Putterman L (2002) Investigating the rise of labour redundancy in China's Stateowned enterprises. China Econ J (Q) 1(2):397–418

Fan C Simon, Wei Xiangdong (2006) The law of one price: evidence from the transitional economy of China. Rev Econ Stat (MIT Press) 88(4):682–697

Head K, Mayer T (2000) Non-Europe: the magnitude and causes of market fragmentation in the EU. Weltwirtschaftliches Archiv 136(2):284–314

Head K, Mayer T (2002) Illusory border effects: distance mismeasurement inflates estimates of home bias in trade. Working Papers 2002-01, CEPII research center

Li J, Larry DQ, Qunyan S (2003) Interregional protection: implications of fiscal decentralization and trade liberalization. China Econ Rev 14(3):227–245

Lin YF, Liu PL (2004) Local protection and market segmentation: from the perspective of development strategy. Working paper of CCER (China Center for Economic Research), Peking University: No. C2004015

Lu M, Chen Zh, Yan Y (2004) Increasing returns, development strategy and regional economic segmentation. Econ Res J 1:54–63

Maddala GS, Shaowen Wu (1999) Comparative study of unit root tests with panel data and a new simple test. Oxford Bull Econ Stat 61:631652

Naughton B (1999) How much can regional integration do to unify China's markets? In: Paper presented for the conference for research on economic development and policy research, Stanford University

Parsley DC, Wei SJ (1996) Convergence to the law of one price without trade barriers or currency fluctuations. Quart J Econ 111(4):1211–1236

Parsley DC, Wei SJ (2001a) Explaining the border effect: the role of exchange rate variability, shipping cost, and geography. J Int Econ 55(1):87–105

Parsley DC, Wei SJ (2001b) Limiting currency volatility to stimulate goods market integration: a price based approach. NBER Working Paper 8468
Ping XQ (2004) Motivation and effect of government protection—empirical analysis. Financ Trade Econ 5:3–10
Poncet S (2002) Chinese market is moving towards "non-integration"—comparative analysis on degree of integration of Chinese domestic market and international market. World Econ Pap 1:3–17
Poncet S (2003a) Domestic market fragmentation and economic growth in China. Mimeo
Poncet S (2003b) Measuring Chinese domestic and international integration. China Econ Rev 14 (1):1–21
Poncet S (2005) A fragmented China: measure and determinants of Chinese domestic market disintegration. Rev Int Econ 13(3):409–430
Samuelson P (1954) Theoretical note on trade problem. Rev Econ Stat 46(2):145–164
Wang DW, Wu YW, Cai F (2004) Migration, unemployment and urban labor and market segmentation. World Econ Pap 1:37–52
Wei S, Wu Y (2001) Globalization and inequality: evidence from within China. NBER working paper 8611
Wooldridge JM (2003) Introductory econometrics: a modern approach. Thomson Learning, South-Western
Xu X (2002) Have the Chinese provinces become integrated under reform? China Econ Rev 13 (2):116–133
Xue JJ, Wei Z (2004) Urban unemployment and poverty in China. China Lab Econ 1(1):58–71
Young A (2000) The razor's edge: distortions and incremental reform in the people's republic of China. Quart J Econ 115(4):1091–1135
Zheng YS, Li CG (2003) Efficiency loss in local market segmentation in China. Soc Sci China 1:64–72

Chapter 6
Urban-Rural Inequality and Regional Economic Growth in China

The East Asian experience shows that fast economic growth could be achieved along with narrowing income inequality, especially for the case of Japan, Korea and Chinese Taiwan. This chapter tries to explore the growth–inequality nexus in China by argues that the conventional approach of data averaging is problematic. It introduces the polynomial inverse lag (PIL) framework so that the impacts of inequality on investment, education, and ultimately on growth can be measured at precisely defined time lags. Combining PIL with simultaneous systems of equations, we analyze the growth–inequality relationship in postreform China, finding that this relationship is nonlinear and is negative irrespective of time horizons.

6.1 About Inequality and Growth: Where Do We Stand?

The literature on the relationship between inequality and growth is large and still growing. Yet, theoretical and empirical evidences are mixed (Banerjee and Duflo 2003, and references therein). Typically, cross-section regressions yield a negative relationship (Benabou 1996b), while the contrary is found using panel data models with fixed effect (Forbes 2000; Li and Zou 1998). In addition, Barro (2000) indicates that the relationship is nonsignificant when rich and poor countries are pooled together.

As asserted by Forbes (2000), the changes of sign in the inequality–growth relationship can be explained by the difference in the time horizon considered. She concludes that in the long run the relationship is negative while it is positive in the short or medium run. This assertion is supported by Banerjee and Duflo (2003). However, neither of these studies considers short-, medium-, and long-run relationships in one unified framework. In fact, no previous attempts have been made to incorporate very short run effects into growth regressions.[1]

[1]By "very short run," we mean instant impacts without any delay or with delay by one time period.

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9_6

Can this assertion or conclusion be used to reconcile the mixed empirical results? Answering this question is not only helpful in settling the intensive debate among academics, but also vital for policy makers. If the assertion is valid, possibilities exist for intertemporal tradeoffs of growth by manipulating income distributions. Otherwise, a low (high) inequality must be targeted in order to achieve growth if the short-, medium-, or long-run relationship is negative (positive).

The conventional approach to discovering the long-run versus short-run relationship is by averaging growth and relevant variables over different time horizons, and then estimating a growth regression model. For example, Forbes (2000) uses data averaged over a 5-year interval in a growth regression and claims that this is a medium- or short-run relationship, which is found to be positive. Subsequently, she also reports results using 10-year averages, which indicate an insignificant relationship. On the basis of these, Forbes asserts that the short-run positive relationship may not contradict the long-run negative relationship. She seems to imply that if a longer time horizon, say 20 years, is considered for averaging data, the relationship may become negative. Meanwhile, Barro (2000) relies on averages over a 10-year interval to estimate long-run relationships.

This practice of averaging is questionable on a number of grounds. First, no consensus exists regarding what time horizon constitutes or defines the short-, medium-, or long-run concepts. For example, a 5-year interval can be considered as short run by some and medium run by others. Further, if conflicting results are obtained with a 20-year and a 25-year averaging, can one attribute these to medium- and long-run differences? What happens if a 5-year and a 6-year averaging give rise to different results? It is important to note that if the true relationship does involve a change in sign at all, there must be a point where such a change occurs (say from period t to period $t + 1$). In this case, one can state that the relationship is positive (or negative) over time horizon t periods and becomes negative (or positive) over time horizon $t + 1$ periods. An appropriate analytical framework should enable identification of this turning point or possibly multiple turning points. In this regard, the conventional averaging procedure is problematic, if not inapplicable at all.

Second, averaging data is usually justified on the ground that it takes away business cycle effects on growth.[2] However, business cycles differ in length for the same economy over time and for different economies. They start and end at

[2]Another argument against using annual data is that they are subject to shocks and may cloud the underlying true relationship. This argument seems untenable given the inclusion of the disturbance term in any econometric equations, which could accommodate shocks and other errors. In passing, it is noted that Barro (2000) opts to use averaged data but for different reasons, namely unavailability of high-frequency data for some variables and the inability of the existing theories in establishing very short run associations between growth and its determinants. Nevertheless, the inability should not prevent one from modeling empirical short-run relationships. After all, the medium- or long-run relationships are built on the short-run counterpart. The former do not exist without the latter.

different time points for different economies as well. Simply applying one time interval in averaging data, for one country over time or for different countries, may not help eliminate the cycle effects. In other words, taking averages is useful only when business cycles are properly identified. In this case, the cycles must be completely synchronized among different economies under consideration and they must be of precisely the same length over time. These are unlikely to be true even if difficulties in business cycle identification can be left aside.

Third, short-, medium-, and long-run relationships between inequality and growth are different aspects of the same underlying economic or growth process, which corresponds to a particular data-generating process (DGP). A DGP is exactly what an econometric model intends to capture or describe. When estimating different regressions, forced by arbitrarily chosen different time intervals for averaging data, one might model different DGPs rather than different aspects of the same DGP. From this perspective, the changes in sign may not reflect the difference between the long and short runs. It may be caused by the use of different averages and by other differences inherent in different regression models.

Fourth, as pointed out by Attanasio et al. (2000), annual data provide information that is lost when averaging. This averaging practice is particularly puzzling as paucity of data is often cited as a major hurdle in estimating growth regressions (Durlauf 2001). It can be easily ascertained that with a 5-year or a 10-year averaging, 80 or 90 % of sample observations are lost. Finally, it is illogical to make short, medium, and long runs mutually exclusive as far as model specification is concerned. After all, these different runs correspond to different aspects of the same DGP and thus should be embedded in a common DGP or a common regression equation. In any case, it is desirable to develop a framework that allows for identification of the growth–inequality relationship over all possible time horizons. One can then discuss findings with a precise definition of time intervals. Under this circumstance, results from different studies can be compared even if data used are of different frequencies. For example, one does not have to stick to 5-year averages in order to compare her/his results with Forbes (2000).

The main purpose of this Chapter is to introduce such a modeling framework that enables identification of the short-, medium-, and long-run effects in one model. A second purpose is to extend the work of Barro (2000) and Lundberg and Squire (2003) by adding important equations and by combining the simultaneous model with the newly introduced framework. In particular, education is endogenized in this paper. Although this can be justified intuitively, theoretically, and empirically, few previous papers made such an attempt with the exception of Heerink (1994). Finally, we use annual data from within China to explore the inequality-growth nexus over different time horizons.

6.2 Inequality-Growth Nexus: Theories and Modeling Framework[3]

6.2.1 Theories on Inequality-Growth Nexus

Several mechanisms are theorized to yield negative effects of inequality on growth. First, under imperfect capital market, a higher inequality means more individuals facing credit constraints. Consequently, they cannot carry out productive investments in physical or human capital (Galor and Zeira 1993; Fishman and Simhon 2002). These can take place in the short run or long run. Second, a worsening inequality generates a rise in the fertility rate among, and less investment in human capital of, the poor (De La Croix and Doepke 2004). This is most likely to happen in the long run. Third, a more unequal income distribution may cause weaker domestic demand that may slow down the economy, as has occurred in China since the late 1990s. This demand-related impact is expected to prevail mostly in the short run. Fourth, a growing inequality increases redistributive tax pressures, which deters investment incentives (Alesina and Rodrik 1994; Persson and Tabellini 1994; Benabou 1996b). Finally, a worsening inequality may lead to a more unstable sociopolitical environment for economic activities (Benhabib and Rustichini 1996). The last two mechanisms require certain time duration for the effects to materialize.

On the other hand, Galor and Tsiddon (1997a, b) develop two theories, both predicting a positive inequality–growth relationship. In one model, the level of human capital is determined by home environment externality. When this externality is large, a high level of inequality may be necessary for growth to take off in a less-developed country. In a second model, major technical changes help enhance mobility and concentration of high-ability workers in technologically advanced sectors, which will generate growth as well as higher inequality. Also, Benabou (1996a) shows that when human capitals of heterogeneous individuals are strongly complementary within localities, more inequality is inductive to growth, at least in the short run. In addition, a high or rising inequality prompts the middle class to vote for changes in taxation rate. Both higher (Saint-Paul and Verdier 1993) and lower taxation rates (Li and Zou 1998) could promote economic growth. Finally, conventional wisdom states that high inequality implies more savings or more investment (Galor and Moav 2004). All these positive effects can materialize in the short or long run.

Clearly, these theories indicate that the overall impact of inequality on growth cannot be set a priori (Aghion et al. 1999). More pertinent to this paper, the short- and long-run effects may well differ in magnitudes as well as in signs. As noted above, the very short run effect is so far overlooked, despite its existence and

[3]For a survey of literature on inequality and human development, see Thorbecke and Charumilind (2002). While human development, growth, and inequality are all interrelated, we focus on inequality and growth in this paper. The absence of regional time-series data on health and environment in China prevents us from considering these variables in our empirical model.

importance. Even medium- and long-run effects are not modeled appropriately in the empirical literature. It is important to point out that the existing theories implicitly or explicitly assume that inequality affects growth through its impacts on physical and human capital formation. This point will be taken up later in this paper when our empirical model is specified.

6.2.2 Model Specification

To enable identification of the inequality effects over different time horizons, distributed lag models can be used. Among the alternative distributed lag structures, the polynomial inverse lag (PIL) of Mitchell and Speaker (1986) is preferred as it possesses two attractive features: its flexibility in uncovering the true lag structure and its easiness in estimation. The second feature is especially important as we will combine PIL with simultaneous equations.

Let Y denote growth and X denote inequality; then the PIL model can be written as

$$Y_t = b + \sum_{i=0}^{\infty} w_i X_{t-i} + e_t, \tag{6.1}$$

where

$$w_i = \sum_{j=2}^{n} \frac{a_j}{(i+1)^j}, \quad i = 0,\ldots,\infty. \tag{6.2}$$

In the above model, w_i are the distributed lag weights, indicating the impacts of X on Y over the time interval i. The notation a_j represents the parameters to be estimated and n is the degree of polynomial. Substituting (6.2) into (6.1) and rearranging yield

$$\begin{aligned} Y_t &= b + \sum_{i=0}^{\infty} w_i X_{t-i} + e_t \\ &= b + \sum_{j=2}^{n} \sum_{i=0}^{m-1} \frac{a_j}{(i+1)^j} X_{t-i} + \underline{\sum_{j=2}^{n} \sum_{i=m}^{\infty} \frac{a_j}{(i+1)^j} X_{t-i}} + e_t. \end{aligned} \tag{6.3}$$

The underlined term on the right-hand side of (6.3) becomes negligible for t greater than 8, thus can be omitted, as suggested by Mitchell and Speaker (1986). On the basis of (6.3), one can obtain the effects of X on Y over any time interval, such as 5 or 8 years. The instant impact is given by $w_0 = \sum_{j=2}^{n} a_j$, the lagged impacts are given by $w_i (i = 1, 2, \ldots, \infty)$, and the cumulative impacts are given by

$\sum_i w_i$, depending on how the short and long runs are defined. In particular, we can use the infinite sum to indicate the very long run impact.

An expended version of (6.3) with the underlined term omitted is

$$\begin{aligned} Y_t = b &+ a_2[X_t + \frac{1}{2^2}X_{t-1} + \frac{1}{3^2}X_{t-2} + \cdots + \frac{1}{m^2}X_{t-m+1}] \\ &+ a_3[X_t + \frac{1}{2^3}X_{t-1} + \frac{1}{3^3}X_{t-2} + \cdots + \frac{1}{m^3}X_{t-m+1}] \\ &+ \cdots + a_n[X_t + \frac{1}{2^n}X_{t-1} + \frac{1}{3^n}X_{t-2} + \cdots + \frac{1}{m^n}X_{t-m+1}]. \end{aligned} \tag{6.4}$$

The expressions in the square brackets are PIL terms associated with different degrees of polynomial n.

One can set $m = 9$, add variables other than Xs in (4), and use the resultant regression to analyze the inequality–growth relationship. However, the issues of heterogeneity, measurement errors, and endogeneity have received considerable attention in the literature. These must be addressed (Durlauf et al. 2005; Atkinson and Brandolini 2001) before empirical estimation. In particular, Banerjee and Duflo (2003) argue why cross-country data are deficient due to differences in cultural structure, technology level, and financial institutions. While not claiming the absence of heterogeneity, this problem is less severe in this paper because data from within China will be used. More importantly, China remains a socialist country with strong institutional, cultural, political, and even economic controls across regions. Despite so, some dummy variables will be incorporated into our empirical model to further address the heterogeneity issue.

Regarding measurement errors, this is largely related to the inequality variable, not or less applicable to other variables (Barro 2000). To be more precise, inequality data used in most cross-country regressions are calculated under different concepts of income (GDP, wage, disposable income, or expenditure), different income recipients (individual, household, or family), and different sampling procedures (proportional sampling, stratified sampling) or even different coverage of population (national, subnational, regional, or small-scale survey). In this paper, the regional urban–rural income ratio will be used to measure inequality. Both rural and urban income data are based on household surveys conducted by the National Statistical Bureau (NSB) of China. Therefore, we do not consider measurement errors as a major problem, at least insofar as variable definitions, population coverage, and sampling techniques are concerned. Using the urban–rural income ratio as an inequality indicator is justified on the ground that the urban–rural income gap constitutes over 70 % of the overall regional inequality (Kanbur and Zhang 2005). And, no regional inequality data are available to us. Wei and Wu (2001) adopt the same practice. Bourguignon and Morrison (1998) find that the urban–rural labor productivity ratio is highly correlated with overall inequality.

The endogeneity problem is resolved by specifying and estimating simultaneous systems of equations, not by relying on lagged variables and the GMM estimation technique in a single equation. Recall the brief review of various growth theories in

session 1; the impact of inequality on growth is mainly channeled through its effects on physical and human capital formations.[4] Thus, it is necessary to include investment and education equations in the system. Consequently, we end up with a four-equation system after adding the usual growth and inequality equations. In contrast, Barro (2000) and Lundberg and Squire (2003) did not endogenize the human capital variable in their models. It is noted that estimating the inequality equation permits testing of the controversial Kuznets hypothesis.

Using INE_{PIL} to denote the inequality terms associated with PIL (INE_{PIL} = RHS of (4) excluding *b*), *incm* to denote the income level lagged by 1 year, the systems of equations are specified as (detailed definitions of variables are provided in the appendix)

$$Incmgr = f_1\ (popgr,\ invt,\ edu,\ gov,\ cpi,\ trade,\ urbangr,\ private,\ incm,\ incmsq,\ central,\ west)$$
$$Invt = f_2\ (INE_{PIL},\ gov,\ cpi,\ trade,\ urban,\ private,\ incm,\ incmsq,\ central,\ west)$$
$$Edu = f_3\ (INE_{PIL},\ peduexp,\ urban,\ incm,\ incmsq,\ central,\ west)$$
$$Inequality = f_4\ (incmgr,\ trade,\ agrexp,\ urban,\ private,\ incm,\ incmsq,\ central,\ west)$$

The first equation in the system explains per capita income growth (*incmgr*), which is determined by population growth (*popgr*) as a proxy of labor input, investment expressed as proportion of GDP (*invt*), and human capital defined as average years of schooling (*edu*). These are standard growth determinants. Following Barro (2000) and Clarke (1995), we add government expenditure as a ratio of GDP (*gov*) and inflation (*cpi*) to this equation. The former represents government interference in economic activities and the latter may capture macroeconomic conditions or business cycle effects. Also controlled are openness (*trade*), urbanization (*urbangr*), and privatization (*private*) variables. The convergence literature appeals for the inclusion of the initial income level ($incm_0$). Location dummy variables for central and western provinces are used in this and all other equations to contain heterogeneity.

In specifying the investment function, the most relevant variable, besides inequality (*INE*), is lagged per capita income (*incm*) as a proxy of savings plus its square (*incmsq*). As with the growth equation, government interference (*gov*) and macroeconomic conditions (*cpi*) are important independent variables. Little is necessary to justify the inclusions of openness, urbanization, and privatization in the investment model.

Although various growth theories indicate that inequality matters for human capital formation, few earlier attempts were made to specify the education equation. It is well known that income (*incm*) is a determinant of education as schooling is costly in China. The income–education relationship may be nonlinear, so we include a square term of income (*incmsq*) in the model. Also, education is likely to be affected by government spending on education, culture, and health (*peduexp*).

[4]Demand-related impact of inequality must eventually work through capital and labor inputs.

Needless to say, more urbanized regions enjoy better education; thus the urbanization variable (*urban*) is relevant.

Leaving income growth and location dummy variables aside, five other variables are included in the inequality model. The Kuznets hypothesis dictates that the income variable and its square ought to be considered. Privatization is included as it is commonly perceived to be a cause of inequality in China. On the other hand, openness and urbanization are included as Wan et al. (2005) and Lu and Chen (2006), respectively, find that they contribute to regional inequality. Given that the inequality variable is defined as the urban–rural income ratio, government support to agriculture (*agrexp*) is expected to help narrow the urban–rural income gap.

6.3 Empirical Evidence from China

6.3.1 Basic Results

China represents a very interesting case for studying the inequality–growth relationship. Except the urban–rural disparity, prereform China was basically an egalitarian society. The low inequality was identified as a strain on economic growth. This is why Deng Xiaoping, at the onset of economic reforms, famously stated that "let some get rich first." The reform period has seen remarkable growth. Although regional inequality and the rural–urban gap declined from the late 1970s to the mid-1980s, both increased rather dramatically since the mid-1980s. China's growth is preceded by a fairly low initial inequality in the prereform period. From this perspective, the inequality–growth relationship seems to be negative. However, the Chinese experience depicts a positive correlation when pre- and postreform periods are examined separately.

There is more. In the early 2004, the Primer of China announced a growth target of 7 %, which is lower than any of the growth rates in China since economic reform began in 1978 (excluding the unusual period from 1989 to 1990). Such a move is unprecedented and represents a major policy shift to address, at least partly, the inequality problem in China. The high and rising inequality is perceived to hurt the national economy from the perspectives of slacking domestic demand and political instability. Directing resources to the rural sector and noncoastal regions is expected to slow down growth in the short run, but may help achieve sustainable growth in the long run. Clearly, policy makers in China, past and present, see both (short-run) positive and (long-run) negative effects of inequality on growth.

These observations appeal for a proper analytical study. Toward this end, data at the regional or provincial level for 1987–2001 are used to estimate the systems of equations outlined in Sect. 6.2. Though desirable, earlier data are too incomplete to be useful. Excluding Taiwan, Hong Kong, and Macao, China has 31 provinces or regions, including four autonomous municipal cities. Hainan province was created in 1988 and is merged with Guangdong. Chongqing is the youngest region in

China. Fortunately, data for Chongqing are available. Most data for Xizang (Tibet) are missing. Therefore, our sample consists of 29 regions. All observations in value terms are deflated by rural and urban CPIs, respectively. For details on data sources and data construction, see the appendix.

The systems of equations are estimated with three-stage least squares after setting $m = 9$. To determine the degree of polynomial n, the general-to-specific approach is followed. This approach is also recommended by Mitchell and Speaker (1986). We started with $n = 6$, in which case high collinearity leads to automatic drops of some PIL terms by STATA. When n is reduced to 5, the PIL term in the investment equation is insignificant. Once this term is removed, all PIL terms are significant at the 10 % level. The estimation results are reported in Table 6.1.

The estimated models are of good quality with most parameters significantly different from zero. Notwithstanding that little can be said a priori about the signs of many estimates, the positive and significant impacts of physical and human capital investments, trade, urbanization, and privatization on growth are consistent with economic theory. Government expenditure is found to be detrimental to growth (when investment is held constant) but helpful in increasing investment. These are acceptable since this variable is included as a proxy for government intervention, particularly in bank lending. See Clarke (1995) and Patridge (1997). As far as the education equation is concerned, higher income is found to cause more human capital formation and urbanization is positively related to regional education level; both findings corroborate well with normal expectations.

One interesting finding relates to the income terms in the growth equation. It shows that growth does not depend on income levels in China, at any conventional level of statistical significance. This is different from Barro (2000), who shows that the growth–inequality relationship is conditional on the level of development; it is positive across developed economies and negative in the developing world. It is noted, however, that inequality does not enter the growth equation directly in our model. Another income-related finding is that the Kuznets hypothesis is rejected. In contrast, a U-pattern is supported by the Chinese data, which is in line with Wan (2004).

Some comments on the inequality equation are in order. As indicated by the coefficients of the location dummy variables, the urban–rural divide is more severe in western than in central regions, which in turn is more severe than in coastal regions. This is understandable as urban China is more equal across locations, while development in rural China is heavily reliant on geographic conditions. When everything else is the same, the rural west usually lags behind with the east leading. Also, Table 6.1 indicates that in addition to the variables of government support to agriculture and income growth, privatization helps reduce the rural–urban income gap. This is justified because TVEs in China, a major component of the privatization index, represent an important driving force in narrowing down the rural–urban gap, although they may contribute to the growing inequality among rural regions (Wan and Zhu 2006). Consistent with Wan et al. (2005), trade is an inequality-increasing variable.

Table 6.1 Estimation results

Right-hand side	Growth equation		Investment equation		Education equation		Inequality equation	
Variables	Coefficient	T-ratio	Coefficient	T-ratio	Coefficient	T-ratio	Coefficient	T-ratio
PIL (n = 2)			−0.285	−1.707*	0.137	1.930*		
PIL (n = 3)			1.563	2.312**	−1.071	−1.818*		
PIL (n = 4)			−1.351	−2.598***	2.287	1.716*		
PIL (n = 5)					−1.351	−1.652*		
peduexp					0.0006	0.300		
agrexp							−0.041	3.727***
incmgr							−0.043	3.071***
popgr	−0.068	−1.015						
invt	1.58	7.215***						
edu	3.561	3.028***						
gov	−1.529	−6.141***	1.16	7.733***				
cpi	−0.442	−4.604***	0.262	3.011***				
urbangr	0.375	5.282***						
urban			−0.073	−1.352	0.042	8.400***	−0.013	4.333***
trade	0.064	2.667***	−0.025	−1.136			0.007	7.000***
private	0.805	6.765***	−0.416	−5.012***			−0.02	3.333***
incm	−53.468	−1.308	6.629	0.161	7.399	1.735*	−12.322	4.444***
incmsq	0.698	0.234	1.058	0.352	−0.476	−2.817	0.874	4.348***
central	7.956	3.716***	−5.48	−3.914***	0.282	2.541**	0.272	2.989***
west	−5.557	−2.621***	4.833	2.271**	−0.403	−2.385**	0.76	6.129***
constant	292.929	2.003**	−76.008	−0.524	−22.97	−1.581	46.571	4.782***

***, **, *Significant at the 1, 5, and 10 % levels

6.3.2 Impact of Inequality on Investment, Education and Economic Growth

Now, attention is turned to the crucial question: how does inequality affect growth? Since the impact is channeled through investment and education, we first examine the relationship between inequality and these two factors. Referring to Eq. (6.1), the marginal effects of inequality are given by w_i. These are shown in Fig. 6.1a. In particular, the instant impact is given by w_0, which is negative in the investment equation but positive in the education model. The impact of inequality on investment turns to be positive after 1 year and remains so for a number of years. It reverts to be negative after 4 years and reaches the negative peak in year 6, before

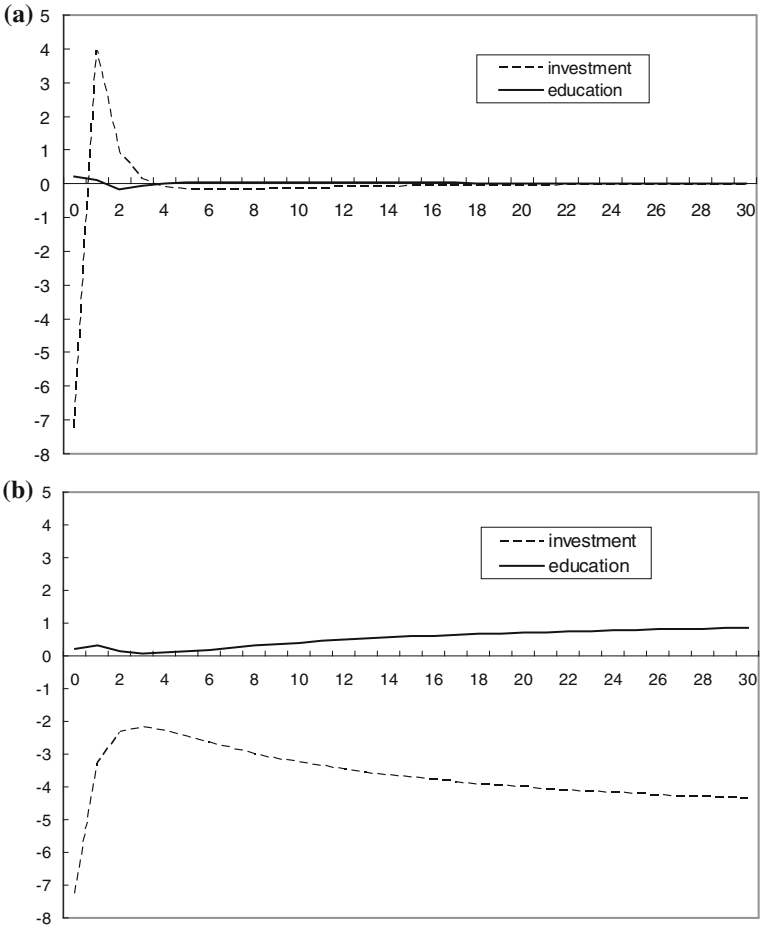

Fig. 6.1 Impact of inequality on investment (*dashed line*) and education (*solid line*). **a** Instant and lagged marginal effects. **b** Cumulative effects

eventually converging to zero. On the other hand, inequality seems more beneficial to human capital formation over all time horizons except in years 3 and 4. The positive effect reaches a peak in year 7 and then converges to zero.

It is also useful to sum w_i to obtain the cumulative effects over different time horizons. These are plotted in Fig. 6.1b, which demonstrates that inequality is detrimental to investment no matter what time interval is considered. This is consistent with Alesina and Rodrik (1994), who demonstrate that high inequality may lead to political instability, which is detrimental to investment and growth. Conversely, this finding corroborates well with the fact that investment rate is low in inland regions where the rural–urban gap is large. In contrast, investment rate is high in coastal areas where the rural–urban gap is relatively smaller. Figure 6.1b also indicates that inequality helps promote accumulation of human capital, which may imply the validity of Simpson's (1990) inverted-U pattern between education and inequality in China. As is known, educational level in China has been on the rise and such a rise is accompanied by the increasing inequality. It is useful to point out that the education–inequality relationship is largely an empirical one as alternative theories exist, which predict opposite effects of inequality on education. Our modeling results support the proposition of Perotti (1992), who concludes that rising inequality enables the rich to obtain education first when tuition fee is high relative to income. Mayer (2000) confirms the positive impact of inequality on college education in the United States. It has been widely publicized that education is exceedingly expensive in China, particularly for secondary and postsecondary studies. From this perspective, the positive impact of inequality on education is understandable.

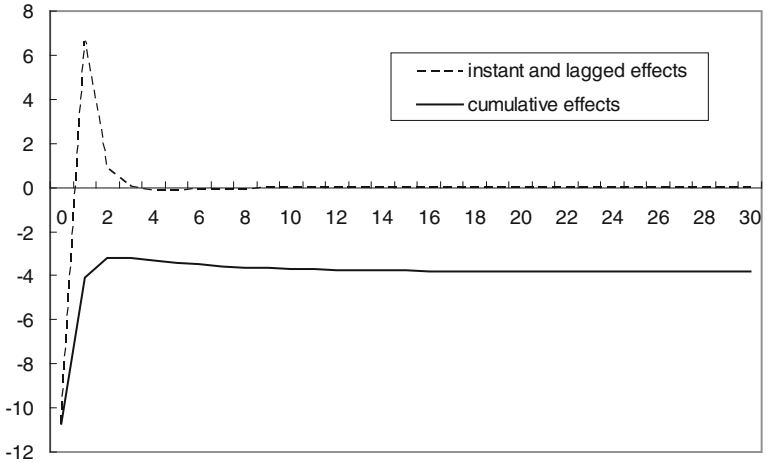

Fig. 6.2 Inequality–growth nexus: instant and lagged effects (*dashed line*), and cumulative effects (*solid line*)

Once the impacts of inequality on education and investment are identified, it is straightforward to simulate the inequality–growth relationship by allowing inequality to increase at a certain margin or percentage. Figure 6.2 shows the instant or lagged as well as cumulative impacts on growth when China's urban–rural income ratio is raised by 0.1 unit. The instant and lagged effects fast decrease to zero after an initially negative and then positive influences in the first four years. The cumulative line demonstrates a negative relationship between inequality and growth, and this relationship holds no matter what time horizon is considered. Most interestingly, the relationship is found to be nonlinear, a key point underlying the theory proposed by Banerjee and Duflo (2003).

6.4 Conclusions and Policy Implications

In this chapter, we introduce the polynomial inverse lag (PIL) model in order to accommodate, within one unified framework, potentially differing impacts of inequality on growth over different time horizons. Applying simultaneous equations incorporating the PIL to data from one country, namely China, our results are expected to suffer less from the problems of heterogeneity, endogeneity, and measurement errors, commonly encountered in cross-country growth regressions.

Despite the seemingly positive correlation between growth and inequality in postreform China, our empirical results unequivocally point to the negative effects of inequality on growths in the short, medium, and long runs. The negative effects stem from the strong and negative influence of inequality on physical investment, which consistently overweigh the mostly positive impacts of inequality on human capital. The inequality–growth relationship is found to be nonlinear, so are the inequality–investment and inequality–education relationships.

As with any other study, this paper can be improved along many dimensions such as data quality, model refinements, and better estimation techniques. One particular avenue for future research lies in the development of bootstrapping or other tools in order to attach statistical significance to the identified effects of inequality on growth. Another issue that is yet to be dealt with is to conduct a robustness test of our research findings. This could be difficult given the open-ended nature of growth theories (Brock and Durlauf 2001).

Policy implications of this chapter are straightforward. China has kept fast economic growth for long time through transition to market economy. However, the byproduct of this process is enlarging income inequality. Our findings alert us that the government should control income inequality even for the purpose of economic growth itself. By doing so, China could keep stable economic growth for the long run with social harmony also achieved.

Appendix: Data

1. Unless indicated otherwise, data for the period 1987–1998 are all from *Comprehensive Statistical Data and Materials for 50 Years of New China* (NBS 1999). Data for years 1999–2001, unless indicated otherwise, are from *China Statistical Yearbook, 2000, 2001 and 2002* (NBS, 2000, 2001, 2002).
2. *popgr* = population growth rate. Except for Hebei, Heilongjiang, and Gansu, 1999–2001 data of agricultural and nonagricultural population are from provincial statistical yearbooks. Population data of Hebei, Heilongjiang, and Gansu in 2000 are from *China Statistical Yearbook, 2001*. For these three regions, the 1999 population data are the averages of the neighboring two years, and the 2001 data are forecast based on data in 2000 and the growth rate during 1999–2000.
3. *incm* = per capita income lagged by 1 year. Regional income is the weighted average of urban and rural per capita incomes, with nonagricultural and agricultural population shares as weights. Both urban and rural incomes are deflated by regional urban and rural CPIs. For Shanghai, Beijing, and Tianjin, urban and rural CPIs are the same.
4. *Incmsq* = *incm* squared.
5. *urgap* = urban–rural income gap. It is defined as urban–rural per capita income ratio.
6. *incmgr* = income growth rate. It is calculated on the basis of *Incm*.
7. *invmtgdp* = investment/GDP ratio. It is computed as total fixed capital investment over GDP.
8. *edu* = education. *China Population Yearbooks* report regional population by education attainment as from 1987. Unfortunately, such data were not published for 1989, 1991, and 1992, and data for 1987 and 1988 are incomplete as illiterate population are not reported. Also, unlike data for other years, the 1994 data did not consider population below the age of 15. To estimate data for these years, we compute average years of schooling using data for the other years and then fit the model:

$$\ln(edu) = f(\cdot) + \mu,$$

where *edu* is per capita years of schooling, $f(\cdot)$ is simply a linear function of time trend and regional dummies, and μ is the error term. This model is estimated by the GLS technique, allowing for heteroskedasticity in the panel data. The R^2 of the estimated equation is 0.966. Denoting the predicted value by ^, we have

$$(\hat{edu}) = \exp[\ln(\hat{edu})]\exp\left(0.5\hat{\sigma}^2\right),$$

where $\ln(\hat{edu})$ denotes the predicted values of ln(edu) and $\hat{\sigma}^2$ is the estimated variance of μ. Data for 1987–1989, 1991, 1992, and 1994 are estimated by the above model.

9. *gov* = governmental consumption ratio, exclusive of expenditure on culture, education, science, and health care. Unlike in the existing literature we cannot exclude education and defense expenditures as these substatistics are not available at the regional/provincial level.
10. *trade* is computed as the trade/GDP ratio. Trade data are converted into RMB.
11. *cpi* are used to proxy inflation. CPIs of Qinghai are from provincial statistical yearbook.
12. *agrexp* = proportion of provincial fiscal expenditure on agriculture.
13. *peduexp* = per capita government expenditure on culture, education, science, and health care.
14. *private* = privatization, computed as the proportion of workers and staff in nonstate-owned entities.
15. *urban* = urbanization, defined as the proportion of nonagricultural population in the total.
16. *urbangr* = growth rate of *urban*.
17. *center, west*: location dummies for central and western China, respectively. Consistent with most of the literature, central provinces refer to *Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, Hunan,* and *Guangxi*, and western provinces include *Sichuan*, *Guizhou*, *Yunnan*, *Shaanxi*, *Gansu*, *Qinghai*, *Ningxia*, *Chongqing* and *Xinjiang*.

References

Aghion P, Caroli E, Garcia-Penalosa C (1999) Inequality and economic growth: the perspective of the new growth theories. J Econ Lit 37(4):1615–1660

Alesina A, Rodrik D (1994) Distributive politics and economic growth. Q J Econ 109(2):465–490

Atkinson AB, Brandolini A (2001) Promise and pitfalls in the use of 'Secondary' data-sets: income inequality in OECD countries as a case study. J Econ Lit 39(3):771–799

Attanasio OP, Picci L, Scorcu A (2000) Saving, growth and investment: a macroeconomic analysis using a panel of countries. Rev Econ Stat 82(2):182–211

Banerjee AV, Duflo E (2003) Inequality and Growth: What Can the Data Say? MIT working paper

Barro RJ (2000) Inequality and Growth in a Panel of Countries. J Econ Growth 5(1):87–120

Benabou R (1996a) Inequality and growth. In: Bernanke BS, Rotemberg JJ (eds) NBER macroeconomics manual. MIT Press, Cambridge

Benabou R (1996b) Heterogeneity, stratification, and growth: macroeconomic implications of community structure and school finance. Am Econ Rev 86(3):584–609

Benhabib J, Rustichini A (1996) Social conflict and growth. J Econ Growth 1(1):129–146

Bourguignon F, Morrisson C (1998) Inequality and development: the role of dualism. J Dev Econ 57(2):233–257

Brock WA, Durlauf SN (2001) Growth empirics and reality. World Bank Econ Rev 15(2):229–272

Clarke GRG (1995) More evidence on income distribution and growth. J Dev Econ 47(2):403–427

De La Croix D, Doepke M (2004) Inequality and growth: why differential fertility matters. Am Econ Rev 93(4):1091–1113

Durlauf SN (2001) Manifesto for a growth econometrics. J Econometrics 100:65–69

Durlauf SN, Johnson PA, Temple JRW (2005) Growth econometrics. In: Aghion P, Durlauf S (eds) Handbook of economic growth. Elsevier/North-Holland, Amsterdam

Fishman A, Simhon, A (2002) The division of labor, inequality and growth. J Econ Growth 7 (2):117–136
Forbes KJ (2000) A Reassessment of the Relationship between Inequality and Growth. Am Econ Rev 90(4):869–887
Galor O, Moav O (2004) From physical to human capital accumulation: inequality in the process of development. Rev Econ Stud 71(4):1001–1026
Galor O, Tsiddon D (1997a) The distribution of human capital and economic growth. J Econ Growth 2(1):93–124
Galor O, Tsiddon D (1997b) Technological progress, mobility, and economic growth. Am Econ Rev 87(3):363–382
Galor O, Zeira J (1993) Income distribution and macroeconomics. Rev Econ Stud 60(1):35–52
Heerink N (1994) Population growth, income distribution, and economic development—theory, methodology, and empirical results. Springer, Berlin
Kanbur R, Zhang X (2005) Fifty years of regional inequality in China: a journey through central planning, reform and openness. Rev Dev Econ 9(1):87–106
Li H, Zou H (1998) Income inequality is not harmful for growth: theory and evidence. Rev Dev Econ 2(3):318–334
Lu M, Chen Z (2006) Market integration and industry agglomeration in regional economic development in china. SDX Joint Publishing Company and Shanghai People's Publishing House, Shanghai
Lundberg M, Squire L (2003) The simultaneous evolution of growth and inequality. Econ J, 113 (487):326–344
Mayer SE (2000) How did the increase in economic inequality between 1970 and 1990 affect American children's education attainment? Unpublished Manuscript, Joint Center for Poverty Research, University of Chicago
Mitchell DW, Speaker PJ (1986) A simple, flexible distributed lag technique: the polynomial inverse lag. J Econometrics 31(3):329–340
NBS (1999) Comprehensive statistical data and materials for 50 years of new China. China Statistics Press, Beijing
NBS (2000) China statistical yearbook 2000. China Statistics Press, Beijing
NBS (2001) China statistical yearbook 2000. China Statistics Press, Beijing
NBS (2002) China statistical yearbook 2000. China Statistics Press, Beijing
Patridge MD (1997) Is inequality harmful for growth? comment. Am Econ Rev 87(5):1019–1032
Perotti R (1992) Income distribution, politics and growth. Am Econ Rev 82(2):311–317
Persson T, Tabellini G (1994) Is inequality harmful for growth? theory and evidence. Am Econ Rev, 84(3):600–621
Saint-Paul G, Verdier T (1993) Education, democracy, and growth. J Dev Econ 42(2):399–407
Simpson M (1990) Political rights and income inequality: a cross-national test. Am Sociol Rev 55 (5):682–693
Thorbecke E, Charumilind C (2002) Economic inequality and its socioeconomic impact. World Dev 30(9):1477–1495
Wan GH (2004) Inequality and economic development in transition economies: are nonlinear models needed?. World Econ Pap 4:1–13
Wan G, Zhu Y (2006) Town and village enterprises and employment generation in China. In: Guha-Khasnobis B, Ravi K (eds) Informal labor markets and development. Palgrave Macmillan, New York, pp 71–86
Wan GH, Lu M, Chen Z (2005) Globalization and regional income gap: empirical evidence from within China. Soc Sci China 3:17–26
Wei S, Wu Y (2001) Globalization and inequality: evidence from within China. NBER working paper, 8611

Chapter 7
Balance Through Agglomeration: A "Third Path" to Balanced Development Between Urban and Rural Areas and Among Regions

It seems that China only has two strategies to achieve urban-rural and regional development. One is to balance development with policies biased toward rural and inland areas by restricting land supply in coastal areas and labor transfer to eastern regions. This is considered the path of "balanced development". The other strategy is to continue to advance economic agglomeration in coastal areas by relaxing control over labor flow and land supply there. This is considered the path of "the pursuit of efficiency". It is generally believed balanced development and pursuit of efficiency are incompatible methods of achieving balanced development. As a result, the first path seems to be a dominating one because of the idea that balanced development is needed to counter the trend of widening urban-rural and inter-regional gaps. However, relatively faster development of inland areas can be achieved by simple government administrative intervention at the possible cost of further development of eastern coastal areas. This is likely to put China on the path to unsustainable development.

We argue there exists a "third path" of balanced development in which economic agglomeration and regional development are reconcilable, and so are urban-rural integration and urban development, and social harmony and economic growth. On one hand, the government can give fuller play to the agglomeration effect of economic activities by promoting free labor flow and driving cross-regional land reallocation, which help to drive development due to the scale effect of agglomeration and helps to increase the per capita hold of resources in the inland areas and realize balanced urban-rural and regional development during long-term sustainable development. On the other hand, promoting economic agglomeration does not mean China needs to give up the goal of balanced development in the short run and instead create conditions for inter-regional and urban-rural transfer on a larger scale by leveraging the agglomeration effect. In addition, transfer payments can also focus on promoting market integration and inter-regional labor division to promote economic growth while balancing development. In this sense, the third path of balanced urban-rural and regional development lays equal emphasis on balance and efficiency.

Theories and empirical studies on urban-rural and regional development are summarized in this chapter, where the main views about development are discussed based on the conclusions and directions of policy innovation in balanced urban-rural and regional development.

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9_7

7.1 Balanced Urban-Rural and Regional Development with Efficiency

We conduct relevant studies to indicate that efficiency and balance are compatible with balanced urban-rural and regional development. Only by promoting the agglomeration of economic activities in coastal areas and cities, and enabling inland and rural areas to fully enjoy the achievements of economic development through labor flow and cross-regional land reallocation can China fundamentally realize the goal of balanced development. To achieve this, China should not unilaterally emphasize efficiency nor promote balance by simple administrative intervention. To this end, the third path of balanced urban-rural and regional development can be summarized by three reconcilable pairs of elements.

7.1.1 Economic Agglomeration and Regional Balance Are Reconcilable

A long-standing puzzle in China is that economic agglomeration in the coastal areas represents an important driving force behind rapid economic development, which however, seems to inevitably widen inter-regional development gaps. It follows that China should slow the trend of economic agglomeration to speed up inland development and narrow inter-regional development gaps. However, there are several misunderstandings in this thinking.

First, economic agglomeration in China is by no means adequate; hence to give up agglomeration is to give up development. According to cross-county comparative studies, the degree of industry agglomeration is low in China where urbanization lags far behind industrialization and economic development (Lu and Tao 2006), and city size difference in China is significantly lower (Fujita et al. 2004). Developed countries such as Japan and France have never stopped the pace of economic agglomeration around metropolises. Japan once considered dispersing the functions and therefore the population of Tokyo, only to find the period during which the share of Tokyo's population in Japan's total dropped corresponded with the city's declining international competitiveness and a national economic recession. Tokyo's population has been increasing again in recent years and the Japanese economy is growing faster, and this is by no means a coincidence.

Second, ever-widening inter-regional gaps in China are attributed to restricted cross-regional labor flow rather than to economic agglomeration. Under freer cross-regional labor flows regional gaps will not widen as rapidly as they do now. On one hand, freer labor inflow helps to slow down increases in labor wages in the coastal areas. On the other hand, most migrant workers are young and competent under today's conditions of labor market segmentation, while relatively old workers do not move for work. If migrant workers can settle in cities, more families will migrate to cities and the remaining rural and regional families will enjoy more land

and natural resources, and even realize scale effect in agricultural production, which will contribute to the narrowing of inter-regional gaps.

The international environment and development China faces now means it is increasingly important to drive industrial development by giving play to the agglomeration effect. Primarily, globalization increases the importance of the location of coastal areas and the agglomeration effect will be given further play in those eastern areas. International capital will select coastal areas near to ports for processing and production in industries where international trade costs are cheapest, and this will be when cheap Chinese labor and international capital are integrated. Moreover, the knowledge-based economy gradually appeared in the second half of the 20th century. That is to say, knowledge has played an increasingly significant role in economic development, which is entirely different from traditional economic growth, which was driven largely by material capital accumulation. Knowledge production and dissemination require face-to-face interactions, and therefore cities (big cities in particular) invariably become the main places for spatial agglomeration of highly skilled people. Finally, output in the postindustrialization stage will be dominated by city-based service industries. Most "products" of the service industry (including services for production) cannot be transported across regions and the development of the service industry needs diversified inputs, so scale effect in urban development needs spatial agglomeration.

Rising land and labor costs in coastal areas due to the agglomeration of economic activities will encourage people to launch more economic activities in inland areas. However, it is believed that manmade land price rises in eastern regions, where the amount of available land is strictly controlled, work against the full play of city agglomeration effect and lead to losses in economic efficiency without producing significant benefits for inland development.

What is important for regional development in China is to design mechanisms to enable inland areas to share the benefits of economic growth arising from the agglomeration process rather than to turn around the trend of economic agglomeration. Promoting free labor flows and cross-regional land transactions represent a feasible mechanism. In respect to land, the Chinese government may control land supply by total management or by allocating aggregate cultivated land quotas to provinces and cities, while allowing inland provinces to transfer quotas of cultivated land for construction to coastal provinces by means of one-time paid transfers or long-term sharing to share the benefits of land appreciation in the coastal areas.[1] In regard to labor, floating workers will share more of the benefits of urban

[1]In reality, this is called interregional land quota transfer of cultivated land for construction. The Ministry of Land and Resources issued an urgent notice to forbid such kind of land quota transfer cross-province in July 2008. Local government is allowed to convert more agricultural land into non-agricultural usage only if another local government within the same province has increased its amount of agricultural land according to the Land Administration Law and the Notice of the General Office of the State Council on Deepening Improvement and Rectification of Land Market and Implementing Strict Land Administration. See the report in *Liberation Daily* on July 17, 2008, for details.

development when they enjoy more equal access to local public services in the cities. Meanwhile, the flow of more workers from inland to coastal areas helps to increase the per capita hold of resources and income in inland areas.

7.1.2 Urban-Rural Integration and Urban Development Are Reconcilable

Urban-rural segmentation policies might once play a positive role in urban development and overall economic development, as seen in the 1990s when they protected the employment of urban residents and maintained social stability[2] during a period when many workers were laid off in urban areas. But now they mainly protect the interests of urban residents in short run at the cost of urban development. If such policies continue to be implemented in China, they will lead to a lose-lose situation in the urban and rural areas.

First, sustained urban-rural segmentation works against giving full play to the agglomeration effect in cities. Capital accumulation and economic development in cities will inevitably drive sustained growth in demand for labor. In turn, full labor flow will be restricted when rural workers moving to cities fail to get equal access to local public services such as pensions, medical care, education and public housing due to continuous urban-rural segmentation policies. This will inevitably increase the price of urban labor, decrease the wages of rural migrant workers and continue the widening of urban-rural income gaps. Failures in full labor flow will result in early labor shortages in the cities and a falling contribution of the city agglomeration effect.

Second, cities are facing the new challenge of a dualistic society when more and more floating population without local *hukou* move into cities with further urbanization. Development is defined in traditional economics as industrialization and urbanization. However, it is important in China that development should show urban-rural integration during rapid industrialization and urbanization. As many rural migrants move to cities, there are increasingly numerous permanent residents without urban *hukou* in cities.[3] New dualistic society segmentation in cities is attributed to the failure of non-registered residents to be able to enjoy the same public services and political rights as those with local *hukou*. If this situation is allowed to continue it will inevitably lessen the satisfaction of non-registered residents with urban life and damage their trust in government and create potential hazards to public governance in cities. More importantly, residential segregation

[2]As a matter of fact, no conclusion is drawn on whether such protection policies really helped to increase employment opportunities for urban residents.

[3]Take Shanghai as an example. According to the report in the Liberation Daily on February 27, 2008, the non-registered population accounted for 25.79 % of the permanent resident population in 2007.

with *hukou* identity will increase the possibility of social crisis, because people without local *hukou* tend to stay in the communities with more non-local people.

Therefore, urban-rural integration in today's China not only aims to narrow urban-rural gaps, but more importantly to settle down more rural migrants through urban-rural integration in cities during urbanization. Harmonious social development requires urban-rural integration to avoid the formation of a dual society in cities.[4]

7.1.3 Social Harmony and Economic Growth Are Reconcilable

Reasonable control of income gaps between urban and rural areas and among regions contributes to social harmony. In a significant adjustment to its development strategy, China has been aiming to build a harmonious socialist society since 2004. One of its most important goals is control of income gaps. Many studies suggest income gaps between urban and rural areas and among regions make the most important contribution to explaining overall income gaps in China (Ravallion and Chen 2007; Li et al. 2008). Therefore, balanced development between urban and rural areas and among regions is critical to narrowing these income gaps. Studies have found that 70–80 % of interregional income gaps at provincial level are explained by urban-rural income gaps (Wan 2006), indicating it is more important to control urban-rural income gaps. Income increases in inland rural areas and contractible urban-rural income contribute to considerably narrowing inter-regional gaps.

Balanced regional development helps to promote inter-regional labor division and economic growth. According to our empirical studies, relatively underdeveloped regions tend to adopt market segmentation and local protectionism and invest in some strategic industries in a bid to catch up with developed regions or improve their bargaining power in sharing the benefits of inter-regional labor division if they could not fully share the benefit of labor division among regions. However, underdeveloped regions will have incentives to give up industries in which they do not have comparative advantages and give play to the advantages enjoyed by coastal areas (Lu and Chen 2006), when there is a mechanism which enables underdeveloped regions to share more benefits while participating in regional labor division.

Narrowing urban-rural income gaps contributes to sustained economic growth. Our empirical studies find that widening urban-rural income gaps restrict investment and economic growth while economic growth helps narrow urban-rural income gap. Therefore, there exist two possibilities for the relationship between urban-rural income gaps and economic growth. One is a virtuous circle, in which

[4]See Chen and Lu (2008) for detailed theoretical analysis.

accelerated economic growth helps to narrow urban-rural income gaps, while narrowed income gaps help further increase economic growth. The other is a vicious circle, in which some non-balanced development policies widen urban-income gaps while promoting economic growth, therefore further widening those gaps in a way that ends up slowing economic growth.[5]

7.2 Policy Innovation in Balanced Urban-Rural and Regional Development

Undeniably, agglomeration of a large quantity of economic resources in China's eastern cities guided by the favorable policies contributed to widening urban-rural and inter-regional gaps. However, urban-rural and regional balance should not be realized by limiting agglomeration effect in eastern regions. However, there is a path of balanced through agglomeration which can achieve balanced development between urban and rural areas and among regions. There is nothing wrong with economic agglomeration, but the problem is that China has for a long time lacked a reasonable mechanism that enables residents in underdeveloped and rural areas to share the achievements of economic agglomeration. As a result, China should not slow down economic agglomeration and development in eastern regions simply by depending on administrative means to balance urban-rural and regional development. Regional balance, in the final analysis, depends on growth in the eastern regions, given a reasonable mechanism is designed to enable inland areas to share the development achievements of eastern regions. Urban regional balance relies on urban development, as long as more rural workers can settle and prosper in cities.

Our theoretical and empirical studies suggest the following adjustment in policies for urban-rural and regional development:

First, regional balance should be realized through development of eastern regions, the key of which is to facilitate cross-regional land reallocation through free transaction of land quotas for converting agricultural land into non-agricultural usage.

The next round of economic growth in China will increasingly depend on the scale and agglomeration effects of economic development after some big and medium-sized cities enter into the postindustrialization stage. Therefore, it is necessary to accelerate the development of big cities and city clusters to drive the development of small and medium-sized cities. To improve the agglomeration ability of big cities and enable inland areas to enjoy the achievements of eastern development, China should increase the efficiency of land allocation by allowing

[5]If the urban-rural income gap is defined as a proxy variable of an overall income gap, the relationship between the urban-rural income gap and economic growth also provides insights to help us understand the relationship between income gap and economic growth. See Chap. 6 for details.

inter-provincial transactions of land quotas so that inland areas could share the benefits of land appreciation in the coastal areas.

Second, urban-rural balance relies on urban development, the key of which is to help rural workers settle down in cities with equal access to local public services.

China is entering a development stage of accelerated urbanization. The key to its future sustainable development is sustainable urban development, which is being hampered by shortages of land and labor. Labor resources needed by urban development can only be addressed by labor flow, while land resources required by urban development can be solved by cross-regional land quota transactions. Only by gradually rendering non-local residents equal treatment in employment, social security and public services can cities help migrant workers fully settle down in the cities and therefore fundamentally relieve labor shortages and population aging in cities. Meanwhile, the incomes of rural residents will more rapidly increase when more rural residents settle in cities and remaining rural residents obtain more per capita resources.

Third, the central government should implement such a strategy as "balance for development".

In recent years, China has gradually shifted the strategy of giving priority to eastern development to one of balanced regional development, which is shown by increased fiscal transfer to rural areas. What need to be emphasized is, the central government tries to keep balance for development other than for balance itself. That is to say, to facilitate inter-regional labor division be specific, the central government should make fiscal transfers to infrastructure projects and public services instead of production areas without comparative advantage in inland areas. Only by doing so can it guide reasonable cross-regional allocation of production factors and contribute to cross-regional labor flow.

Fourth, much effort should be made to ensure innovative legislation and introduce a decision-making mechanism to lay a foundation for balanced urban-rural and regional development.

The greatest obstacle to balanced urban-rural and regional development in the future will come from contradictions between state and local interests. Hence much effort should be made to develop more innovative legislation and decision-making mechanisms. China should formulate laws to restrict market segmentation by local governments and gradually provide permanent residents without local *hukou* in cities with equal access to local public services. In terms of decision-making mechanisms, policy makers should gradually pay attention to the interest of urban residents without local *hukou* in urban public policies and let them play a more positive role in the development and implementation of relevant policies.

Spatial integration of labor and capital, and in particular manufacturing agglomeration in the eastern coastal areas, are as important as demographic dividends and capital accumulation (including foreign capital) on which China's high-speed economic growth has depended over the past three decades. This growth was realized through globalization and marketization despite inadequate labor flow, serious interregional market segmentation and failure to allocate land resources on a national scale. Sustainable growth in China will increasingly depend on structural

adjustment and the resulting improvement in production efficiency. As a large country, China should shake off long-standing localism to form integrated national markets, and should gradually equalize inter-regional living standards (including public services) during further economic agglomeration in the eastern coastal areas. These goals will continue to test government's wisdom and abilities. At least we have become aware that economic agglomeration presents an approach rather than an obstacle to balanced urban-rural and regional development.

References

Chen Z, Lu M (2008) From segmentation to integration: political economies of urban-rural economic growth and social harmony. Econ Res J 1:21–32

Chen Z, Lu M, Jin Y (2004) Regional difference in human capital and educational development in china: estimates of panel data. J World Econ 12:25–31

Deng XP (1993) Selected works of Deng Xiaoping, vol III. People's Publishing House, Delhi

Fan G, Wang XL (2001) NERI INDEX. Economic Science Press, london

Fujita M, JV Henderson, Kanemoto Y, Mori T (2004) Spatial distribution of economic activities in Japan and China. in Henderson V, Thisse J-F (eds), Handbook of urban and regional economics, vol. 4, North-Holland, 2911–2977.

Huang JL, Li KW (2006) Export opening, regional market size and economic growth. Econ Res J 6:27–38

Li Sh, Sicular T, Gustafson L (eds) (2008) Research on Chinese resident income allocation (III). Beijing Normal University Press, Beijing

Lu M (2007) Labor and human resource economics—economic system and public policy. Shanghai Century Publishing Group and Shanghai People's Publishing House, Delhi

Lu M, Chen Z (2002) Market segmentation: another trap of reform? Chengdu: J Econ Infor

Lu M, Chen Z (2006) Market integration and industry agglomeration in regional economic development in China. SDX Joint Publishing Company and Shanghai People's Publishing House

Lu JY, Tao ZG (2006) Regional manufacturing agglomeration in China and international comparisons. Econ Res J 3:103–114

Lu M, Chen Z, Wang Y, Zhang Y, Zhang Y, Luo C (2013) China's economic development: institutions, growth and imbalances. Edward Elgar

Ravallion M, Chen S (2007) China's (Uneven) progress against poverty. J Dev Econ 82(1):1–42

Ren Y (2004) Population Urbanization and breaking urban-rural dual structure. Explor Free Views 3:24–25

Wan GH (2006) Economic development and income inequality: methodology and evidence. SDX Joint Publishing Company and Shanghai People's Publishing House

Yang YY et al. (1997) Equality and efficiency – income allocation in contemporary China. China Today Publishing House, China

Yuan ZG, Lu M (1998) On recessive unemployment. Lixin Accounting Publishing House, Shanghai

Zhang Y (2005) Fiscal policy and economic growth under decentralization system. Shanghai People's Publishing House, Shanghai

Zhang Y (2007) Fiscal decentralization, FDI competition and local government behavior. World Econ Pap 2:22–36

Zhao RW, Li S, Li K (editor-in-chief) (ed) (1999) Reinvestigation on resident income distribution in China: Income distribution during economic reform and development, 1st edn. China Financial and Economics Publishing House, China

Postscript

China's sustainable high-speed economic growth will depend on balanced development between urban and rural areas and among regions.

Capital accumulation and labor reallocation have made important contributions to China's rapid economic growth over the past three decades, but this growth will inevitably slow down. In this situation, China's future economic growth will depend more on stable increases in total factor productivity. Can China achieve this?

Recently, Professor Dwight H. Perkins, who is a senior expert in Asian studies at Harvard University, was invited to deliver a speech at the China Center for Economic Studies (CCES), Fudan University. He gave us the following judgments: it is very normal that China's overall annual economic growth rate will drop to 6 % because China has maintained an average annual growth rate of about 10 % for 30 years, which is a world record. It is impossible for China to maintain the growth rate of total factor productivity of the past 30 years of reform along with improvements in economic development. Perkins listed and compared several other Asian economies and found that Japan, South Korea and Chinese Taiwan began to witness a significant decline in economic growth after per capita GDP reached US$13,300 (based on 2005 prices).

The two judgments by Perkins are somehow contradictory. According to results of factor decomposition on economic growth, China's economic growth will slow down if it becomes difficult to speed up improvements in total factor productivity along with slowing labor growth rates. However, China can be optimistic for a long time based on standard per capita GDP over US$13,000 because its per capita GDP only exceeded US$2200 in 2007.

These two paradoxical results are attributed to China's huge size. Compared with Japan and South Korea, for example, China is massive in area and population. Its eastern regions have made major contributions to the nation's rapid economic growth over the past 30 years. Perhaps it is more suitable to compare one or several Chinese provinces with other Asian economies. In other words, East China is going to embrace a period of slower economic growth due to the narrowing gap with developed countries. For example, per capita GDP of permanent residents in Shanghai reached RMB64,592 in 2007 (exceeding US$9000), while vast inland

Z. Chen and M. Lu, *Toward Balanced Growth with Economic Agglomeration*,
DOI 10.1007/978-3-662-47412-9

areas may have just entered a period of major relocation of manufacturing industry from coastal areas, which will accelerate GDP growth in those regions.

In China's future, structural adjustment in conjunction with institutional and technological improvement will constitute an important impetus behind total factor productivity growth, with priority given to labor. First, spatial reallocation of labor. Indeed, China's inland provinces lack advantages in developing manufacturing industry because of their inland location. Mongolia and Kazakhstan, for example, face the same dilemma. The problem is that an independent landlocked country cannot transfer workers to coastal countries nor engage in international trade without expensive long-distance transport. Inland Chinese provinces, as part of a country with long coastlines, will solve this problem by spatial labor reallocation to coastal areas. Workers may concentrate in coastal areas, while the continuing agglomeration effect is likely to become a stable source labor productivity growth. Accelerated urbanization and economic agglomeration may even contribute to higher labor productivity than that achieved in the past 30 years. Second, human capital improvement. China's high-speed economic growth over the 30 years of the reform and opening-up contributed to its advantages in low costs, which, however, underestimates the cost of natural resources, environment and labor welfare. In the 21st century, China's economic growth will inevitably lose momentum as a result of rising cost of energy and resource as well as the continuous appreciation of the RMB. However, it is obvious that rural areas have lagged far behind urban areas in education, health, medicine and other public services over the past 30 years, and consequently the rural migrant workers flowing to cities has been dominated by low-skilled workers. China will certainly obtain a great driving force for sustained economic growth under a system of free labor flow if it can introduce policies to significantly increase the human capital of rural migrants.

We must also consider complementation among different regions in such a large country. Indeed, a small country can only make a minor link in the global labor division system, which either enters the stage of cheap labor, or perhaps in some cases enters a stage of high labor cost with innovation. Regions in China are made up of different small provincial economies which are at different development stages, and consequently China covers a long section of the international labor division chain. As coastal areas in China gradually progressed into the development stage driven by innovation, inland areas still had great potential to develop labor-intensive industries. An African colleague once said at an international conference that Chinese products range from luxury goods to the most affordable daily necessities for people on the lowest incomes, and that this demonstrated the broad characteristics of a country as large as China.

The question of whether China can maintain high-speed economic growth is answered based on the above-mentioned discussions which, of course, do not involve other factors that may influence long-term growth, in particular institutional restrictions and risks in the international environment. Generally speaking, improvement in labor productivity by means of labor reallocation, human capital accumulation, urbanization and economic agglomeration in China may make up for a slowdown in capital and labor growth and provide a continuous dynamic for

high-speed economic growth. During this process many inland areas will continue to catch up with those developed regions. For other developing countries, "catching up" mainly refers to rapid economic growth of a country equivalent to one or several Chinese provinces, while in China such "catching up" may refer to inlanders "catching up", with the difference that inlanders can "catch up" by moving to work in coastal areas through a process of spatial labor reallocation. More importantly, complementation among regional economies will become more important and inter-regional development will also gradually tend to be balanced when an average annual two-digit growth rate in coastal areas has spread to inland areas, during which process the most important factors will be infrastructure construction, the supply of rural public services, especially education, and the establishment of a free-market system in those inland areas.

Our findings are related to continuous studies and reflections on urban-rural and regional issues in recent years. We were involved in relevant studies in recent years, in particular international cooperative studies published in *Market Integration and Industry Agglomeration in Regional Economic Development in China* by the Shanghai People's Publishing House. We participated in the UNU-WIDER research program, "Inequality and Poverty in China", co-composed two papers with professor Guanghua Wan, which make up the main contents of Chaps. 4 and 6 in this book, and had relevant English papers published in the *Journal of Comparative Economics* and the *Review of Income and Wealth*. Later we also took part in the World Bank research program, "Economic Analysis of Regional Disparities in China" under the leadership of Professor Hengfu Zou, contributing studies of differences in market segmentation across regions. Afterwards, the corresponding English paper was included in *China: Linking Markets for Growth,* which was co-edited by Professor Song Ligang and Professor Ross Garnaut at the Australian National University. That paper constitutes Chap. 5 of this book. During 2006–07, we were invited by Indermit Gill and Yukon Huang from the World Bank to participate in the composition of a background paper entitled *World Development Report 2009* and to take charge of studies on regional economic imbalance and growth in China. Relevant research achievements that have been enriched and modified constitute Chaps. 2 and 3 of this book. Therefore, this book actually presents a conclusion of our studies on balanced urban-rural and regional development in recent years. Our academic views and as policy implications are mainly explored in Chaps. 1 and 7. On the occasion of the publication of this book, we would like to extend our appreciation to colleagues and project leaders for their support during these international cooperative studies.

Our students have provided substantial support to relevant studies in this book. Shiqing Jiang, Xiaofeng Liu, Zheng Xu, Jingmin Chen and Hong Gao helped us collect mass data and participated in data processing. Min Chen, Qihan Gui and Yu Gong made outstanding contributions to studies on market segmentation, and Zheng Xu read through the first draft of this book from a reader's perspective and suggested many textual modifications. We also would like to extend our special acknowledgment to colleagues at the School of Economics at Fudan University, CCES under the leadership of Professor Jun Zhang for its provision of a favorable

academic atmosphere, as well as to Ms. Mei Chen and Ms. Lu Zhan at CCES for their substantial management support. Last but not least, Ms. Yiyi Xin does a fantastic job in helping us arrange academic activities under the newly established platform, Fudan Lab for China Development Studies (FLCDS).

Our thanks also go to the National Social Science Funds (11AZD084, 12AZD045, 13&ZD015) in China. Mr. Qibing Zhu at Peking University Press helped a lot for the earlier Chinese copy of this book, while Ms. Bing Xu did a great job in arranging the translation of the book. Finally, we would like to thank our family members and acknowledge the fascinating era of change in China that has offered up so many opportunities.

By Zhao Chen and Ming Lu
Summer of 2014 in Shanghai