THE EFFECTS OF INTERNAL MIGRATION ON REGIONAL INEQUALITY IN CHINA: EVIDENCE FROM PANEL DATA ANALYSIS

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The causes and consequences of labor migration have been widely studied in multiple disciplines. There is not much doubt that migration is driven to some extent by regional inequality, but the effect of migration on inequality is ambiguous in existing theories and empirical studies which often present mixed or even contradictory conclusions.

Focusing on China, this study aims to investigate the effects of internal migration on regional inequality via panel data analysis. It contributes to the literature by linking migration to inequality at both local growth channel and national dynamic channel. The panel data used in this study include all thirty-one province-level administrative units across China for the years 1992 through 2008. Fixed-effects method is adopted to control time-invariant, province-specific characteristics and structural equations modeling strategy allows estimated coefficients to vary across regions.

The empirical evidence from this study indicates that whether and how migration affect regional inequality depend on the developmental stages and industrial structures of involved areas. The analytic results also support the notion that the effects of migration on inequality change across regions and time periods. Not only do the findings contribute to the existing debate, but also have important policy implications.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

First, I thank my advisor, Professor Vijai Singh for his continuing support and advice during the whole process of my study. His experienced advice helps me narrow down the research questions and guides me with an implementable direction to start and finish my dissertation. Without his guide, I cannot finish my dissertation with a decent job. Moreover, I want to express my gratitude to my other committee members, Professors Lisa Brush, Melanie Hughes and Thomas Rawski for their insightful comments on my dissertation.

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1.0 INTRODUCTION

1.1 BACKGROUND AND MOTIVATIONS

It has been widely noted in the literature of both sociology and economics that migration plays an important role regarding population redistribution and is strongly related to regional economic development and social inequality. These relationships have been studied in a large body of literature. Most migration studies focus on capitalist economy, in which individual choice is the main determinant of migration. People migrate to better themselves economically and socially; thus regional differentials provide incentives for individuals to migrate. This assumption, however, is less valid in socialist and transitional economies where human migration is largely controlled by the government.

Migration and inequality are interdependent upon each other. We have seen that inequality, or regional wage differentials, creates a natural incentive for people to migrate. On the other hand, migration has nontrivial impact on regional development as well. Most scholars agree that internal migration tends to promote the economic growth of a country, because persons tend to move from regions of relatively high rates of natural increase to regions of relatively rapid economic expansion. The result is a better allocation of capital and human resources, and a favorable effect on economic growth takes place. What is controversial is the nature of the impact of internal migration on regional inequality. Okun (1968) argued that it is

theoretically impossible to determine the impact of internal migration on regional inequality, as it is required to consider the economic and demographic structures of the regions, whether the faster-growth regions are also the more-developed regions, and whether the time frame is long-term or short-term.

What make China interesting are the ways economic reforms and regional inequalities are related to population movement. Since the economic reform in 1978, China has experienced a surprisingly high growth rate for more than thirty years, and the world economy has witnessed China's rise as the "world factory" and its dominance in manufacturing. The success of the Chinese economy is closely connected with internal labor migration: without the large-scale migration of the rural population that supplies almost unlimited cheap labor to power the Chinese economic engine, the rise of China would have been impossible. It is for that reason that rural-to-urban migration in China has been a particularly important social and economic phenomenon and has attracted much attention from both academics and policy makers.

For much of the socialist period of China until the late 1970s, labor migration (e.g., rural-to-urban migration) was strictly controlled by the government. Since early 1980s, population mobility has risen dramatically as one of main consequences of China's economic reforms and the relaxation of migration controls. As a transitional economy, China has shifted gradually from planned allocation of labor to a more open labor market. Much of the China-related literature studies population redistribution on the one hand, and the relationship between migration and regional inequality on the other.

Economic reforms have widened the development gaps between regions. Economic growth, job opportunities, and higher wages in more-developed regions (urban areas) provide a strong incentive to migrants from less-developed regions (rural areas) to migrate to urban areas.

Those migrants are major sources of cheap labor that facilitate industrialization in more-developed regions, further accelerating economic growth. Therefore, the relationship between migration and regional inequality is expected to be strong and bidirectional (Fan, 2005).

In the existing literature about China's migration, there is consensus that regional inequality serves as a pull factor to labor migration. In particular, the "three economic belts," a product of China's the seventh Five-Year Plan (1985–1990) that divided the whole nation into three regions (eastern, central, and western), each with its own comparative advantage and economic specialization, provides a convenient regionalization scheme to describe the level and changes of regional inequality. Migration from the central and western regions to the eastern region increased dramatically in recent periods as the regional inequality widened almost at the same time. The massive population flow is the result of both structural changes caused by economic growth and institutional changes caused by relaxation of mobility control (Cai and Wang, 2003).

However, whether labor migration increases or decreases regional inequality remains a debate. As far as China is concerned, the relationship between migration and inequality is ambiguous. Different studies, utilizing on different methods and datasets, derive different results about this relationship. In this dissertation, I will empirically test the relationship between labor migration and regional inequality in China. I investigate the impact of labor migration on regional income disparity among eastern, central, and western regions and their contribution to overall inequality in China. This study will shed light on the ambiguous relationship between migration and inequality in China. Not only does this study contribute to migration literature, it also has policy implications regarding China's labor migration circumstances.

1.2 INTERNAL MIGRATION IN CHINA SINCE 1949

China is the most populous developing country in the world. During the Maoist period, China's approach to labor was one based on centralized allocation. This approach entailed low job mobility and controlled labor migration. The household registration (*hukou*) system was established in the 1950s to control population mobility and limit migration from rural to urban areas. This system assigns a *hukou* location for every Chinese citizen: agricultural *hukou* or nonagricultural *hukou*. Through *hukou* system, the government allocated housing and jobs and rationed food and other necessities. This linkage made it almost impossible for people to live in urban areas without local *hukou*. Yang (1993) argued that not only does *hukou* system determine one's residence and access to government provision of social services, and thereby influence one's incentive to migrate, it also directly determines one's access to urban wage employment, which affects migration by changing one's ability to earn income, to afford the costs involved, and, most important, to obtain government approval. Therefore, *hukou* system successfully confined the population to its place of birth. Rural to urban migration occurred only at an extremely small scale, under the auspices of the government. Zhao (2005) argued further that *hukou* system deprived both rural and urban residents of their freedom of mobility. The unique household registration system distinguished Chinese migration from migration in other developing countries.

Market reforms since the late 1970s have brought about great changes in Chinese population dynamics and significantly weakened the government's control over geographic mobility and its ability to enforce *hukou* system. The people's commune system and the "iron bowl" in the rural areas were replaced by the Household Responsibility System (HRS), aimed at increasing the income level of poor, rural areas. The HRS eventually replaced the collective

production team system. It returned some degree of personal freedom to rural people, increased their productivity, led to the availability of food in the urban free market, and eventually put an end to food rationing (Zhao, 1999); it also generated surplus labor in rural areas. In short, the market reforms in the late 1970s freed many rural laborers to leave the land and surplus labor and underemployment in rural areas became migration push factors.

On the other hand, the mandate of rapid economic growth has legitimized a strategy of export-oriented industrialization and urbanization. Under the open-door policy, both domestic and foreign capital search for cheap sites for investment, thus creating a huge demand for cheap labor. The adoption of export-oriented, labor-intensive industrialization demanded a labor regime different from that of the Maoist period, one that depended heavily on migrant workers. All of these factors made rural-to-urban migration both possible and necessary.

Labor migration from rural to urban areas has emerged as a prominent phenomenon in China after decades of stagnation. Since the early 1980s, a large number of migrants have successfully entered cities without official approval. Official estimates of the floating population are in the range of 150 million, accounting for about 12% of China's total population (National Bureau of Statistics, 2006). Rural migrants reside in cities without the permanent legal status required to be there, and a large proportion of these people are circular migrants—i.e., they move back and forth frequently (Zhao, 1999).

In the meantime, the Chinese government relaxed controls on labor migration. Huang and Pieke (2003) documented that the government still prohibited migration from 1979 to 1983. Then, from 1984 to 1988, the government allowed farmers to enter urban areas as long as they provided their own food. Following the "rural migrant wave" of 1989, migration became a significant social phenomenon, and the government encouraged rural-to-urban migration. As

Zhao (2005) pointed out, since 2000 the government has been reforming *hukou* system and now allows greater mobility among people. As a consequence, rural labor began to move, live, and work in cities as so-called temporary residents. Although *hukou* system still significantly affects migration decisions, its effect has been greatly reduced compared with the past. Through China's internal migration, people's incentives to migrate in response to regional disparities have been clearly shown; however, the effect of migration on regional inequality remains ambiguous.

1.3 REGIONAL INEQUALITY IN CHINA

In the past thirty years China has pursued an aggressive strategy of market liberalization, the opening of trade, and other structural transformations. Through the three decades since implementation of the economic reform package, the Chinese economy has experienced rapid and sustained growth, with Gross Domestic Product (GDP) expanding by an average of 9.5% per year between 1978 and 2005 (Brandt & Rawski, 2008). Absolute poverty, as measured by headcount ratios and other measures, consistently fell in Chinese data (Walley and Zhang, 2004), and the proportion of the population living in absolute poverty dropped from 75.7% in 1980 to 12.49% in 2001 (Brandt & Rawski, 2008; Ravallion & Chen, 2004). Other nonincome metrics, such as school enrollment, literacy rate, access to electricity, and life expectancy, also show similar improvements.

At the same time, these growth and poverty reductions were unevenly distributed across the country. A conspicuous feature of China's economic growth during the past three decades has been the differential rate of growth across regions. Increases in per capita expenditure were fastest in urban and coastal areas and slowest in rural and inland areas, such as the western and

central regions. Despite moderate increases in per capita expenditures, poverty in these regions has persisted at high levels. This is because they were initially relatively poor areas. Furthermore, there has been a steady increase in interprovincial inequality, evidenced by the increasing disparity in provincial per capita GDP. In 2001, GDP per capita for the eastern region as a whole stood at 12,071 yuan, nearly two times that of the central region and more than two times that of the western region. The gap between the central and western regions also widened, but to a smaller degree (Fan, 2005).

China has turned from a society with relatively egalitarian income distribution[1] to one with moderate inequality. Inequality is a currently burning issue in China. The Gini coefficient, which measures economic inequality in a country, was estimated to be 0.33 in 1980 and rose to 0.45 in recent years (World Bank, 2005). Spatial inequalities among different regions and between rural and urban areas have also been on the rise. Fujita and Hu (2001) pointed out that interprovincial inequality declined during the 1980s and showed signs of increase in the 1990s, while inequality between the eastern coastal area and the rest of China has been on the rise since the 1980s. Zhang (2001) associated the changes in regional inequality with international trade and foreign direct investment. Xu and Li (2006) and Wang (2007) investigated per capita GDP up to 2004 and 2005, respectively; both documented a slight decline in interprovincial inequality. Fan and Sun (2008) provided further evidence on the recent trend of regional inequality up to 2006.

Though most existing literature has documented the rise of inequality in China in the 1980s and 1990s, there is no consensus on the relationship between migration and regional inequality from empirical studies. Hu (2002) developed a spatial model and showed that the

[1] Rawski (1982) found that pre-reform income distribution in China was far from egalitarian.

increasing rural-to-urban migration in China may be one of the reasons for the rising income inequality between the coastal area and inland. Lin et al. (2004) examined the relationship between labor migration and regional inequality and showed that the intensified migration in the 1990s was not sufficient to reduce regional income disparity. Whalley and Zhang (2004) used calibration and showed that removing migration barriers such as *hukou* system tends to reduce inequality. Using interprovincial migration data from the 1990 and 2000 population censuses, Fan (2005) examined the relationship between migration and regional development and showed that this relationship has been bidirectional and has become stronger over time. Hertel and Zhai (2006) use simulation to argue that reforms in *hukou* system and increasing labor mobility would reduce the rural-urban income inequality.

In short, there is much ambiguity about the relationship between migration and inequality in China. The aim of this study is to investigate the relationship and to try to shed some light on the connection.

1.4 RESEARCH OBJECTIVES AND CONTRIBUTIONS

In the previous sections, I have shown that China's economic development in the past thirty years has been characterized by rapid globalization, high growth, high concentration of capital, rapid poverty reduction, and rising spatial inequality. The research objective of this dissertation is to study the role of internal migration against this background, as the relationship between migration and inequality remains ambiguous. A good understanding of how the labor market, or migration, operates is essential for the design of policies for development and poverty alleviation in the context of increasing spatial inequality. The goal of this dissertation is to contribute to

such an understanding. The research questions include: What are the relationships between migration and regional inequality in China? Is migration complementary to local growth and development? Does migration ameliorate or exacerbate spatial or regional economic inequality? If so, through what channels? If not, why? What are the effects of intraprovincial migration and interprovincial migration on spatial inequality, respectively? What are the effects of urban migration and rural migration on spatial inequality, respectively? Is there any difference in the effects of migration on inequality across regions in China? Is there any difference in the effects of migration on inequality across time? What are the factors that might explain the potential regional difference or time difference? What policy implications can be drawn from this study against the background of rising inequality and relaxed but still highly restricted migration policies in China?

The main contribution of this dissertation to the migration literature is to link migration to spatial inequality at both local and national levels. To study the impact of internal migration on regional economic inequality, I use provincial-level data with national coverage, which allows me to track patterns and trends across all provinces or regions of the country and capture the characteristics and specificities of individual provinces. The longitudinal data start from the point marking the intensification of market reforms and cover a sufficiently long time period to transcend short-term fluctuations.

As there is a potential reciprocal effect between migration and spatial inequality, I include lagged independent variables in the regression equations to enhance my ability to reduce suspect endogeneity bias and determine the direction of causality. I add fixed effects to capture heterogeneity among provinces and adopt a structural equations model to test for the changes in regression slopes not only across regions but also across time periods. As the regression outcome

variable is measured as both a local economic growth rate and a national inequality contribution, I examine the migration-inequality relationship through both local growth channels and national dynamic channels. Moreover, migration is measured at both interprovincial and intraprovincial levels, which allows me to compare relatively long-distance moves with relatively short-distance moves.

There is not much doubt that internal labor migration is driven to some extent by regional or spatial inequality, because people tend to move in order to better themselves economically. However, the effect of migration on inequality is ambiguous in existing theories and empirical studies. The findings of this dissertation imply that previous research often presents mixed or even contradictory conclusions for various reasons. For instance, studies focusing on the different developmental stages and industrial structures of areas may generate different results. Moreover, the distance of migration does matter in most cases. Of course, you may draw different conclusions based on whether you focus on "local" or "global" relationships between migration and inequality.

Methodologically, the fixed-effects panel data analysis conducted in this dissertation suggests that longitudinal methods are clearly superior to cross-sectional methods. There are two major advantages of longitudinal methods for analyzing the relationship between migration and inequality. First, simple methods used for longitudinal data, such as taking one-year lags of independent variable(s), can reduce potential problems caused by reciprocal relationships between migration and economic growth and between migration and spatial inequality. Second, "time" is not only useful to determine the model structure, such as fixed-effects models, but should also be considered an explanatory variable and be included in the model. This is particularly applicable to studies on developing countries like China.

Regarding policy implication, the findings of this dissertation indicate that eastern cities serve as growth engines for surrounding eastern suburban and rural areas, but the spillover effects generated by the richer eastern region are very limited and are too weak to help the poorer inland regions catch up. The government can encourage short-distance migration and urbanization in the inland regions. To do so, many conditions should be met, among which rural education is the most important (Johnson, 2002). More resources should be shifted to rural education in order to enhance the skill levels and productivity of the rural population and to prepare them for nonagricultural employment, thus increasing their ability and propensity to move from farm to city. An equally important condition is the governmental promotion of more capital flows and investments in labor-rich but capital-scarce inland areas in order to generate more employment opportunities and to encourage skilled labor to remain in or even be attracted to inland areas. Government could use similar tools like the Western Development Program (*xi bu da kai fa*) to stimulate growth in the central region and reduce the economic gap between the central and eastern regions. The structure and summary of the dissertation is as follows.

In chapters 2 and 3, I thoroughly review the literature on the theoretical relationship between migration and spatial inequality and the empirical findings on migration and its link to spatial inequality in China. Chapters 4 and 5 detail the data sources, variables and their operationalization, and analytic methods utilized to test the research questions proposed in this introductory chapter. Chapters 6 and 7 provide a description and interpretation of the results of statistical analyses, and the final chapter summarizes and explains the results and their implications for migration theory, methods, and policies, along with directions for future research.

2.0 RELATED LITERATURE: THEORETICAL BACKGROUND

2.1 GENERAL THEORIES OF MIGRATION

In migration literature, the most widely adopted theoretical approach is the neoclassical, which is also called the "functionalist approach" or the "equilibrium approach." Ravenstein (1889) pointed out that people migrate in order to better themselves economically; hence migration is considered to be individuals' responses to regional differentials in economic development. Following this argument, neoclassical theory views migration as an outcome of geographic differences in labor demand and supply and of individuals' rational calculation of costs and benefits (Sjaastad, 1962). The neoclassical approach was initially a major contribution from the realm of economics, and is generally correlated with the functionalist paradigm and modernization theory in sociology, which focuses on equilibrium models and considers migration a voluntary and rational decision made by individuals who seek better economic opportunities to respond to higher wages offered away from home (Lewis, 1954). At the aggregate level, migration is viewed as the means by which surplus labor in less-developed areas (e.g., rural agricultural sectors) is transferred to more-developed areas (e.g., urban industrial sectors) in response to wage differentials.

There are both macro and micro forms of the neoclassical approach. Because of the developmentalist orientation of the field of migration in the early periods of migration theorizing (say, the third quarter of the twentieth century), the oldest and best-known neoclassical theory of

migration was developed to explain how labor migration responds to economic development (Harris & Todaro, 1970; Lewis 1954; Todaro 1976). According to this macro theory and its extensions, migration is caused by geographic differences in the supply of and demand for labor, and therefore by geographic difference in equilibrium market wage rates (Massey et al., 1993). As a result, workers from low-wage areas tend to move to high-wage areas, which leads to the changes in the supply of and the demand for labor in both areas, and eventually wage differentials reflect only the costs of migration at the new equilibrium. Thus, for less-developed areas, out-migration is the only means to solve the problem of surplus labor and proceed in the process of development; for the economy as a whole, labor migration is such an equilibrating factor that both sending and receiving areas benefit, because it eventually optimizes the distribution of human capital among regions and evens out regional wage inequalities. The macro version of the neoclassical approach implicitly assumes that the elimination of wage differentials will end labor movement, and that labor markets are the primary mechanisms by which migration is induced. The simple and compelling explanation of migration offered by neoclassical macroeconomics has strongly shaped public thinking and has provided the intellectual basis for much immigration policy (Massey et al., 1993).

The micro version of the neoclassical approach focuses on individual rational choice and cost-benefit calculation (Sjaastad, 1962; Todaro, 1976, 1989; Todaro & Maruszko, 1987). This framework suggests that rational individuals choose to move in response to wage differences between sending and receiving areas, and that they expect higher earnings and a positive net return out of migration. As Ravenstein (1889: 286), the undisputed founding father of modern migration studies, put it in his famous laws of migration: "Bad or oppressive laws, heavy taxation, an unattractive climate, uncongenial social surroundings and even compulsion (slave

trade, transportation), all have produced and are still producing currents of migration, but none of these currents can compare in volume with that which arises from the desire inherent in most men to 'better' themselves in material respects." According to this framework, migration may be conceptualized as an investment to increase expected output. In theory, a potential migrant goes to where the expected net return is greatest, which in turn leads to distinct conclusions. Researchers usually investigate individual migrants' characteristics, social conditions, or technologies for lowering migration costs. Greenwood (1985) studied the effects of various individual characteristics (such as age, gender, marital status, education attainment, employment, and occupation) on migration. Graves and Linneman (1979) studied the effects of the presence of other household members on migration.

As an extension or modification to the neoclassical approach, Stark and his colleagues developed the theory of the new economics of migration (Katz & Stark, 1986; Lauby & Stark, 1988; Stark, 1984, 1991; Stark & Bloom, 1985; Stark & Levhari, 1982; Taylor, 1986). A key insight of this new approach is that migration decisions are not made by isolated individuals but by families or households in which people act collectively to maximize expected income and minimize the risks associated with various market failures.

As Massey et al. (1993) pointed out, in developed countries, risks to household income are usually minimized through private insurance markets or governmental programs, but in developing countries these institutional mechanisms are imperfect, absent, or inaccessible to low-income families, giving them incentives to diversify risks through migration. In developed countries, moreover, credit markets are relatively well functioning, which enables families to finance new projects, such as the adoption of new production technology. In most developing areas, in contrast, credit is usually not available, or is procurable only at high cost. In the absence

of accessible public or affordable private insurance and credit programs, market failures create strong pressures for labor movement. Especially in developing countries, people act collectively not only to maximize expected income but also to minimize risks associated with various market failures. According to the new economics, the relevant economic variables that explain migration are not wages but measures of risk and needs for and access to capital. Using data collected in twenty-five Mexican communities, Massey and Espinosa (1997) empirically studied the driving forces of Mexico–U.S. migration. They argue that, over the past twenty-five years, probabilities of migration are linked more to the forces identified by the new economics of migration than to the individual cost-benefit calculations assumed by the neoclassical model.

The theoretical models growing out of the new economics of migration result in a set of propositions and hypotheses that are quite different from those originating from neoclassical theory, and hence lead to different policy implications. As we discussed earlier, families or households are the appropriate units of analysis for migration research, not autonomous individuals. A wage differential is neither a necessary nor sufficient condition for labor migration to occur; risk-averse households may have strong incentives to diversify risks through labor movement even in the absence of wage differentials. Migration and local employment are not mutually exclusive, and there are strong incentives for households to choose both migration and local activities. Thus, economic development within sending areas need not reduce the pressure for labor migration.

Governments can influence migration rates not only through policies that influence labor markets but also through those that affect insurance and capital markets. For instance, government insurance programs—particularly unemployment insurance—can significantly affect the incentives for labor movement. Government policies and economic changes that influence

income distribution will impact the relative deprivation of some households, and thus alter their incentives to migrate. In fact, government policies that produce a higher mean income in migrant-sending areas may increase migration if relatively poor households do not share the income gain. Conversely, policies may reduce migration if relatively rich households do not share the income gain (Massey et al., 1993).

The major contribution of the neoclassical economic model lies in its articulation of a formal theory of migration behavior at both individual and aggregate levels and its generation of testable hypotheses for empirical research. Nevertheless, no matter which level of analysis (macro or micro) one adopts, the neoclassical model of migration research is fundamentally a micro-social approach in the sense that it assumes social processes (migration processes, in this case) are simply sums of individual actions undertaken on the basis of individual cost-benefit calculations (Massy et al., 1993). The "methodological individualism" and reductionism of the neoclassical approach makes it problematic to use individual actions to explain or predict structural changes—say, reduced or eliminated spatial inequality as a consequence of "aggregate" migration flows. In other words, it tends to confuse details with social structures, and often commits "the fallacy of composition by assuming that since individuals benefit, the society must necessarily benefit" (Papademetriou & Martin, 1991: 8). The neoclassical approach is historical, presuming movement toward equilibrium and overlooking the particular politicoeconomic conditions under which population movement takes place. Wage differences cannot always explain migration; sometimes people migrate because they have no real alternative. As Amin (1974: 89) notes: "Would anyone dare to explain the migration from Europe to North America in the nineteenth century as having been caused by the motivations of the migrants with reference to differences between potential incomes without pointing out that

the migrants were peasants who had been driven from their lands by the development of agrarian capitalism?" Even though there have been substantial modifications of the neoclassical model (e.g., Harris & Todaro, 1970; Todaro, 1981), those modifications still reduce migrants, a category that is socially structured by gender, ethnicity, and social class, to mere embodiments of labor power, and fail to "adequately take into account the political and other structural barriers to mobility" (Goss & Lindquist, 1995).

The limitations of the neoclassical model are also evident in the context of international migration from developing to developed countries. In fact, the neoclassical approach has generally become a policy-making orthodoxy for labor migration. For example, many Asian countries have encouraged their citizens to seek income opportunities overseas under the assumption that labor migration will benefit receiving countries by providing cheap labor and solving labor-shortage problems. Labor migration is also expected to benefit sending countries by solving labor-surplus problems and serving as "a political safety valve," since "it is generally the most ambitious and potentially vocal individuals who migrate" (Goss & Lindquist, 1995: 320). Also, remittances sent or brought back by migrants are expected to raise local living standards if they are used for household consumption or to increase value-added production and incomes, stimulate local production, and create local employment, if spent to purchase additional factor inputs or to rent substitute labor for production activities. However, the benefits of migration to emigration countries are ambiguous. There is no iron law that automatically translates out-migration into economic development, and labor migration does not necessarily resolve developmental dilemmas.

Since the mid-1970s, the Philippine government has been influenced by this model and has encouraged its citizens to migrate and work overseas to help combat domestic economic

stagnation and to accumulate sufficient capital to stimulate long-term development. However, the equilibrating predictions and developmental benefits of labor migration have been inconsistent with the Philippines' experience of migration without development. First, remittances are used less for investment than debt repayment and consumption, which may also cause inflation and prevent definitive conclusions about economic development. Second, migration provides only temporary relief of domestic unemployment, which continued to rise in the Philippines in the late 1970s and 1980s despite massive emigration. Third, wages and skill levels have not increased as a result of emigration (Goss & Lindquist, 1995).

The neoclassical model is criticized by conflict theorists. Instead of considering migration to be calculated decisions by rational individuals, conflict theorists investigate migration in the context of class structure and conflict. Neo-Marxists (Castells, 1975; Castles & Kosack, 1973; Nikolinakos, 1973) view migration as the result of the incorporation of less-developed sectors into more-developed sectors. This process becomes cumulatively unequal and leads to the weakening of the position of the less-developed sectors. Therefore, connection between unequally developed states becomes a means of additional surplus extraction by more-developed states, and migration should not be expected to lead to equilibrium among regions (Portes & Walton, 1981: 28). The structural approach stresses conflict instead of equilibrium and focuses on the "contextual factors (structural forces)" that "produce socio-spatial inequalities and constrain the life chances of individuals as members of specific social classes in particular places" (Goss & Lindquist, 1995: 318). With its strong Marxist overtones, structural perspective sees migration (international migration in particular) not as the sum of individuals' voluntary decisions and actions but as the consequence of sociospatial structures and uneven and asymmetrical relations that are systematically reproduced within global economies and create the

conditions for labor migration. International migration is especially likely to take place between past colonial powers and their former colonies, due to cultural, linguistic, administrative, transportation, and communication links established early and maintained over time (Massy et al., 1993). However, migration does not reduce or eliminate spatial inequalities and lead to "equilibrium"; instead it intensifies inequalities and perpetuates underdevelopment in sending countries due to their loss of human capital through out-migration.

As a challenge to the neoclassical explanation of migration, the structural approach was initially embodied in neo-Marxist dependency theory during the 1960s and 1970s. The dependency theory argues that labor migration is a response to uneven spatial development, which results from former colonial relationships between developed core countries and underdeveloped periphery countries (Goss & Lindquist, 1995). Moreover, due to the selection of the most productive and talented migrant workers from the underdeveloped sending countries, migration creates a geographical transfer of value greater than the return to sending countries through remittance (Amin, 1974). Such "brain drain" in underdeveloped sending countries perpetuates and reinforces the inequalities between sending and receiving countries; thus, underdevelopment is a by-product of development (Arango, 2000).

The structural model of migration effectively challenges the neoclassical economic model and provides a useful theoretical and conceptual framework for understanding the dynamics of international migration by shifting the unit of analysis from individual migrant to international power relationship, from microbehavioral to macrostructural processes, and from the study of solely economic forces to that of both political and economic forces from a historical-structural perspective.

However, the school of structural perspective is also burdened by its theoretical formulations (Papademetriou & Martin, 1991). With its historical-structural emphasis, the structural approach tends to focus on the evolution of the world capitalist system and its gradual penetration from rich countries to poor countries, which restricts its analytical scope to "international" migration. As Papademetriou and Martin (1991: 10) put it, "the historical and structural nature of this process , . . and the disarticulation of periphery actors, make it very difficult to apply this sort of analysis to anything less than the global level . . . one appreciates the almost insurmountable problems of empirical measurement" (see also Caporaso, 1978a, 1978b; Cardoso, 1979; Duvall, 1978; de Janvry & Garramon, 1977; Portes & Walton, 1981; Skocpol, 1977;). Thus, the structural approach loses sight of the contextual dynamics in the "internal" process of labor migration as part of international capitalist integration. As structural theorists themselves argue, the dislocations and disruptions in poor countries (e.g., the displacement of workers in traditional agricultural sectors) resulting from the global capitalist penetration and exploitation lead to a large labor surplus and migration to cities, which create an uprooted proletariat prone to migrate abroad. Although internal migration may provide a background for the study of specific migratory relationships between countries, it has never been a subject of empirical investigation.

There are certainly many noneconomic motivations for migration. A migration network is one such well-known notion. Migration networks can be defined as sets of interpersonal relationships that link migrants with relatives, friends, or fellow countrymen at home. They convey information, provide financial assistance, facilitate employment and accommodation, and give support in various forms. By doing so, they reduce the costs and uncertainty of migration and thus facilitate it. Moreover, networks can also induce migration through demonstration

effects. Massey et al. (1993) suggest that migration networks can be seen as a form of social capital, since they are social relations that permit access to other goods of economic significance, such as employment or higher wages. Their arguments rely on social capital theory and are associated with James Coleman and Pierre Bourdieu.

Arango (2000) further argues that social networks for migration could be considered some of the most important explanatory factors of migration. Many migrants move simply because their socially connected friends and family members migrated in the past. On the one hand, family reunion accounts for a substantial part of international migration. On the other hand, the importance of social networks is believed to increase as entering receiving countries becomes more and more difficult, taking into account the networks' capacity to reduce the costs and uncertainty of migrating. Furthermore, networks are cumulative in nature; therefore, networks are the main mechanisms that make migration a self-perpetuating phenomenon. Social networks could explain the continuation of migration independent from the causes that induced the initial migration. Hence, migration networks may contribute to explaining differential migration. However, there certainly exists an upper bound for the networks' effect. Therefore, the dynamics of migration-network growth and stagnation constitute an area that deserves further investigation.

Faist (1997) points out that migration networks constitute an intermediate, relational level that stands between the micro level of individual decision-making and the macro level of structural determinants. Thus this approach could help to bridge a gap that is one of the major limitations in migration thinking. So far, a systematic framework that theorizes about migration networks has yet to be developed.

This framework could also be used to accommodate intermediary institutions such as smuggling rings or humanitarian organizations, which assist migrants to overcome entry barriers for different purposes and aims. Once international migration has started, private institutions and voluntary organizations arise to satisfy the demand created by the imbalance between the large number of people who seek entry into receiving countries and the limited number of immigrant visas these countries typically offer. The barriers that receiving countries implement to keep people out create a profitable economic niche for entrepreneurs and institutions dedicated to promoting international movement, yielding a black market in migration. As this underground market develops, humanitarian organizations also arise in developed countries to safeguard the rights and improve the treatment of legal and undocumented migrants. For-profit organizations and private entrepreneurs provide a range of services to migrants in exchange for fees set in the underground market. Humanitarian groups help migrants by providing counseling, social services, and legal advice about how to obtain legitimate papers, and even provide insulation from immigration law enforcement authorities. Over time, as individuals, firms, and organizations become well known to immigrants, they also become institutionally stable, constituting another form of social capital that migrants can rely on to gain access to foreign labor markets. The recognition of a gradual buildup of institutions, organizations, and entrepreneurs dedicated to arranging immigrant entry—legal or illegal—again yields hypotheses that are quite different from those originating from neoclassical individual-decision models.

Another theoretical strand states that migration is a self-sustaining and self-perpetuating phenomenon, which was first proposed by Gunnar Myrdal under the label of cumulative causation in the context of uneven development in underdeveloped areas. Massey et al. (1998) have enlarged the notion, identifying several factors and mechanisms that are responsible for the

self-perpetuation of migration. The basic idea is that migration changes reality in a way that induces subsequent moves through a number of socioeconomic processes, one of which, the expansion of socioeconomic processes, has been discussed previously. Other relevant mechanisms include relative deprivation, the development of a culture of migration, perverse distribution of human capital, and the stigmatization of jobs usually performed by immigrants.

Recent theoretical contributions are contributing to a better understanding of the causes of migration, and of the mechanisms that contribute to its self-perpetuation. However, the overall picture is still far from satisfactory. The usefulness of theories that try to explain *why* people move is limited by their inability to explain why so *few* people move. This is one of the reasons I am determined to investigate labor migration in China, where massive internal labor migration has been observed during the last decades. In terms of international migration, more effort should be put into studying noneconomic factors that influence migration, such as family types, migration networks, and social structures and systems in general. Then we can say something about the cultural dimensions and contexts of migration, including the costs of cultural adaptation. In addition to these noneconomic factors, politics and the roles played by states should be taken into account to explain limited mobility. In practice, nothing shapes migration flows and types more than admission policies. Any theory built primarily on economic models is bound to be in trouble in an international migration scene in which political considerations and states intervene so prominently. As Zolberg (1989) points out, politics and states are usually missing in theories of migration, and urgently need to be brought back into them.

Arango (2000) critically reviews existing theories of migration and calls attention to other dimensions of migration, including processes and consequences, the "unsettled relationship" between migration and development, social structures such as family and kinship ties, and the

state and political context in which migration takes place. My work in this dissertation could be considered a reply to Arango's critique by examining the "unsettled relationship" between migration and development, and of regional inequality in particular.

2.2 MIGRATION AND INEQUALITY

Migration and inequality are interdependent upon each other. We have seen that inequality or regional wage differentials create natural incentives for people to migrate. On the other hand, migration also has nontrivial impact on regional development. There is not much doubt that internal migration tends to increase the rate of economic growth of a country. This is because persons tend to move from regions of relatively high rates of natural increase to regions of relatively rapid economic expansion. Thus a better allocation of resources is achieved, resulting in a favorable effect on economic growth.

What is controversial is the nature of the impact of internal migration on regional rates of growth and inequality in per capita income. Kuznets (1955) conjectures that income inequality widens when the labor force shifts from the agricultural sector to the nonagricultural sector during the early stages of economic development. Myrdal (1957) also argued that migration widens the gap in per capita income between the sending and receiving areas. Because it is the advanced and expanding regions that are usually the receiving regions, internal migration, according to Myrdal, widens the gap in per capita income between the advanced and the poorer regions. On the other hand, Easterlin (1961) pointed out that inter-region migration contributed to the convergence of per capita income levels since 1860 in the United States. Okun (1968) argued that it is theoretically impossible to determine the impact of internal migration on

regional inequality, as it is required to consider the economic and demographic structures of the regions, whether the faster-growth regions are also the more-developed regions, and whether the time frame is long-term or short-term. Using data for the time period 1940 to 1950 in the United States, he examined the effects and pointed out that further research was required to confirm his findings.

Oberai and Singh (1983) suggest that inequality may be reduced if the very poor migrate, as the resulting increase in wages will bring up the wages of those who were at the bottom of the scale. Previous research has shown evidence of migration's impact on reducing income inequality among rural households in Northeast Thailand (Guest, 1998). Yang (2004) presents a dynamic model for analyzing the link between migration and provincial inequality in Thailand and finds that provincial production is highly unequal, while household income exhibits moderate between-province inequality. The wage differential drives rural-to-urban migration, and in turn the wage rate at the destination is affected by the total amount of migrant labor supply. Migration generates a net income gain for migrants, and they share that income gain with their family members via remittances, which help redistribute income toward poor provinces, resulting in a lower level of provincial inequality in terms of household incomes.

Using data on interprovincial migration in Vietnam, Phan and Coxhead (2010) investigated the relationship between migration and inequality. As in China, Vietnam's economic boom during the transition to a market economy generated rapid growth with unequal regional development. Phan and Coxhead examined the role of migration as an influence on income inequality between pairs of provinces. Their analysis confirmed economic motives for migration but also suggested the existence of poverty-related labor immobility at the provincial level. The examination of income inequality between pairs of provinces suggests that the

influence of migration on inequality can be either negative or positive. For those provinces where most of Vietnam's export-oriented industries are located, they confirm the robust inequality-reducing impact of labor migration.

Soto and Torche (2004) provide empirical support for their hypothesis that lack of convergence in Chile in the 1980s and 1990s seems to be associated with low levels of regional migration, and that this phenomenon may be the result, to a large extent, of government social policies. They found that annual per capita GDP in Chile grew at 5% per year between 1975 and 2000. However, regional income inequality remained stagnant even though poverty declined significantly in all regions. Moreover, they found that convergence in per capita income and productivity levels was "too slow to become a significant force in equalizing regional income." Their study suggests that lack of convergence is mostly associated with low levels of internal migration.

For most developing countries, one main channel of realizing labor force shift is rural-to-urban migration. In the existing literature, the effect of growth-related migration dynamics on regional inequality remains largely unexplained. Jeong (2002) used SES data to show that growth and income inequality are closely connected through factors like occupation, financial intermediation, and education, but he did not address geographic factors. Jeong and Townsend (2003) examined the micro underpinnings of two models of growth and inequality, but failed to discuss cross-province inequality.

As for the consequences of migration, there exists a considerable amount of confusion and debate. Migration researchers agree more on the positive effects of migration on individuals but are less sure about the effects of migration on income inequality. There has been much discussion about whether migration increases or decreases inequality. A commonly held view is

that migration increases inequality. Lipton (1980) showed that rural-urban migration does not tend to equalize incomes because of the following reasons: the selective nature of migration; migration costs or barriers; the absence of the most productive household members; the low volume of net remittance; old and sick return migrants; etc. Moreover, he argued that the fact that migrants come from the most-productive age groups, that unequal power structures within villages go unchallenged as a result, and that migrants from wealthier backgrounds do better all conspired to ensure that migration enhanced inequality (Black, Natali, & Skinner, 2006).

Since 1980, further studies have in some cases supported Lipton's work, but in other cases have come to somewhat different conclusions. One reason for such differences lies in methodological variation—which specific economic question is being asked, and which econometric or statistical techniques are being used to estimate income and income distribution. For instance, if remittances are treated as exogenous variables, the economic question is how remittances, in total or at the margins, affect the observed income distribution in the sending areas. However, if remittances are treated as potential substitutes for home earnings, the economic question becomes how the observed income distribution compares to a counterfactual scenario in which no migration takes place but an imputed level of home earnings is included. Barham and Boucher (1995) documented a study of migration from Nicaragua using both of these methods and suggested that where remittances are considered exogenous, they reduce income inequality, whereas if they are considered a substitute for home earnings, they increase income inequality.

Based on the livelihood approach, Waddington (2003) argued that examples can be found on both sides and whether migration increases inequality or decrease inequality is essentially dependent on the uneven distribution of migrant characteristics such as human capital and

networks. Black, Natali, and Skinner (2006) presented their case studies on Central America, Eastern Europe, West Africa, and South Asia and argued that migration could either increase or decrease inequality, depending on specific contexts. They further argued that "inequality needs to be defined in broader terms than simply income or wealth. Inequality, like poverty, is multi-dimensional, and can be measured at individual, household, regional and international levels. There are socio-cultural dimensions to inequality, as well as inequalities in access to power, whilst all aspects of inequality are highly gendered."

In a specific case study regarding migration and inequality between the U.S. and Mexico, Black, Natali, and Skinner (2006) documented an inverted *U*-shaped relationship between migration and inequality. They argued that patterns of network play an important role in migration. When migration costs are high to begin with, network effects tend to increase migration more for the middle and upper-middle classes. As migration cost continues to fall through the building of larger networks, primarily the lower and lower-middle classes benefit, which tends to reduce inequality. McKenzie and Rapoport (2007) demonstrated this relationship using two datasets: the first consisted of data from fifty-seven rural communities in Mexico collected as part of the Mexican Migration Project (MMP), while the second consisted of data from ninety-seven rural municipalities from the Encuesta Nacional de la Dinamica Demografica (ENADID). Both datasets provided detailed information on international migration, but did not include income or consumption data, so inequality was measured instead in terms of data on households' ownership of infrastructure and assets. Although this data did not show increasing inequality at low migration-prevalence rates, it did show that an increase in migration prevalence was followed by a decrease in inequality. In particular, the ENADID data showed an inverted-*U* relationship between international migration and inequality, with emigration increasing

inequality at lower volumes and then reducing inequality as volume approached the levels prevailing in the MMP communities. For instance, community migration prevalence fifteen years earlier, which served as a proxy of the stock of migration experience in the community, was shown to have significant negative effects on community inequality. This effect was strongest and most significant for asset inequality, but also was significant for income and consumption inequality.

Given the ambiguous relationship between migration and inequality, it is necessary for migration researchers to define which kind of migration and which kind of inequality are being analyzed. A bigger question to ask is whether rural-urban migration is socially desirable. Economists have developed two distinct approaches to empirically address this question. The first approach focuses on the wages migrants receive. If migrants receive higher wages, migration is considered socially desirable. Though this approach seems logical in the neoclassical framework, there are a few problems complicating the matter. For example, data collection might be prohibitively expensive; private gain to migrants might not mean social gain due to the negative externality created by migrants. The second approach focuses on the optimal size of urban areas, which has its own problems. Due to the problems associated with these two respective approaches, economists have made only limited progress in the normative assessment of the consequences of migration (Morrison & Guo, 1998).

3.0 RELATED LITERATURE: LABOR MIGRATION IN CHINA

3.1 MARKET FORCES GOVERNING MIGRATION IN CHINA

To investigate the relationship between migration and inequality, China could serve as a natural experiment. Since China began its economic reforms in 1978, rural-to-urban migration has been a particularly important social and economic phenomenon and has attracted much attention from both academics and policy makers. The growing literature includes contributions from sociology treatment such as CASS (2000); demographers such as Li, Chen, and Bao (1999); economic researchers such as West and Zhao (2000); and government-sponsored research reports such as Zhang and Zhou (1999).

China is the most populous developing country in the world, and its government has been concerned with achieving a more balanced distribution of population. Its unique system of household registration (*hukou*) distinguishes Chinese migration from migration in other developing countries. The system was established in the 1950s to control population mobility and to limit migration from rural to urban areas.[2]. Rural to urban migration occurred only at an extremely small scale, under the auspices of the government. Since China's economic reforms in 1978, the Household Responsibility System (HRS) has emerged and eventually replaced the

[2] Zhao (2005) argues that *hukou* system was not intended to control population mobility. The main reason cited was food shortage. Lin, Cai, and Li (1999) argue that *hukou* system was introduced because the government needed to tie farmers to the land in order to provide cheap agriculture products to the industrial sector.

collective production team system. The HRS returned some degree of personal freedom to rural people, increased their productivity, led to the availability of food in the urban free market, and eventually put an end to food rationing (Zhao, 1999a); it also generated surplus labor in rural areas. All of these factors made rural-to-urban migration both possible and necessary.

Labor migration from rural to urban areas has emerged as a prominent phenomenon in China after decades of stagnation. The growth of this population group reflects fundamental social and demographic changes in Chinese society since the early 1980s. The HRS created a strong incentive for peasants to reduce production costs and increase agricultural productivity. Thus, surplus rural labor became an even greater problem in China. On the other hand, the success of agricultural production in the late 1970s and early 1980s dramatically increased the food supply in Chinese cities, making it possible for more rural people to migrate to cities and to survive without food ration cards. When migrants left for cities, their remaining family members could still take care of their land very well due to increasing agricultural productivity and modernization. In short, the market reforms in the late 1970s freed many rural laborers to leave the land and surplus labor and underemployment in rural areas became migration push factors.

In the meantime, the Chinese government relaxed controls on labor migration and allowed farmers to enter urban areas as long as they provided their own food. Following the "rural migrant wave" of 1989, migration became a significant social phenomenon, and the government encouraged rural-to-urban migration. Since 2000 the government has been reforming *hukou* system, and now allows greater mobility among people.

The analysis above could be considered the supply side of the migration story, while the following analysis could be considered the demand side. Under free choice, migration is considered a demographic response to macroeconomic development (Lee, 1966; Zelinsky,

1971). Most theories and models of migration hold the assumption that people are all rational individual decision makers who act in their own interests within the socioeconomic system as long as they have enough information and capability. However, in the case of China, government policies and economic processes play equally important roles in affecting individuals' mobility behaviors. The industrialization of rural areas and the development of small towns were promoted to absorb the rural labor surplus. In particular with the development of towns and villages, the peasants could "leave the land but not the countryside" (*li tu bu li xiang*). At the same time, the government recognized the central role of large cities in economic development. Market reforms brought about rapid development and great demand for low-skill labor (e.g., construction workers) in urban areas. As Li (1998) pointed out, Shanghai completed more municipal works in four years than it did in the previous four decades, with thousands of skyscrapers rising from the ground. In the Pudong District of Shanghai, more than three-fourths of the construction workers were migrants. Unsurprisingly, rural migrant workers were the primary labor pool for these construction projects.

Another demand-side cause of rural-urban migration is the emergence and expansion of foreign investment and nonstate sectors and their increasing demand for labor in urban areas. Prior to 1980s, the Chinese state used its nationalization program to dissolve the economic foundation of private business. But since the market reforms, private enterprises and foreign joint ventures began to reemerge, and grew rapidly. Migrant workers constituted an overwhelming majority of the labor pool for those nonstate sectors (Li, 1998). As *China Daily* reported in 1994, the number of migrant laborers had surpassed local laborers in some more-developed market towns in Jiangsu Province.

After examining these push-and-pull factors or the supply-and-demand factors that contributed to rural-urban migration, it is necessary to look at the government's response to these economic processes and their associated migration dynamics. The increase in agricultural labor productivity and demand for low-skill laborers in urban areas in the late 1970s induced a large portion of the rural labor force to move to urban areas. Therefore, many population policies were implemented to deal with the migration surge. On the one hand, the government attempted to control migration through the promotion of rural nonfarm employment opportunities and the development of small cities and towns (e.g., the policy of "control the big cities, develop middle cities appropriately, and actively develop the small cities" in 1980; the policy of "the farmers who want to establish their business with their own capital and grain should be allowed to" in 1984; and the policy of "leaving the land but not the countryside" (*li tu bu li xiang*). The government hoped that migrants could be kept away from large cities with populations of 500,000 or more. This was achieved by allowing medium cities of populations of 200,000–500,000 to grow and actively encouraging the development of small cities and towns with fewer than 200,000 inhabitants (Davin, 1999).

On the other hand, *hukou* system was gradually relaxed, which made it possible for rural residents to move freely without having to change their *hukou*. As a consequence, rural labor began to move, live, and work in cities as so-called temporary residents. Also, *hukou* system underwent reform: a series of social security mechanisms favorable to migrant workers were put in place. Moreover, the government no longer prohibited the mobility of rural people through tough migration restrictions. New migrants could make their own decisions based on cost/benefit calculations and their preferences. Although *hukou* system still significantly affected migration decisions, its effect was greatly diminished compared with the past. In 1997, the Ministry of

Public Security started a pilot experimental reform of *hukou* system in 382 small cities and towns. Since 2000, the government has been reforming *hukou* system, and now allows greater mobility among the people.[3] Knight, Song, and Jia (1999) used a survey of four Chinese cities (Beijing, Shenzhen, Wuhan, and Suzhou) to study government policy on rural-urban migration. Chan (2011) argued that interprovincial migration has increased rapidly since the early 1990s, spurred by significant wage differentials between provinces. The idea of long-distance migration for a better job has gained popularity over time in many provinces, including those in the western region of China. Through China's internal migration, people's incentives to migrate in response to regional disparities have been clearly shown; however, the effect of migration on regional inequality remains ambiguous.

Using 1990 census data, Cai (1996) reported that there were 34.1 million migrants in China, of which 32.42% were interprovincial migrants. However, using 2000 census data, Wang, Wu, and Cai (2003) estimated that there were around 12.47 million migrants, of which 26.4% were interprovincial migrants. Among all migrants, 78% were rural-to-urban and urban-to-urban migrants. It is unclear why the number of migrants decreased between these two censuses; it is counterintuitive and inconsistent with common wisdom (Zhao, 2005). Compared to the study of Huang and Pieke (2003), it seems that Wang, Wu, and Cai (2003) underestimated the scale of migration. In general, the migrants were mainly from the central and western regions, and the popular destinations were big cities and eastern coastal areas. Wang, Wu, and Cai (2003) estimated that of the interprovincial migrants, 75% migrated to eastern areas, and only 9.8% and 18.3% to central and western areas, respectively.

[3] By the end of 2001, several provinces, including Liaoning, Hunan, Fujian, Guangdong, and Jilin, eliminated the distinction between rural *hukou* and urban *hukou* (Zhao, 2005).

Huang and Pieke (2003) suggested that rural migrants were generally more educated and younger than nonmigrants. There were fewer female migrants than male; only one-third of rural migrants were female. Moreover, minority nationalities were less likely to migrate. Wang, Maruyama, and Kikuchi (2000) pointed out that rural migrants usually held informal jobs, since *hukou* system made it difficult for them to find jobs in the formal sector. Cai (1996) showed that 36% of migrants held jobs in the manufacturing and service sectors.

3.2 MIGRATION AND INEQUALITY IN CHINA: EMPIRICAL EVIDENCE

Migration scholars have examined the consequences of migration, and economic development in particular, with regard to place of origin or place of destination. In the research on place of origin, pessimistic scholars found that out-migration tended to deteriorate the economy in the sending location (Lucas, 2005). Out-migration is considered a brain drain for the sending place, and local productivity suffers from out-migration, since most out-migrants are young, physically strong, enterprising, talented, educated, skilled, and not easily replaceable (Harris, 1995; Todaro, 1997). As a result, the people remaining in sending areas are overwhelmingly women, children, and the elderly. Economic development and technological modernization slow down or even stagnate, and the sending areas become less and less attractive to investors, causing local business and production to get even worse (Davin, 1999). The consequences of migration in sending areas are considered to be an evil cycle indeed.

However, other scholars disagree with the pessimistic model and think it is less appropriate for the case of China. First of all, migration, as a "safety valve," is one of the most direct ways to solve the surplus labor problem and reduce population pressure on the land in

rural areas. Moreover, most Chinese migrants preserve strong ties with their sending areas. The circular nature of migration ensures a high level of connection and remittances sent or brought back to the sending areas. Also, modern transportation and communication ensure the flow of information between migrants and the remaining population, and help to maintain the link between them. Because of such strong ties, optimistic scholars argue that migration and follow-up remittance are beneficial for sending areas (Harris & Todaro, 1970; Rozelle, Taylor, and de Brauw, 1999; Taylor, Rozelle, and de Brauw, 2003). Remittance income can raise local living standards if it is used for household consumption. Remittance can also increase value-added production and incomes, stimulate local productivity, and create local employment, if spent to purchase additional factor inputs or to rent substitute labor for production activities. In addition, out-migration can accelerate lifestyle and attitudinal changes in the place of origin. In other words, circular migration with strong social ties has generated not only remittance flow but also progressive attitudes and modern technological skills, which are essential to the processes of urbanization and industrialization in sending areas (Chan, 2001).

Migration scholars are also interested in the consequences of migration in the place of destination. Some scholars believe in-migration in urban areas is beneficial to urban development. Cai (1997) noted that in-migration solved the problem of labor shortage and stimulated economic development in urban areas. This "reserve army of labor" is also cheap, flexible, and capable. They are willing to take low-skill, low-wage, "dirty" jobs that local urban residents are not willing to take. Those jobs often require working overtime or under dangerous working conditions. Zhao (1995) estimated that the full cost of hiring a migrant worker was only about one-fourth of the cost of hiring a local worker. Furthermore, Xu (1997) noted that in-migration also created new consumption demand and new capital investment in the receiving

place—that is, increased demand for food, clothing, housing, schooling, and public facilities due to in-migration stimulated further capital investment and economic development.

As stated above, it is clear that internal migration in China is intimately linked with economic development in both sending areas and receiving areas. Thus, it can also have some effect on rural-urban inequality. The relationship between migration and inequality is of the "chicken or egg" type. On the one hand, rural-urban inequalities may contribute to rural-urban migration in China. Back in Mao's era, the greatest advantage of urban life was access to subsidized food (Davin, 1999). Urban employees, almost all of whom were employed in state-owned enterprises and government, were guaranteed lifetime employment (the "iron bowl") with associated benefits such as health care, pensions, and subsidized housing. On the other hand, rural life was full of risk and uncertainty. Peasant life was highly dependent on the success of crops. In rural areas, social security and health care were both locally financed. The rural household was the most important provider of welfare and security, and was financially responsible for the care of children, the elderly, and sick or disabled family members. In short, rural families bore all the costs themselves (Davin, 1994).

Since the market reforms in the late 1970s, the income gap between rural and urban areas has been widening, which is considered to be a driving force for the surge of rural-urban migration (Li, 1998). The rural-urban income gap grew from 1:1.71 in 1984 to 1:2.55 in 1994. From 1992 to 1993, the growth rate of urban income was 12%, while it was only 2% for rural residents. Because of this widening income disparity, it is conceivable that many villagers migrated to cities in seek of a better life.

In addition to the widening rural-urban income gap, urban residents have continued to have advantages in many aspects of life, such as welfare, health care, education, and pensions.

For example, urban residents have access to higher-quality schools and medical services for which they pay less than rural residents. Retired workers in cities can continue enjoying pension benefits (Davis-Friedmann, 1991). Almost all urban households have electricity and running water at low cost. Central heating is common the northern China, and washing machines, flush toilets, refrigerators and color television sets are also common in average urban households. In the rural areas, decollectivization along with the implementation of the household responsibility system severely weakened the already very limited social services and welfare. Most peasants now have to pay for their own medical care, and must rely almost completely on their families in old age. The quality of life in the countryside is also not comparable to that in the cities. Most rural households do not have running water systems, so their water has to be fetched from outside; their fuel has to be gathered, and human waste is used as fertilizer. Also, in contrast to urban life, rural life offers little amusement. Thus, because of the sharp contrast between rural and urban life and the rising costs of living in rural areas, villagers tend to migrate to cities for better income to support their families and seek better lives, even though they may not be able to become permanent urban residents. Rural-urban disparities clearly affect rural residents' decisions about migration.

On the other hand, migration has been considered an important mechanism affecting inequality between sending areas and receiving areas. In his famous laws of migration, Ravenstein (1889) contended that people migrate to better themselves economically. "Migration is considered as an individual response to regional differences in economic development" (Fan, 2005: 296). Neoclassical theorists also view migration as an outcome of regional differences in labor demand and supply and of individuals' rational calculation of costs and benefits (Sjaastad, 1962). They argue that migration is an equilibrating factor, so that labor migration from low- to

high-wage areas will eventually optimize the distribution of human resources and capital among regions and even out regional wage inequalities (Borts & Stein, 1964). However, scholars adopting structural approaches contend that migration from peripheral (less-developed) areas to core (more-developed) areas may accelerate polarization and income inequalities between areas (Myrdal, 1957; Hirschman, 1958).

In the case of China, most scholars (e.g., D. Gale Johnson, 2002) adopted the views expressed in neoclassical theories and believed that transfer of labor out of the countryside was essential to reduce income disparity between farm and nonfarm people (Lin, Wang, and Zhao, 2004). Nevertheless, some scholars (e.g., Davin, 1999) note that migration in some cases may reinforce and even increase existing inequalities. For instance, migrants from better-off families or better-off rural areas can get access to more resources and information, which in turn indicates that they can afford the expense of getting to the most-developed cities, where they can earn higher wages; and their remittances are more likely to be spent on investment instead of consumption. In short, the benefits generated from migration tend to benefit those who already have a better foundation.

Shifting from economic planning to increased utilization of market mechanisms is the goal of the Chinese economic reform. The working of a market economy is greatly aided by labor migration. Restricting migration creates serious economic losses. Thanks to economic reforms, old restrictions are no longer effective in tying rural people to the land and to rural areas. As a result, despite government restrictions, a large number of rural people have been able to migrate to cities. However, due to the continued policy of restricting migration, the lives of these migrants are made much more difficult than they would ordinarily be. If there is no significant change in *hukou* system in the near future, it is likely that migrants will never obtain

the same social status as urban *hukou* holders, and the current clear segregation between local residents and migrants will persist, with serious social consequences (Zhao, 2000).

Though most existing literature documents the rise of inequality in China in the 1980s and 1990s, there is no consensus on the relationship between migration and regional inequality from empirical studies on China. China has transformed from a society with relatively egalitarian distribution of economic resources[4] to one with moderate inequality.[5] It has been established, using micro data, that rural-urban disparities accounted for 50% of inequality in 1995, and explained 75% of the increase between 1984 and 1995 (World Bank, 1997). Using population census data, Lin, Wang, and Zhao (2004) examined changes in regional income disparity between 1990 and 2000 and population migration in the same period. Instead of using per capita GDP, they used per capita incomes derived from household surveys.[6] Their study advocated the importance of labor migration as a way of alleviating income disparity between rural and urban areas, but it has not been sufficient to reduce regional income inequality. Following the new economics of migration theory, de Brauw, Taylor, and Rozelle (2003) argued that labor migration has a negative effect on household income in source areas. On the other hand, remittances sent home by migrants partially compensate for this lost-labor effect. Overall, they find that migration at the household level increases household per capita income for those left behind.

Whalley and Zhang (2004) studied the effect of *hukou* system on income inequality and labor migration in China. Intuitively, their numerical results suggested a significant role for

[4] Rawski (1982) found that pre-reform income distribution in China was far from egalitarian.
[5] Some existing literature has attempted to explain rising regional inequality through uneven development opportunities, such as globalization (Wei & Wu, 2002), fiscal decentralization (Kanbur & Zhang, 2001), industrialization, and market integration (Park, 2002).
[6] Rawski (2001) argued that GDP statistics in China are problematic.

hukou system in preventing movement toward a more equal distribution of income in China. Based on the 2002 China Regional Input-Output Table, Xu and Li (2006) constructed a recursive dynamic computable general equilibrium model; their simulation results showed that labor migration had little effect on regional disparity of per capita GDP. However, they found that labor migration decreased the regional disparity of per capita consumption. Their result is different from that of many empirical studies of China's labor migration, most of which argue that regional migration contributes much to the convergence of regional income disparity.

Following a recursive computable general equilibrium model as well, Zhai, Hertel, and Wang's (2003) simulation results showed that reforms in *hukou* system would dramatically reduce urban-rural income disparity. Yao, Zhang, and Feng (2005) argued that labor migration could only be regarded as a short-run solution to reduce spatial income inequality. Moreover, it might even induce further inequality and other undesirable consequences to both coastal and inland areas. They further suggested that the long-run solution to regional inequality and development should be encouragement of industrialization of the central and western zones. Hu (2002) developed a spatial agglomeration model to explain the increasing regional disparity in China and showed that increasing rural-to-urban labor mobility may be one of the reasons for the enlarging income disparity between coastal and inland areas.

Using interprovincial migration data from 1990 and 2000 population censuses, Fan (2005) examined the relationship between migration and regional development and showed that this relationship has been bidirectional and become stronger over time. The reasons for the bidirectional relationship are as follows. On the one hand, economic reforms have widened regional disparity. Economic growth, job opportunities, and higher wages in more-developed areas exert a strong pull to migrants from poorer areas. On the other hand, cheap labor from poor

areas facilitates industrialization in more-developed areas, further accelerating their economic growth. Candelaria, Daly, and Hale (2010) studied the persistent inequality of China and found that migration was driven by wage differentials, but, contrary to the findings of Whalley and Zhang (2004), migration did not reduce wage inequality across provinces. They argued that it was restrictions on labor migration during the period they studied that prevented migration from having a noticeable equilibrating effect on wage differentials across provinces. Cai, Park, and Zhao (2006) documented a significant increase in the urban-rural gap since the mid-1980s. The reasons, they argued, lay in the cost of migration, policy barriers to migration (e.g., *hukou* system), and productivity differentials between rural and urban workers. Moreover, they also provided an explanation based on the sources of statistics regarding rural-urban per capita income. In a framework of convergence in the neoclassical theory of growth, Cai, Du, and Wang (2002) investigated the impact of labor migration on regional disparity and economic growth. They found that labor migration distortion negatively impacted the regional growth rate in terms of per capita GDP. They further argued that relaxation of restrictions on labor migration would increase growth in the central and western regions and help to narrow interregional inequality.

Most empirical studies about migration in China are more or less plagued by misinterpretation and problems in the key data (Liu & Chan, 2001). Migration by nature is hard to measure, and the underling concepts China uses to define migration are quite different from those commonly used in other countries (Chan, 2012). The analysis of Chinese migration is further complicated by particular institutional arrangements and systems of population and migration management, and of statistical reporting (Chan, 2007). It is difficult to keep consistent yearly migration data. Chan, Liu, and Yang (1999) used China's 1990 census 1% microdata to

compare *hukou* and non-*hukou* migrations. They found that these two types of migrants shared some general demographic characteristics, but displayed substantial socioeconomic differences.

Some United Nations (1999) researchers once called the Chinese "floating population," the largest group of internal migrants in China, "statistically invisible." Roberts (2002) found it hard to detect these "invisible residents" in Chinese data. For example, even though Shanghai is one of China's major destinations for migrants, there is only one obscure single column reporting the number of migrants (*wailai renkou*) under the Population and Labor Section in the *Shanghai Statistical Yearbook 2006*. Such problems have limited researchers' ability to analyze not only China's migration but also its urbanization and the relationship between labor migration and regional inequality.

4.0 DATA AND VARIABLES

4.1 DATA SOURCES

In this section, I describe my data sources for migration, inequality, and control variables. For this dissertation, I collected migration data from eighteen volumes of the *China National Population Statistics by County* (*Zhonghua Renmin Gongheguo quan guo fen xian shi ren kou tong ji zi liao*), compiled and published by the Ministry of Public Security of China (MPS), for thirty-one province-level administrative units across China for the years 1992 through 2008, covering a period of fast economic growth in China. I restricted my attention to after 1992, because 1992 is the first year in which migration data were available in this data book series. Also, I am interested in changes in migration and inequality during the transition process. Deng Xiaoping's famous southern tour took place in 1992, marking the reinvigoration and intensification of market-oriented reforms and the opening up of economic policies. As a result, internal labor migration resumed its rising trend, and by 1995 migration flows had exceeded 11 million per year (Li, 2004). The thirty-one province-level administrative units, hereafter referred to as provinces, include twenty-two provinces, five minority autonomous regions, and four municipalities directly under the jurisdiction of the central government. I exclude the migration numbers for Hong Kong, Macau, and abroad from my analysis. For the data analysis in this chapter, I will use the volumes of interprovincial in-migration, interprovincial out-migration, and

intraprovincial in-migration and intraprovincial out-migration by urban (*shi*) and rural (*xian*) areas of each province. A major advantage of the migration data provided by the MPS is that they are yearly provincial data with national coverage, while most data used in previous Chinese migration research are either surveys taken from samples of one or several provinces (or counties) or population censuses taken every ten years (Zhao, 2005). Compared with the migration data from decennial censuses, yearly migration data from the MPS better captures temporary, seasonal, and return migration within each ten-year time interval. Moreover, the MPS data provide not only province-level aggregate migration information but also migration information for urban and rural subareas within each province, which is especially useful for studying the effect of migration on regional inequality, controlling for the type of migration sending or receiving places (e.g., interprovincial in-migration to urban areas of Zhejiang Province). A major drawback of the MPS migration data is that they do not include unregistered migration—migration without changing *hukou* status and migration without obtaining temporary registration cards in receiving places—so they must underestimate *de facto* or actual moves, and are more likely to reflect the *de jure* or permanent moves with *hukou* status changed.

Data on provincial socioeconomic characteristics, such as gross provincial production (or provincial GDP), population, employment, investment, and government expenditure, are mostly derived from the *Compilation of Statistics on the 60 Years of New China (Xin Zhongguo 60 nian tong ji zi liao hui bian*), published by the National Bureau of Statistics of China (NBS) in 2009. To calculate the initial level of human capital (i.e., initial mean years of schooling of working population), ideally I would need the composition of working population by highest level of educational attainment and by province in 1992, which had not become available in yearbooks until 1997 when *China Statistical Yearbook*, *China Labor Statistical Yearbook*, and *China*

Population Statistical Yearbook started to publish such information on a yearly basis. Therefore, I use the 1990 census data to calculate the initial level of human capital and the source is the 1993 volume of the *China Statistical Yearbook*.

In the case of missing values for certain provinces or certain years, I use the *Compilation of Statistics on the 55 Years of New China* (an earlier edition of the *Compilation of Statistics on the 60 Years of New China*) and the *China National Population Statistics by County* as supplement data sources to fill in those missing values.

In 1997, Chongqing, which used to be a city in Sichuan Province, was raised to the status of provincial-level municipality directly under the jurisdiction of the central government, resulting in the creation of a new province and also affecting all the statistics for Sichuan and Chongqing. Most of the existing studies deal with this issue by either combining the statistics of the two provinces and continuing to treat Chongqing as part of Sichuan after 1997 (e.g., Fan, 2005; Lin, Wang, and Zhao, 2004) or completely eliminating the statistics of both from the datasets. In order to preserve most of the information, I take a different approach, by first interpolating Chongqing's statistics for the period 1992–1997 and then adjusting Sichuan's statistics by removing Chongqing's portion for the same period. With the separation of Chongqing and Sichuan into two provinces, I have a dataset with a total of thirty-one provinces for the entire study period.

4.2 VARIABLES

As for the measurements of regional economic inequality, previous empirical studies fail to distinguish between regional convergence or divergence through the production growth channel

and the income redistribution channel (or national dynamic channel), which often leads to different or even contradictory conclusions and policy suggestions (Yang, 2004). The redistribution channel works in two ways, as neoclassical migration models predict. On the one hand, migrants send remittances back to their original households, and these remittances can be used to finance consumption. As a result of direct and contemporaneous income rise in sending places, the income gaps between sending and receiving places decreased (Phan, 2008). On the other hand, neoclassical theorists have long argued that migration is an outcome of regional differences in labor demand and supply. Labor migration from low- to high-wage regions will eventually optimize the distribution of human resources and capital among regions and even out regional income inequalities (Borts & Stein, 1964).

The growth channel is relatively more indirect and more complicated than the income channel. The neoclassical growth model predicts a convergent growth trend among regions in the long run due to the diminishing returns to capital—poorer regions tend to grow faster than richer regions, catching up to those richer regions (Cai, Wang, and Du, 2002; Mankiw, Romer, and Weil, 1992). Against this background, migration is viewed as an equilibrating factor in terms of facilitating capital reallocation, narrowing labor productivity differentials, and reducing the spatial economic gap. Meanwhile, migration may also act as an indirect converging mechanism, because remittances may be used for productive investment in addition to consumption, which speeds up the growth of sending regions and improves their levels of economic development, and hence reducing regional economic inequality (Phan, 2008).

In chapter 7, I will examine whether migration helps reduce spatial inequality in China through both the local growth channel and national dynamic channel. For the local growth channel, the goal is to test whether migration has any statistically significant impact on the speed

of convergence in production, so **the first dependent variable** is annual growth rate of per capita GDP in province *i* in year *t*. Because real GDP instead of nominal GDP is more economically meaningful, I used official nominal GDP and official GDP deflator (i.e., official annual growth rates of real GDP) to compute real per capita GDP and its growth rate for my analysis. Per capita GDP in current prices was converted into that in 2000 constant prices. For the national dynamic channel, I will test whether migration affect overall national inequality as a result of redistribution of capital and resources, so **the second dependent variable** is contribution share of province *i* in year *t* to national Theil Index. The formula is

$$T = W_1(\log W_1 - \log N_1) + W_2(\log W_2 - \log N_2) + ... + W_m(\log W_m - \log N_m)$$

where W_m is income share of province *m*; N_m is population share of province *m*;

$T_m = W_m(\log W_m - \log N_m)$, which is the contribution share of province *m* to the national Theil Index.

The **independent variables** are various province-level migration rates, which I illustrate below. Intraprovincial migration rate of province *i* in year *t*, indicating migration volumes within a province, is computed by dividing intraprovincial in-migration by the total population of the province. Intraprovincial in-migration and intraprovincial out-migration of the same province should be identical, theoretically, but are slightly different in real data. I use the in-migration numbers because, similar to trade data, migration receiving places are more likely to record migrant numbers accurately than are sending places. Interprovincial net migration rate of province *i* in year *t* is the difference of interprovincial in-migration and out-migration of a province, divided by the total population of the province. This measure shows the net effect of in-migration and out-migration on a province's population. A positive value represents more

people entering the province than leaving it, while a negative value means more people leaving than entering.

As indicated by the previous research, the patterns and trends of migration and its subsequent social and economic impacts differ between urban and rural areas. Therefore, in addition to the aggregate province-level migration variables, I also created migration variables for urban and rural areas, respectively, within a province. This is especially useful for studying human migration with both intra/interprovincial dimensions and urban/rural dimensions. Urban intraprovincial in-migration rate of province *i* in year *t*, indicating moves to urban areas within a province, is computed by dividing intraprovincial in-migration of urban areas by the urban population of the receiving province. Urban intraprovincial out-migration rate of province *i* in year *t*, indicating moves from urban areas within a province, is computed by dividing intraprovincial out-migration of urban areas by the urban population of the sending province. Rural intraprovincial in-migration rate of province *i* in year *t*, indicating moves to rural areas within a province, is computed by dividing intraprovincial in-migration of rural areas by the rural population of the receiving province. Rural intraprovincial out-migration rate of province *i* in year *t*, indicating moves out of rural areas within a province, is computed by dividing intraprovincial out-migration of rural areas by the rural population of the sending province. Urban interprovincial in-migration rate of province *i* in year *t*, indicating moves from all other provinces to urban areas of a province, is computed by dividing interprovincial in-migration of urban areas by the urban population of the receiving province. Urban interprovincial out-migration rate of province *i* in year *t*, indicating moves from urban areas of a province to all other provinces, is computed by dividing interprovincial out-migration of urban areas by the urban population of the sending province. Rural interprovincial in-migration rate of province *i* in

year *t*, indicating moves from all other provinces to rural areas of a province, is computed by dividing interprovincial in-migration of rural areas by the rural population of the receiving province. Rural interprovincial out-migration rate of province *i* in year *t*, indicating moves from rural areas of a province to all other provinces, is computed by dividing interprovincial out-migration of rural areas by the rural population of the sending province. Migration variables are log-transformed to reduce skewness and kurtosis, which will be discussed in the descriptive section of this chapter.

In order to choose appropriate control variables that capture the "fundamentals" of the economy and incorporate China's institutional characteristics, and which therefore should be included in convergence regressions, there are three basic criteria to follow: 1) the variables must be widely used in the existing literature; 2) they have to be exogenous, or the potential endogeneity bias must be avoided; and 3) they must be robust and consistently statistically significant in the literature (Phan, 2008). Numerous variables have been found to determine the long-run GDP growth rate or the differences in steady states (Cai et a., 2002; Sala-i-Martin, 1996). Out of these variables, I chose the following province-specific **control variables**, in line with the literature (e.g., Cai et al., 2002; Candelaria et al., 2010; Phan, 2008; Sala-i-Martin, 1997).

An important variable in analyzing the economic growth path of areas toward their steady states is initial per capita GDP, which is measured as per capita GDP of province *i* in 1992, as the starting year for this study is 1992. Under the assumption that economies with lower initial economic development levels tend to grow at faster rates than economies with higher initial economic development levels, due to the diminishing returns to capital per worker, we expect initial per capita GDP to be negatively correlated with subsequent GDP growth rate (Cai et al.,

2002). In the long run, poorer economies will catch up, and all economies should converge economically as they approach their steady states. This is known as β-convergence in the neoclassical growth model (see Barro & Sala-i-Martin, 2004). Unconditional or absolute β-convergence means that poorer economies catch up with the richer ones even if the differences in the determinants of their steady states are not controlled in the convergence regression. These differences include investment rate, initial human capital level, population growth rate, productivity level, and technological growth rate. Conditional β-convergence regression models control for these differences (Phan, 2008).

Initial mean years of schooling of working population of province *i*, in 1990, is used as a proxy of the initial level of human capital or labor quality. Cai, Wang, and Du (2002) noted that human capital, commonly measured by primary-school enrollment rate, secondary-school enrollment rate, or mean years of school, is considered a main determinant of differences in steady-state GDP across provinces. Primary- and secondary-school enrollment rates in China might generate distorted statistics in some provinces due to the suspension of birth control among ethnic minority groups, I choose to measure the initial level of human capital by mean years of schooling of working population. My calculation of mean years of schooling follows the most commonly used approach (see Barro & Lee, 1993, 2010). The formula is shown below.

$$MYS = \sum_{a} \sum_{l} HS_{al} \times YS_{al}$$

where *MYS* is mean years of schooling; HS_{al} is proportion of the population in age group *a* for which the level of education *l* is the highest level attained; YS_{al} is official duration of the level of education *l* for age group *a* at the time when this age group was in school. The group in my study is the working population and the highest educational levels they attained (and the durations)

include illiterate or semi-illiterate (0 year), primary school (6 years), junior secondary school (9 years), senior secondary school (12 years), and college or higher level (16 years).

Employment rate of province *i* in year *t* is the share of employed persons in the total population of a province (i.e., employment-to-population ratio), which is assumed to be an indicator of labor market conditions and a key component of economic growth (Cai et al., 2002).

Comparative labor productivity of province *i* in year *t* is defined as the ratio of labor productivity of the agricultural sector to labor productivity of the industrial sector, indicating the allocative efficiency of labor among sectors. Since agriculture is mainly concentrated in rural areas while industry is mostly located in urban areas, it is necessary to include comparative labor productivity in the regression equations. This is computed by dividing the agricultural value added (i.e., the primary industry GDP) by the agricultural labor forces to obtain the labor productivity of agriculture, and dividing the industrial value added (i.e., the secondary industry GDP) by the industrial labor forces to get the labor productivity of industry, and then computing their ratio. If the factor markets are perfect, movement of capital and labor between sectors will lead to equal value of marginal product for all factors, and the comparative productivity of agricultural labor will eventually equal 100%. On the other hand, if there are barriers to factor mobility (e.g., institutional or policy barriers) that hinder the mobility of capital and labor from the low-productivity agricultural sector to the high-productivity industrial sector, the comparative productivity of agricultural labor will be less than 100% (Cai et al., 2002).

Investment rate of province *i* in year *t* is the proportion of total capital formation (i.e., total investment in fixed assets) in the provincial GDP. The higher the investment rate, the higher the expected economic growth rate. Cat et al. (2002) noted that the investment rate was highest

in the western region between 1978 and 1989, while it was highest in the eastern region between 1990 and 1998.

Government expenditure share of province *i* in year *t* is the ratio of local governments' consumption expenditure to the provincial GDP. In general, the Chinese government expenditure level is highest in the western region and lowest in the eastern region of the country. A common assumption is that government intervention should have a negative effect on GDP growth (Barro, 1998; Cai et al., 2002).

Last but not least, I will introduce a time period dummy variable, which takes the value 0 before the year 2000 and 1 in 2000 and later, and a series of migration x time period interaction terms (i.e., multiplying migration variables by time period) to test whether the effects of migration-independent variables on per capita GDP growth rate differ over time.

5.0 ANALYTIC METHODS

5.1 RECIPROCAL CAUSALITY AND LAGGED INDEPENDENT VARIABLES

As discussed in the literature review section, the relationship between labor migration and regional economic inequality is of the "chicken or egg" variety (Richardson, 1978: 108–109; Fan, 2005). Similarly, the link between migration and regional economic growth rate may also be reciprocal. Labor migration induced by uneven regional development speed and spatial economic inequality could further affect economic growth rate and regional disparity. Thus, if I use a cross-sectional instead of a longitudinal dataset, I may not know the true causal direction between these interdependent variables, because it is possible that economic growth rate predicts migration rather than the other way around. In order to deal with this dual causality issue, one thing I can do is to determine the temporal order among the independent migration variables. To determine if the values of an independent variable predict the values of a dependent variable, the independent variable must be measured before the dependent variable (Inglehart & Welzel, 2005; Kubichek, 2011). In my study, I should run statistical models with lagged values of migration to test whether changes in migration predict changes in GDP growth rate. In practice, I will take one-year lags of the independent migration variables in the regression equations and test how the lagged migration values affect the current growth rate values.

Additionally, there may be a spurious relationship between migration and GDP growth rate; that is, there may be other factors that cause both the variation in migration and the variation in growth rate. For instance, places with higher initial levels of economic development attract more incoming migrants but have relatively lower economic growth rates. In this case, it is the level of economic development in the starting year that impacts both in-migration flows and growth rates in the following years. Once one introduces the initial level of economic development (e.g., initial GDP per capita) into the model, the relationship between migration and growth rate might be weaker or even disappear, and thus their relationship could be spurious. Another possible causal relationship to consider is a chain relationship (Agresti & Finlay, 1997; Kubichek, 2011). For example, in-migration rates might affect levels of employment rates in the destination places, which in turn might affect local economic growth rates. In this case, employment rate might be an intervening variable, and the relationship between migration and growth rate might be weaker or even disappear once the level of employment rate is controlled. For both spurious and chain relationships, it is important to consider the temporal order of the main explanatory variables as described earlier, and which control variables theory and previous research would suggest including (Kubichek, 2011).

5.2 OLS, FIXED EFFECTS, AND RANDOM EFFECTS

Although ordinary least squares (OLS) regression is a widely used statistical method in social science research, it does have a few drawbacks regarding modeling longitudinal data. Some of the regular assumptions of OLS cannot be satisfied when applied to longitudinal data analysis. The first assumption of OLS is that error terms, with a mean of zero, are independent for all

entities and all times. Second, both error terms and the variability in error terms are uncorrelated with any of the independent variables. Third, the variance of the error terms remains constant across time or across entities—that is, the error residuals are homoskedastic.

The inherent structure of longitudinal data violates all of the above assumptions. First, it is likely that the error terms of different time periods for the same entity are correlated. For instance, the error term for the growth rate of per capita GDP of Beijing in 1998 is likely to be related to the error term for the growth rate of per capita GDP of Beijing in 1999. Second, the residuals for longitudinal data may be heteroskedastic. For example, the variance in error terms may be larger in the 2000s than in the 1990s due to economic fluctuations, policy interventions, etc. Third, error terms may be correlated with some of the independent variables due to the unobserved, time-invariant characteristics associated with individual entities. For instance, it is possible that provinces with better weather conditions will attract more in-migrants than provinces with worse weather conditions. Since not all affecting variables such as weather conditions will be included in the regressions, these unmeasured or omitted time-invariant characteristics are treated as part of the error terms. If one uses OLS regression (also called pooled OLS regression for longitudinal data) for longitudinal data that does not satisfy the above assumptions, the standard errors of the regression coefficients might be increased and the results might be biased. A solution is to adopt either fixed- or random-effects models that allow for the heteroskedasticity of longitudinal data without introducing bias. Moreover, fixed-effects models allow for correlations between time-invariant, unit-specific errors and independent variables as well.

Compared with classic OLS, fixed-effects models have a few advantages. Fixed-effects models allow one to control for time-invariant, unit-specific characteristics (e.g., unique features

of an individual nation, region, province, or district) for longitudinal datasets. These unique features can include a wide range of characteristics that one cannot directly measure, such as geographical attributes, cultural norms, weather conditions, or historical attributes of individual units. Fixed-effects regressions aggregate data from all time periods to estimate "average" coefficients that explain how the dependent variable changes with the independent variables over time. In fixed-effects models, an error term includes two parts: the time-invariant, unmeasured heterogeneity unique to each entity, and the idiosyncratic error for a random distribution.

For my analysis in this chapter, the advantage of the fixed-effects model over OLS is that it allows me to estimate the effects of migration on GDP growth rate while controlling for unobserved province-specific characteristics. In the fixed-effects model, each province acts as its own control. In other words, fixed-effects regression essentially "differences out" time-invariant, between-province variation in migration variables. The between-province variation in migration variables may be confounded by unobserved features of each individual province, such as weather conditions or geographic attributes affecting the variations in migration and in GDP growth rate. Differencing out these unobserved characteristics allows me to more accurately estimate the true relationship between the independent and dependent variables and to generate unbiased estimators.

In the meantime, I have to admit that there are several drawbacks of the fixed-effects model for my research. Since the fixed-effects model differences out all time-invariant, entity-specific characteristics, I cannot directly estimate the effects of observable time-invariant variables on the dependent variable. For example, the fixed-effects model cannot be used to test unconditional or absolute β-convergence regression—that is, to estimate the impact of initial provincial per capita GDP on provincial annual growth rate. To solve this problem, I will use

OLS to test the β-convergence hypothesis and utilize both OLS and fixed-effect methods for all other equations to see whether the two methods generate statistically significantly different results. Similarly, I cannot estimate the effect of the time period dummy (the 1990s versus the 2000s) on the GDP growth rate using the fixed-effects model. What I can do is include interaction terms of independent migration variables and the time period dichotomous variable, such as "urban interprovincial in-migration × time period dummy."

Another drawback of the fixed-effects model is that it usually produces larger p-values and standard errors than the random-effects model does. This is because the fixed-effects model uses only information on within-unit variation and discards information on between-unit variation. Therefore, if there is a lot of between-province variation in migration variables but not much within-province change over time, the fixed-effects coefficients are not likely to be statistically significant, though they are unbiased. To determine whether the less restrictive fixed-effects method is preferred over the random-effects method, I will use the Hausman (1978) test of the null hypothesis that the random effects coefficients are identical to the fixed-effects coefficients (Allison, 2009). This basically tests whether unique errors are correlated with repressors; the null hypothesis is that they are not. If the null hypothesis is rejected, it suggests some evidence in favor of the fixed-effects model and against the random-effects model.

5.3 INTERACTIONS WITH TIME AND STRUCTURAL EQUATIONS IN THE FIXED-EFFECTS METHOD

It is important to account for the differences among the three geographic (and economic) regions of China—east, central, and west, also called the "three economic belts"—conceptualized in

China's seventh Five-Year Plan (1985–1990). Each region has its own economic specialization and comparative advantage (Fan, 2005), and a large part of the changes in the spatial disparity in economic development in China can be attributed to the divergence between regions and the convergence within regions (Cai et al., 2002; Lin, Cai, and Li, 1997). For instance, during the early 2000s, per capita GDP for the eastern region was almost two times that of the central region and more than two times that of the western region; the gap between the central and western regions has also increased, but to a smaller degree (Fan, 2005).

Therefore, I extend the baseline models to allow the coefficients for predictor variables to vary across regions and over time. A simple method is to include several interaction terms among the explanatory variables of interest in a single equation model. An interaction term is sometimes called a slope dummy variable. It is simply the multiplication of a dummy variable by a continuous (or ordinal) explanatory variable, which can be included as an additional explanatory variable in the regression model. The interaction term allows one to test for differences in the slope between different categories, as defined by the dummy variable (Castilla, 2007). The slope of the relationship between dependent variable and independent variable could be different depending on whether the conditions specified by the multiplying dummies are met. For example, the effect of migration on spatial inequality may vary across regions and/or across time. This is in contrast to an intercept dummy variable, which changes the intercept but does not change the slope for different categories, as defined by the dummy variable. Now, suppose I am interested in estimating the following simple regression model, in which the dependent variable is *Growth* and there is only one explanatory variable of interest, *Migration*. For purposes of illustration, here I exclude all control variables that would unnecessarily complicate the discussion.

$$Growth_{it} = \beta_0 + \beta_1 Migration_{it} + \varepsilon_{it}$$

In addition, a possible regression model taking into account the variation of the effect of migration on growth across the two time periods is this:

$$Growth_{it} = \beta_0 + \beta_1 Migration_{it} + \beta_2 Migration \times Time + \varepsilon_{it}$$

where an interaction term or slope dummy variable has been computed and included in the model as a new independent variable. *Migration* × *Time* equals explanatory variable *Migration* multiplied by dummy variable *Time* (0 for the time period 1992–1999, and 1 for the time period 2000–2008). A t-test for β_2 helps to determine whether the difference in β_1 slopes between time period 1990s and time period 2000s is significant.

Alternatively, the model could test whether the effect of migration on growth differs between regions. Then the regression equation is this:

$$Growth_{it} = \beta_0 + \beta_1 Migration_{it} + \beta_2 Migration \times East + \beta_3 Migration \times West + \varepsilon_{it}$$

where the central region is the reference group and has been dropped from the model.

The model could get more complicated if one would like to test whether region-migration interaction effects change over time, or whether time-migration interaction effects change across regions. To test such hypotheses, one could include three-way interaction terms such as *Migration* × *East* × *Time*, which is the product of the variables *Migration*, *Time Period Dummy*, and *East Region Dummy*. The magnitude and significance of the coefficients of those three-way interaction terms would test for differences in the effects of migration variables on GDP growth rate across regions, as well as across time periods in the longitudinal regression model. The interpretation in practice of three-way interactions is more complicated than that of two-way interactions. For instance, the interaction term *Migration* × *East* × *Time* indicates whether the regional difference (between the eastern region and the reference region) in the effect of

migration on spatial inequality varies across time periods, or whether the time difference in the effect of migration on spatial inequality varies across regions.

Since there are more than one main explanatory variable in most of my regression models (e.g., urban intraprovincial in-migration, rural intraprovincial in-migration, urban intraprovincial out-migration, and rural intraprovincial out-migration in one equation), incorporating interaction terms for multiple independent variables timing three regions as well as two time periods would make the statistical results very complicated to interpret. In this case, structural equations modeling (SEM) or simultaneous equations modeling (sometimes also called path analysis) are recommended. The main advantage of SEM for longitudinal analysis is to allow model coefficients to vary across panels (or groups of panels) and/or over time in a deterministic manner (Castilla, 2007). To build a system of structural equations for the analysis in this chapter, I can specify a causal model and estimate such a model simultaneously either for different regions or for different time periods. Since the dominant component of this chapter is temporal, and fewer interaction terms lead to more degrees of freedom, I will adopt a region-wise SEM instead of a period-wise one, as specified in the following section.

5.4 MODEL SPECIFICATION

For the analysis of longitudinal data in this chapter, like most convergence researchers, I will first test the standard unconditional or absolute convergence regression—whether initial GDP level plays a role in determining subsequent growth rates. Next, I will investigate conditional convergence by first adding control variables to the equation and then adding the main migration explanatory variables. I will estimate the models in such a way that previous models are nested

within subsequent models. This will allow me to test different hypotheses and use the F-statistics to determine whether a subsequent model is statistically significantly different or better than its previous model. Also, I will implement both pooled OLS and fixed effects and check to see whether the latter is superior to the former for longitudinal data modeling, as predicted theoretically. Moreover, I will run a Hausman test to decide between fixed or random effects. If the null hypothesis—that the preferred model is random effects versus the alternative fixed effects—is rejected, I will adopt the less-restrictive fixed-effects method for subsequent SEM equations.

The last step is to estimate the SEM for three geographic and economic regions—east, central, and west. Specifically, I have thirty-one provinces or cases, which are grouped into three regions (groups of cases) in the sample whose dominant component is temporal. The system of equations can be specified as follows:

$$Y_{i,t}^{E} = \beta_0^{E} + \beta_1^{E} \ln M_{i,t-1}^{E} + \beta_2^{E} E_{i,t}^{E} + \beta_3^{E} P_{i,t}^{E} + \beta_4^{E} I_{i,t}^{E} + \beta_5^{E} G_{i,t}^{E} + \ln M_{i,t-1}^{E} * T_i^{E} + \varepsilon_{i,t}^{E}$$
$$Y_{i,t}^{C} = \beta_0^{C} + \beta_1^{C} \ln M_{i,t-1}^{C} + \beta_2^{C} E_{i,t}^{C} + \beta_3^{C} P_{i,t}^{C} + \beta_4^{C} I_{i,t}^{C} + \beta_5^{C} G_{i,t}^{C} + \ln M_{i,t-1}^{C} * T_i^{C} + \varepsilon_{i,t}^{C}$$
$$Y_{i,t}^{W} = \beta_0^{W} + \beta_1^{W} \ln M_{i,t-1}^{W} + \beta_2^{W} E_{i,t}^{W} + \beta_3^{W} P_{i,t}^{W} + \beta_4^{W} I_{i,t}^{W} + \beta_5^{W} G_{i,t}^{W} + \ln M_{i,t-1}^{W} * T_i^{W} + \varepsilon_{i,t}^{W}$$

where:

$Y_{i,t}$ = Annual growth rate of per capita GDP of province *i* in year *t*

$M_{i,t-1}$ = Migration rate variables of province *i* in year *t-1* (lagged)

$E_{i,t}$ = Employment rate of province *i* in year *t*

$P_{i,t}$ = Comparative productivity of agricultural labor of province *i* in year *t*

$I_{i,t}$ = Investment rate of province *i* in year *t*

$G_{i,t}$ = Government budget expenditure share of province *i* in year *t*

T_i = 0 for the time period 1992–1999, 1 for the time period 2000–2008

The first equation in the SEM is for the eastern region; the second equation is for the central region; and the last equation is for the western region. The eastern region includes the provinces of Liaoning, Beijing, Tianjin, Hebei, Shandong, Jiangsu, Shanghai, Zhejiang, Fujian, Guangdong, Guangxi, and Hainan. The central region includes Heilongjiang, Jilin, Inner Mongolia, Shanxi, Henan, Anhui, Hubei, Jiangxi, and Hunan. The western region includes Xinjiang, Qinghai, Tibet, Ningxia, Gansu, Shaanxi, Sichuan, Chongqing, Guizhou, and Yunnan. The coefficients to be estimated are hypothesized to be different for each region. The error terms of the different equations are correlated with each other. This model is referred to as the *seemingly unrelated regression equations model*, since the relationships among each of the different equations are not explicit. Rather, such relations come from the correlations that might exist among the error terms for each of the regression equations in the system. In other words, the equations in the system are related through the random errors (Castilla, 2007).

The system of equations will be estimated simultaneously or jointly, since it is efficient to do so, particularly when the error terms are significantly correlated. If the error terms of different regression equations are not significantly correlated, the simultaneous estimation of the systems of equations is still accurate, and it is exactly the same as the independent estimation of each of the regression equations using classic OLS technique (Castilla, 2007).

In this way, I can determine whether the coefficients differ across time based on the testing results of the interaction terms, and across regions based on the cross-model testing results for the SEM. Although it is possible to test whether the impact of a particular independent variable on the dependent variable is the same for all groups of units, a common type of test to perform in research using SEM is the Chow test, which helps to discover whether all regression

coefficients (including constant terms) are equal for different groups of units (Castilla, 2007). Based on the result of the significance of the χ^2 statistic, one can reject or not reject the null hypothesis that all equation coefficients do not vary across groups. If the null hypothesis is rejected, it confirms that estimating one equation for each group simultaneously is what one should do. If the null hypothesis cannot be rejected, meaning there is no difference in the coefficients across different groups of units, it probably makes more sense to estimate just one equation for all units combined. For my study in particular, I will use the Chow test to find out whether all coefficients vary across regions—in other words, whether it is necessary to use SEM for different regions instead of the pooled OLS.

Figure 5.1 Provincial-Level Administrative Units and Three Regions in China

Source: *Fan 2005.*

6.0 DESCRIPTIVE STATISTICS

6.1 SUMMARY STATISTICS OF CONTINUOUS DEPENDENT, INDEPENDENT, AND CONTROL VARIABLES

Table 6.1 reports the overall summary statistics of all continuous dependent, independent, and control variables (unlogged and logged) that I use in this study. Table 6.2 reports the summary statistics of all continuous variables (unlogged and logged) by time period and geographic region. The average per capita GDP in China across years (1992–2008) and provinces is 10551.22 RMB, with standard deviation of 10306.3 RMB. Guizhou Province has the lowest per capita GDP of all the provinces in 1992 at 1034 RMB, while Shanghai has the highest in 2008 at 73124 RMB. The distribution of per capita GDP is positively skewed with a skewness of 2.57 (greater than 0), and the Kurtosis is 11.42, which is problematic (greater than 10). After taking the natural log of the per capita GDP to normalize the distribution, the skewness dropped from 2.57 to 0.2, and the Kurtosis dropped from 11.42 to 2.7. The mean value of logged per capita GDP across years and provinces is 8.92, and the standard deviation is 0.82, which is much less than the mean. For the period 1992–1999, the average per capita GDP for the eastern region is 8232.9 RMB, more than twice that of the central region (3841.03 RMB) or the western region (3181.55 RMB). The standard deviation for the east is 5182.66 RMB, more than three times of that for the central (1503.3 RMB) or for the west (1266.37 RMB). From the 1990s to the 2000s,

the average per capita GDP increased dramatically for all three regions, but the regional disparities remained the same. The average per capita GDP and its variation for the east are still much larger compared with those of the central or the west.

The average province-wise annual growth rate of per capita GDP is 15.95%, which is consistent with what has been documented in the existing literature. For the majority of the observations, the annual growth rate of per capita GDP falls between about 8% and 24% (mean minus and plus one standard deviation). Guangxi Province has the lowest average annual per capita GDP growth rate of all provinces in 1999 at 2.25%, and Fujian has the highest average growth rate in 1994 at 46.03%. The skewness of this variable is 0.82, and the Kurtosis is 3.52; both are low, so there is no need for transformation. For the time period 1992–1999, the eastern region has the highest average growth rate at 18.79%, followed by the central region at 17.33% and the western region at 16.14%. The average economic growth rates decrease from the 1990s to the 2000s for all three regions. The decline of the average growth rate of per capita GDP in the east is the greatest among the three, indicating the convergence trend across regions over time. For the period 2000–2008, the central region has the highest average growth rate at 15.79%, followed by the west at 14.65% and the east at 14%. As indicated by the regional standard deviations, the variations in growth rates within regions drops by about half from the 1990s to the 2000s, which shows the convergence trend within geographic regions over years.

Migration-independent variables are predictably positively skewed. Some have high Kurtosis compared with 3.0 for a normal distribution, suggesting that for these variables there is a clump of cases concentrated in one part of the distribution (e.g., the rural intraprovincial out-migration rate has a Kurtosis of 25.99, and the urban interprovincial in-migration rate has a Kurtosis of 47.96). A Kurtosis greater than 10 is considered somewhat problematic, and very

serious if it is more than 20 (Acock, 2006). Hence, I normalize all the migration variables by taking their natural logs. I will estimate the log-transformed migration rates in the statistical models; this functional form is sometimes called the semi-log form, in which some but not all of the variables (dependent and independent) are expressed by their natural logs (Studenmund, 1997).

From Table 6.1, one can see that, taking all provinces and years together, the mean value of the intraprovincial migration rate (1.24%) is much higher than that of either the interprovincial in-migration rate (0.33%) or the interprovincial out-migration rate (0.27%). In other words, population movements within provinces are more active than movements between provinces. As for intraprovincial migration, the largest component is movement into urban areas (averaging 1.95%), followed by movement out of urban areas (averaging 1.49%) and movement out of rural areas (averaging 1.24%). For migration going beyond provincial borders, a large proportion is into and out of urban areas (0.67% and 0.45% on average, respectively). These findings are consistent with those in the previous migration research literature. As Zhao (2005) argues, rural-to-urban migration is the most important form of migration in China, followed by urban-to-urban and rural-to-rural migration. Empirical research has been largely concentrated on the rural-to-urban migration form, while research on other forms is still quite limited.

For the period 1992–1999, the average intraprovincial migration rate was higher in the west (1.39%) and central (1.38%) regions than in the east (1.02%). Within each region, urban in-migration was again the major component of intraprovincial migration. As for interprovincial population movement between 1992 and 1999, the eastern region had a higher average interprovincial in-migration rate (0.35%) than the western (0.22%) or central (0.21%) regions, while the average interprovincial out-migration rates were almost the same for all the three

regions. Urban interprovincial in-migration accounted for the largest proportion of overall interprovincial migration for all three regions during the 1990s. As indicated by the mean value of the interprovincial net migration rates for the 1990s, most of the eastern provinces experienced a net increase in population through migration, while the gains and the losses of population due to migration almost canceled each other out for the remainder of the country.

Comparing the migration patterns in the 2000s with those in the 1990s, one finds that intraprovincial migration decreases for both the eastern and central regions but increases for the western region, so the west still has the highest average intraprovincial migration rate (1.65%), followed by the central region (1.24%) and then the east (0.89%), for the 2000s. Urban intraprovincial in-migration was still the most important component of overall intraprovincial migration for the 2000s. Average interprovincial in- and out-migration rates increased from the 1990s to the 2000s for all regions, but the increase in the west was greater than that of the central region, so the average interprovincial in-migration rate of the west turned out to be higher than that of the central region for the 2000–2008 time period. The urban interprovincial out-migration rate was higher than the urban interprovincial in-migration rate for the central region in the 2000s, and the rural interprovincial out-migration rate was also higher than the rural interprovincial in-migration rate for the central region in the 2000s. The east still experienced positive average net migration through interprovincial migration, but the patterns of interprovincial net migration in the 2000s are different from those of the 1990s for the rest of the country; during the 2000s the central region started to lose people, while the western region began to gain them.

The mean per capita GDP in the starting year (1992) is 3205.81 RMB. However, there is quite a bit of spread about the mean, as the standard deviation is 2049.35 RMB. This means that

the initial per capita GDP is between about 1156 and 5255 RMB for 68% of the cases across provinces and time. The province with the lowest observed initial per capita GDP is Guizhou (1234 RMB), while the province with the highest is Shanghai (11061 RMB). The eastern region has the highest average initial per capita GDP at 4912.76 RMB, followed by the central region at 2296.49 RMB and then the western region at 1975.85 RMB. However, the variation of the initial GDP for the east is the greatest, too—almost five times that of the other regions, indicating that large disparities existed even among provinces within the eastern region in the early 1990s. As I mentioned in the data sources section, Deng Xiaoping made his famous southern tour of China in 1992, as a method of reasserting his economic policy and reformist platform. Prior to that, there were only a few economic (and political) centers in the eastern coastal area, such as the "Golden Triangle" region surrounding Shanghai, and most inland areas were still seriously underdeveloped. As shown in Figure 6.1, the provinces with the highest initial level of per capita GDP (e.g., Shanghai, Beijing, Tianjin, and Guangdong) are all located in the eastern region, while those with the lowest initial GDP levels (e.g., Guizhou, Gansu, and Tibet) are mostly in the western region. There is a negative but weak relationship between the initial per capita GDP and the average annual growth rate of per capita GDP between 1992 and 2008, which suggests that the standard convergence—faster growth speeds of per capita GDP for poorer economies compared with those for richer ones, leading to catch-up in levels of per capita GDP—might exist with a low chance in China. As with most income-related variables in social science research, the initial per capita GDP is very positively skewed, so I transformed it into the form of its natural log.

As a reasonable proxy for initial human capital endowment, the mean years of schooling of working population in 1990 has a mean of 6.8 years and a standard deviation of 1.44 years.

This means that the majority of observations of initial mean years of schooling of working population are between 5.36 and 8.24 years. The province with the lowest initial level of human capital is Tibet (2.44 years), while the province with the highest initial human capital is Beijing (9.87 years), followed by Shanghai and Tianjin. The eastern region has the highest initial mean years of schooling of working population at 7.68, followed by the central region at 7.09 and then the western region at 5.49. As also shown in figures 6.4—6.6, the provinces with the highest initial educational levels (e.g., Beijing, Shanghai, Tianjin, and Liaoning) are mainly located in the eastern region, while the provinces with the lowest levels (e.g., Tibet, Gansu, Qinghai, Guizhou, Ningxia, and Yunnan) are mostly located in the western region. There is a positive but weak relationship between the initial level of human capital and the average growth rate of per capita GDP between 1992 and 2008, which is in line with classical convergence theory.

The average employment rate for all the provinces and all the years is 52.81%, and the standard deviation is 6.32%, which is much lower than the mean. Xinjiang has the lowest employment rate of all provinces in 2000 at 36.36%, and Shanghai has the highest employment rate of all provinces in 2008 at 75.72%. The employment rate is highest in the eastern region and lowest in the central region for both the 1990s and the 2000s, and it increased from the 1990s to the 2000s for all regions. It is intuitive that migrant receiving places tend to have higher levels of employment and lower rates of unemployment, as a pull factor to attract incoming migrants. Also, migrant workers tend to have their jobs arranged through networking with their relatives and friends before they move, making it very unlikely for them to be unemployed in their destination places (Guest, 1998; Phan, 2008). The employment rate is not skewed in my data, so there is no need for any transformation.

The mean value of the comparative productivity of agricultural labor for all provinces and years is 18.49%, and the standard deviation is 8.2%. Guizhou has the lowest mean value (3.66%) in 2004, and Beijing has the highest mean value (54.88%) in 1992. The mean comparative productivity of agricultural labor in the country as a whole is much less than 100%, meaning that factor markets in China are imperfect and there must be institutional and policy barriers hindering the mobility of capital and labor from the low-productivity agricultural sector to the high-productivity industrial sector (Cai, Wang, and Du, 2002). The comparative productivity of agricultural labor in the western region was lower than that in the central or eastern regions for both time periods, suggesting a greater misallocation of capital and labor in the west. As noted by Cai, Wang, and Du (2002), since the beginning of the market reforms in late 1970s, the agricultural-industrial productivity gap narrowed until the mid-1990s. During the late 1990s, the rapid slowdown of township and village enterprise (TVE) growth led to a sharp decrease in agricultural out-migration, and even some reverse labor migration back into the agricultural sector. This trend is reflected in Table 6.2. The comparative productivity of agricultural labor declined from the 1990s to the 2000s for the country as a whole, with the decline being most severe in the central region (down 11.54%). The comparative productivity of agricultural labor is slightly positively skewed, but its skewness is not large enough to require a transformation.

The mean value of investment rate is 41.05%, and the standard deviation is 12.91% for the whole country. For the period 1992–1999, investment rate was highest in the east (37.68%) and lowest in the central region (29.07%). This pattern changed for the period 2000–2008, during which investment rate was highest in the west (55.88%) and lowest in the east (40.68%). In other words, the speed of investment growth was higher in the west and central regions than in

the east, which is partly due to the Western Development Program launched by the State Council in January 2000 to boost the economic development of the twelve provinces in western China. The main purpose of this policy was to help the lagging western region catch up to the eastern region. The investment rate is slightly positively skewed, but not so much that it requires normalization.

The mean value of government expenditure share is 15.21%, and the standard deviation is 11.01%. For the whole country and all years, Jiangsu has the lowest government expenditure share in 1995 at 4.92%, and Tibet has the highest expenditure share in 2008 at 96.15%. For all years, the government expenditure share is highest in the western region and lowest in the eastern region. The percentage of share increased over time for all regions, with the western region increasing the most (at 9.07%), which again might result from the Western Development Program. The government expenditure share also has positive skewness within an acceptable range.

Table 6.1 Overall Summary Statistics of Continuous Variables (Unlogged and Logged)

Variable	Mean	Std. Dev.	Min.	Max.	Skewness	Kurtosis
Per capita GDP (RMB)	9834.84	8648.11	1580.79	62812.67	2.51	11.04
ln(per capita GDP)	8.92	0.71	7.37	11.05	0.44	2.80
Annual growth rate of per capita GDP (%)	10.74	3.28	2.10	39.00	1.82	14.00
Intraprovincial migration rate (%)	1.24	0.56	0.05	5.19	2.24	14.52
ln(intraprovincial migration rate)	0.10	0.57	-2.92	1.65	-2.51	13.79
Urban intraprovincial in-migration rate (%)	1.95	1.04	0.03	7.91	0.72	4.88
ln(urban intraprovincial in-migration rate)	0.45	0.81	-3.62	2.07	-2.04	8.68
Urban intraprovincial out-migration rate (%)	1.49	0.90	0.01	7.11	1.41	8.29
ln(urban intraprovincial out-migration rate)	0.13	0.92	-4.79	1.96	-2.12	9.23
Rural intraprovincial in-migration rate (%)	1.05	0.73	0.01	5.37	2.16	9.37
ln(rural intraprovincial in-migration rate)	-0.17	0.75	-4.33	1.68	-1.72	10.87
Rural intraprovincial out-migration rate (%)	1.06	0.74	0.02	5.42	2.42	10.44
ln(rural intraprovincial out-migration rate)	-0.13	0.65	-3.86	1.69	-1.07	8.89
Interprovincial in-migration rate (%)	0.33	0.25	0.04	1.40	2.03	6.98
ln(interprovincial in-migration rate)	-1.33	0.64	-3.31	0.34	0.39	3.15
Interprovincial out-migration rate (%)	0.27	0.12	0.08	0.73	0.92	3.53
ln(interprovincial out-migration rate)	-1.41	0.42	-2.57	-0.32	0.09	2.27
Net interprovincial migration rate (%)	0.06	0.21	-0.34	1.06	2.18	8.30
ln(net interprovincial migration rate)	-2.56	1.49	-9.34	0.06	-0.69	4.34
Urban interprovincial in-migration rate (%)	0.67	0.85	0.05	9.78	5.94	47.96
ln(urban interprovincial in-migration rate)	-0.71	0.74	-2.99	2.28	0.07	5.57
Urban interprovincial out-migration rate (%)	0.45	0.27	0.06	2.44	2.66	14.97
ln(urban interprovincial out-migration rate)	-0.95	0.58	-2.80	0.89	-0.82	5.44
Rural interprovincial in-migration rate (%)	0.16	0.14	0.02	0.91	2.56	11.22
ln(rural interprovincial in-migration rate)	-2.05	0.67	-4.07	-0.09	0.32	3.30
Rural interprovincial out-migration rate (%)	0.19	0.14	0.00	1.16	2.47	13.26
ln(rural interprovincial out-migration rate)	-1.89	0.76	-6.09	0.15	-1.56	9.63
Initial per capita GDP (1992)	3961.75	2692.83	1580.79	13543.58	2.40	8.43
ln(initial per capita GDP)	8.14	0.50	7.37	9.51	1.12	4.02
Mean years of schooling of working pop. (1990)	6.80	1.44	2.44	9.87	-0.49	4.29
Employment rate (%)	52.81	6.32	36.36	75.72	0.09	3.20
Comparative labor productivity (%)	18.55	8.74	3.67	62.69	1.07	4.69
Investment rate (%)	41.05	12.91	21.81	87.30	1.05	3.67
Government expenditure share (%)	15.21	11.01	4.92	96.15	3.85	21.49

Sources: Author's calculation based on *China Statistical Yearbook* (1993), *China National Population Statistics by County* (Volumes 1993–2009), and *Compilation of Statistics on the 60 Years of New China* (2009).

Table 6.2 Summary Statistics of Continuous Variables (Unlogged & Logged) by Time Period & Region

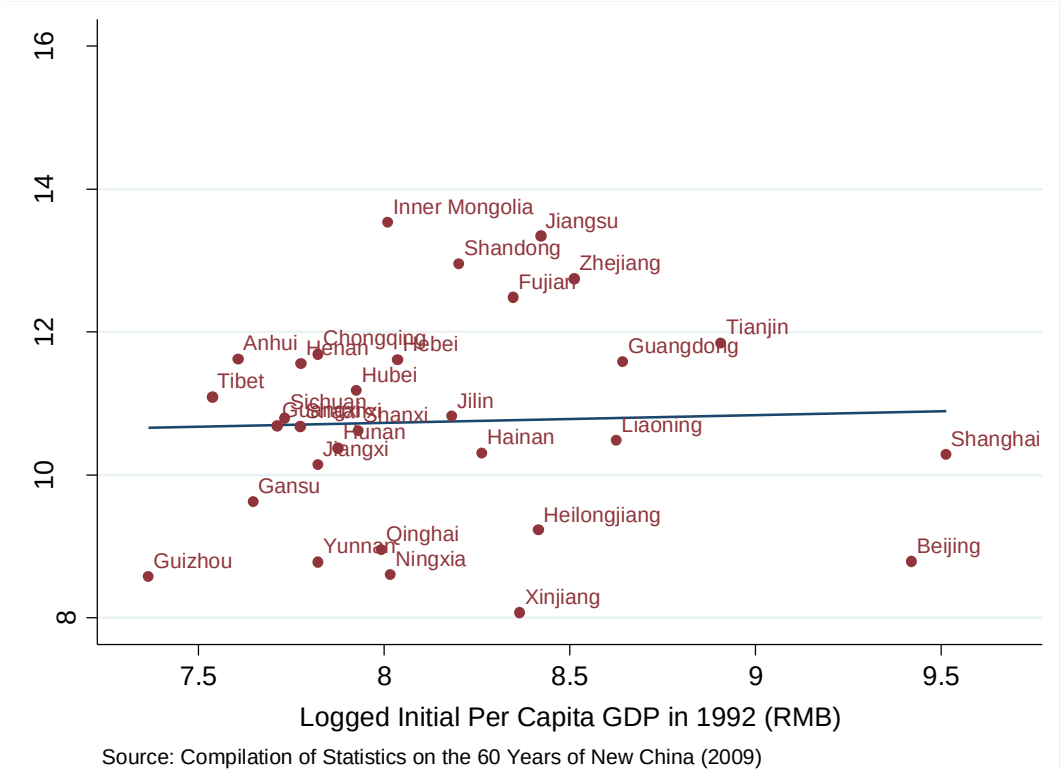
	1992–1999					
	East		Central		West	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Per capita GDP (RMB)	9112.66	5425.15	4190.98	1220.16	3527.74	1111.45
ln(per capita GDP)	8.96	0.55	8.30	0.29	8.12	0.32
Annual growth rate of per capita GDP (%)	12.13	5.09	10.06	2.47	8.96	2.51
Intraprovincial migration rate (%)	1.02	0.33	1.38	0.24	1.39	0.38
ln(intraprovincial migration rate)	-0.06	0.43	0.31	0.18	0.29	0.26
Urban intraprovincial in-migration rate (%)	1.87	1.30	2.27	0.81	2.03	0.95
ln(urban intraprovincial in-migration rate)	0.22	1.05	0.76	0.35	0.60	0.47
Urban intraprovincial out-migration rate (%)	1.41	1.10	1.71	0.61	1.48	0.84
ln(urban intraprovincial out-migration rate)	-0.21	1.30	0.48	0.34	0.25	0.52
Rural intraprovincial in-migration rate (%)	1.08	0.83	1.26	0.82	1.30	0.43
ln(rural intraprovincial in-migration rate)	-0.19	0.77	0.10	0.47	0.21	0.32
Rural intraprovincial out-migration rate (%)	1.22	0.95	1.28	0.93	1.24	0.39
ln(rural intraprovincial out-migration rate)	-0.07	0.77	0.09	0.51	0.16	0.33
Interprovincial in-migration rate (%)	0.35	0.28	0.21	0.08	0.22	0.17
ln(interprovincial in-migration rate)	-1.29	0.69	-1.64	0.40	-1.72	0.66
Interprovincial out-migration rate (%)	0.23	0.11	0.21	0.08	0.22	0.09
ln(interprovincial out-migration rate)	-1.56	0.41	-1.64	0.35	-1.59	0.41
Net interprovincial migration rate (%)	0.12	0.20	0.00	0.06	0.00	0.14
ln(net interprovincial migration rate)	-2.39	1.28	-3.55	1.33	-2.91	1.91
Urban interprovincial in-migration rate (%)	0.79	0.72	0.39	0.15	0.47	0.28
ln(urban interprovincial in-migration rate)	-0.59	0.91	-1.00	0.33	-1.03	0.85
Urban interprovincial out-migration rate (%)	0.45	0.31	0.32	0.05	0.41	0.22
ln(urban interprovincial out-migration rate)	-1.00	0.71	-1.15	0.17	-1.13	0.80
Rural interprovincial in-migration rate (%)	0.16	0.14	0.18	0.22	0.15	0.15
ln(rural interprovincial in-migration rate)	-2.08	0.67	-2.10	0.81	-2.17	0.69
Rural interprovincial out-migration rate (%)	0.16	0.12	0.22	0.24	0.18	0.08
ln(rural interprovincial out-migration rate)	-2.09	0.66	-1.88	0.78	-1.79	0.38
Initial per capita GDP (1992)	5928.36	3414.79	2909.11	704.66	2549.19	722.20
ln(initial per capita GDP)	8.55	0.51	7.95	0.22	7.81	0.26
Mean years of schooling of working pop. (1990)	7.68	1.10	7.09	0.85	5.49	1.29
Employment rate (%)	53.81	5.72	49.53	4.70	51.97	5.66
Comparative labor productivity (%)	25.65	8.71	28.41	8.40	16.37	4.13
Investment rate (%)	37.68	9.95	29.07	4.56	36.63	8.62
Government expenditure share (%)	8.99	2.38	10.16	2.23	18.27	13.19

Table 6.2 Continued

	2000–2008					
	East		Central		West	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Per capita GDP (RMB)	20791.57	12071.76	9856.43	3834.80	7559.07	2625.21
ln(per capita GDP)	9.78	0.57	9.13	0.36	8.87	0.36
Annual growth rate of per capita GDP (%)	10.80	2.34	11.85	3.04	10.34	1.97
Intraprovincial migration rate (%)	0.89	0.61	1.24	0.29	1.65	0.81
ln(intraprovincial migration rate)	-0.37	0.88	0.19	0.23	0.41	0.43
Urban intraprovincial in-migration rate (%)	1.42	1.08	1.90	0.50	2.38	0.99
ln(urban intraprovincial in-migration rate)	-0.03	1.11	0.61	0.26	0.75	0.53
Urban intraprovincial out-migration rate (%)	1.17	0.97	1.42	0.40	1.85	0.99
ln(urban intraprovincial out-migration rate)	-0.28	1.21	0.31	0.28	0.45	0.63
Rural intraprovincial in-migration rate (%)	0.60	0.53	0.86	0.39	1.33	0.88
ln(rural intraprovincial in-migration rate)	-0.83	0.98	-0.25	0.44	0.15	0.48
Rural intraprovincial out-migration rate (%)	0.69	0.55	0.84	0.36	1.21	0.79
ln(rural intraprovincial out-migration rate)	-0.63	0.80	-0.26	0.40	0.06	0.47
Interprovincial in-migration rate (%)	0.50	0.36	0.27	0.09	0.34	0.19
ln(interprovincial in-migration rate)	-0.91	0.66	-1.38	0.33	-1.23	0.56
Interprovincial out-migration rate (%)	0.29	0.11	0.33	0.11	0.32	0.12
ln(interprovincial out-migration rate)	-1.32	0.35	-1.18	0.35	-1.24	0.43
Net interprovincial migration rate (%)	0.22	0.31	-0.06	0.07	0.02	0.16
ln(net interprovincial migration rate)	-1.82	1.17	-4.20	1.29	-2.63	1.40
Urban interprovincial in-migration rate (%)	1.17	1.60	0.43	0.16	0.60	0.30
ln(urban interprovincial in-migration rate)	-0.30	0.85	-0.90	0.35	-0.63	0.48
Urban interprovincial out-migration rate (%)	0.53	0.40	0.48	0.18	0.46	0.18
ln(urban interprovincial out-migration rate)	-0.83	0.61	-0.79	0.34	-0.86	0.45
Rural interprovincial in-migration rate (%)	0.13	0.08	0.16	0.08	0.20	0.12
ln(rural interprovincial in-migration rate)	-2.20	0.67	-1.96	0.49	-1.79	0.62
Rural interprovincial out-migration rate (%)	0.14	0.09	0.23	0.12	0.24	0.10
ln(rural interprovincial out-migration rate)	-2.32	1.11	-1.58	0.46	-1.51	0.44
Initial per capita GDP (1992)	5928.36	3412.80	2909.11	704.11	2549.19	721.69
ln(initial per capita GDP)	8.55	0.51	7.95	0.22	7.81	0.26
Mean years of schooling of working pop. (1990)	7.68	1.10	7.09	0.85	5.49	1.29
Employment rate (%)	55.93	7.23	51.03	6.02	53.00	5.89
Comparative labor productivity	16.65	4.60	15.34	6.37	10.21	3.91
Investment rate (%)	40.68	8.51	44.08	14.08	55.88	12.41
Government expenditure share (%)	12.31	3.69	14.43	2.80	27.34	17.26

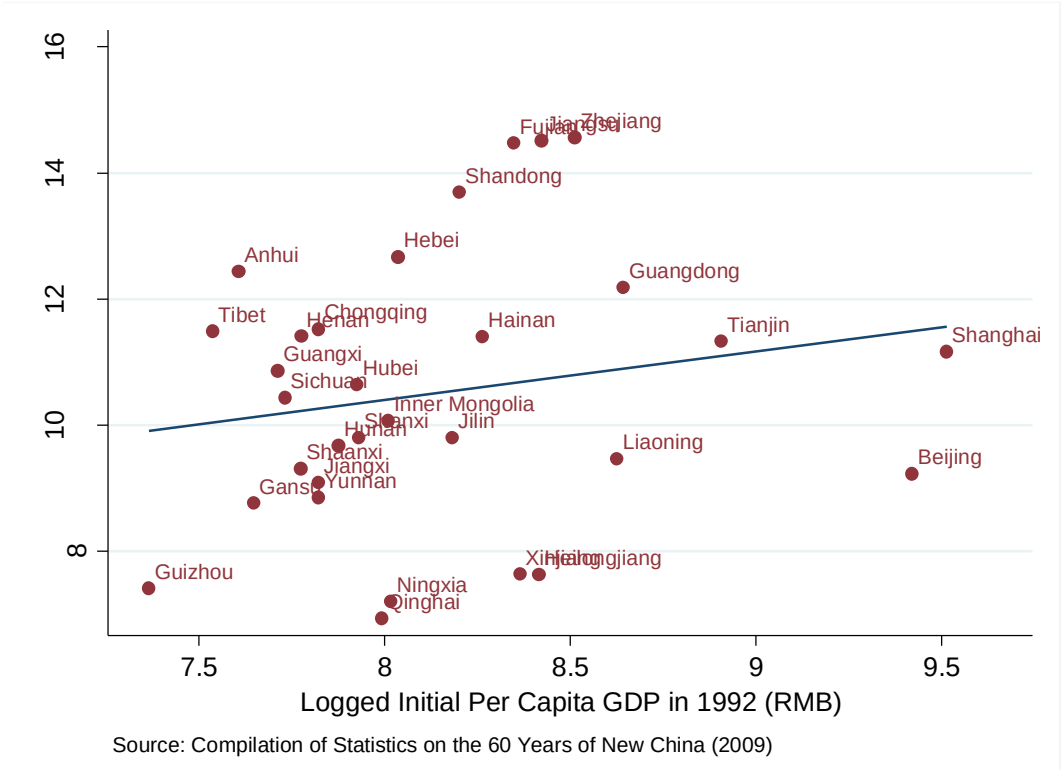
Sources: Author's calculation based on *China Statistical Yearbook* (1993), *China National Population Statistics by County* (Volumes 1993–2009), and *Compilation of Statistics on the 60 Years of New China* (2009).

Figure 6.1 Relationship between Economic Growth Rate and Initial Economic Condition by Province for 1992-2008



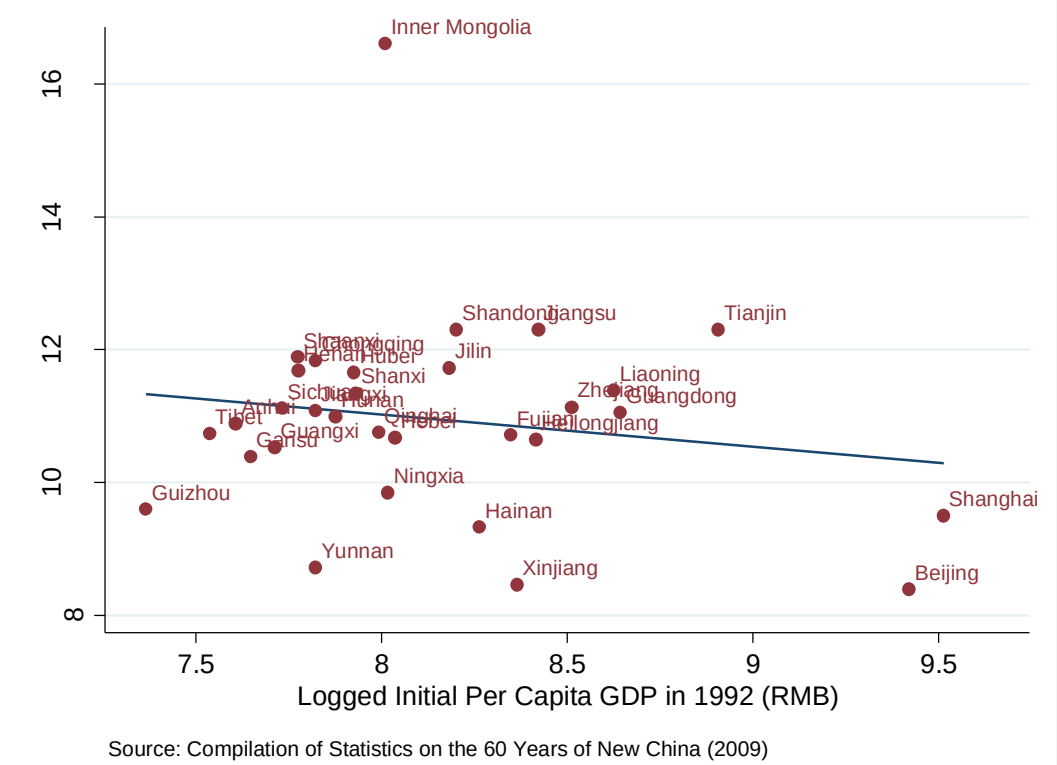
Source: Compilation of Statistics on the 60 Years of New China (2009)

Figure 6.2 Relationship between Economic Growth Rate and Initial Economic Condition by Province for 1992-1999



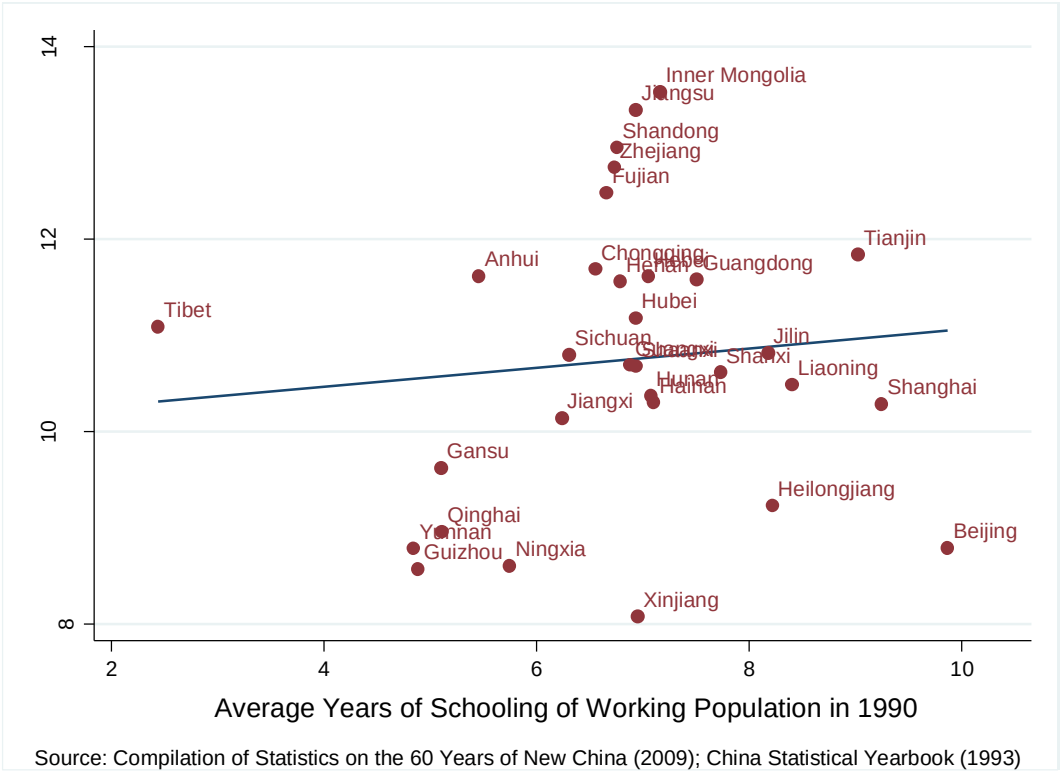
Source: Compilation of Statistics on the 60 Years of New China (2009)

Figure 6.3 Relationship between Economic Growth Rate and Initial Economic Condition by Province for 2000-2008



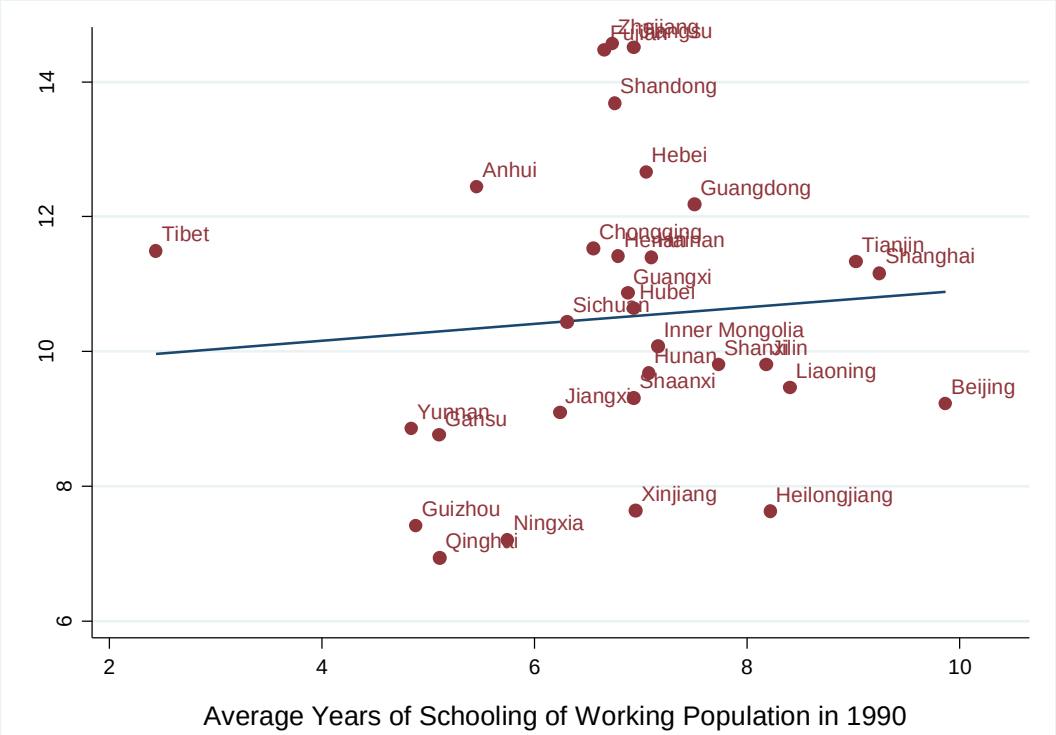
Source: Compilation of Statistics on the 60 Years of New China (2009)

Figure 6.4 Relationship between Economic Growth Rate and Initial Human Capital by Province for 1992-2008



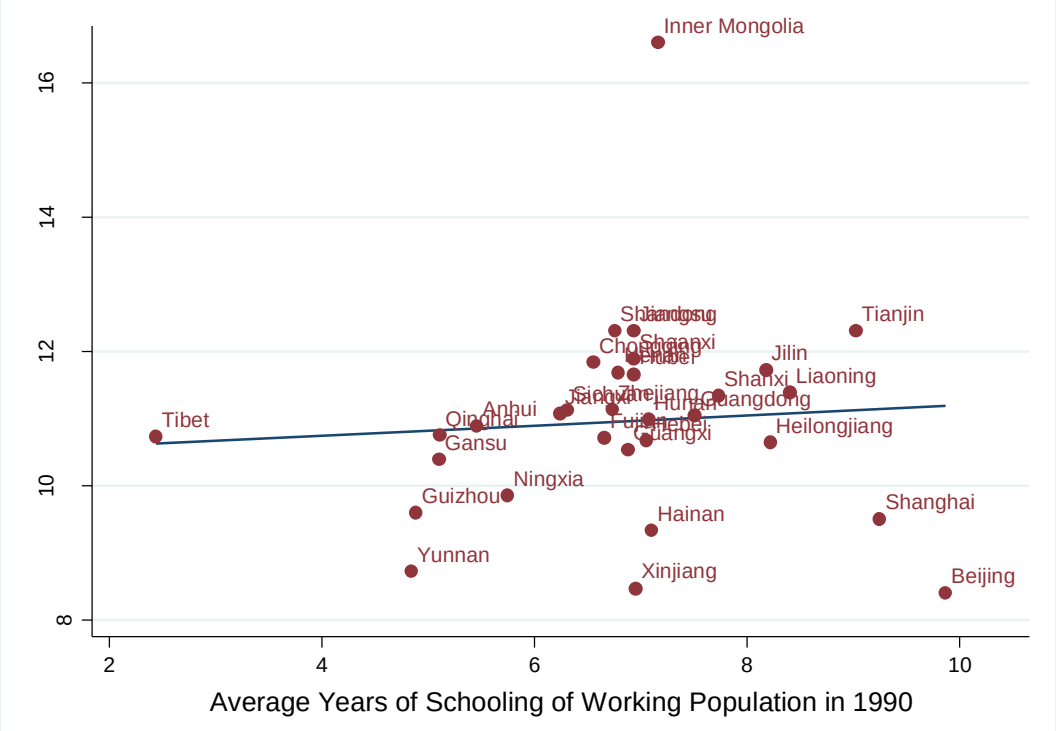
Source: Compilation of Statistics on the 60 Years of New China (2009); China Statistical Yearbook (1993)

Figure 6.5 Relationship between Economic Growth Rate and Initial Human Capital by Province for 1992-1999



Source: Compilation of Statistics on the 60 Years of New China (2009); China Statistical Yearbook (1993)

Figure 6.6 Relationship between Economic Growth Rate and Initial Human Capital by Province for 2000-2008



Source: Compilation of Statistics on the 60 Years of New China (2009); China Statistical Yearbook (1993)

6.2 PATTERNS AND TRENDS OF REGIONAL GROWTH AND ECONOMIC INEQUALITY

Using per capita GDP as a proxy of the level of economic development, figure 6.7 illustrates the trend in three commonly used indices of interprovincial inequality—the Gini Coefficient, the Theil Entropy Index, and the Coefficient of Variation (CV)—over the period 1992–2008. All three measures are popularly used in the literature on regional inequality in China. The Gini Coefficient is the most commonly used measure of inequality. The coefficient varies between 0, indicating complete equality, and 1, reflecting complete inequality (one person holds all the income or consumption, and all others have none). The CV is a distribution's standard deviation divided by its mean. It is commonly used and fairly easy to understand, but is sensitive to outliers (Fan & Sun, 2008). A shared disadvantage of both the Gini Coefficient and CV is that they measure the overall inequality and are not additive across different groups (i.e., the total Gini of an economy is not equal to the sum of the Ginis for its subgroups). The Theil Index is less popular and less intuitive than the Gini Coefficient for measuring income inequality, but it has the important advantage of being additive across subgroups in a society and is thus more easily decomposable than other inequality measures (World Bank). I will take advantage of this property of the Theil Index to depict the inequalities among and within regions and their contributions to the total inequality.

As one can see in figure 6.7, the three indices all show a similar trend of interprovincial economic inequality over the period 1992–2008. Interprovincial inequality increases with fluctuation between 1992 and 1999; remains relatively stable, with only a slight increase, from

about 1999 to about 2004; and then declines after 2004. According to figure 6.8, the increased interprovincial inequality between 1992 and 2004 can be explained by the enlarged gap between the eastern region and the central and western regions combined. After 2004, increasing interregional disparities are offset by the decline in intraregional inequality in the eastern region, so the overall interprovincial inequality declines. The relative levels and pace of change of interprovincial inequality, however, vary among the three measures. The Theil Index reveals a more rapid increase of inequality during the 1990s than the other two indices.

Figure 6.8 decomposes the Theil Index of regional disparity into its intraregional (i.e., intraeast, intracentral, and intrawest) and interregional components for the period 1992–2008. These components' contributions to the overall Theil Index vary over time. The contribution share of intraregional inequality to overall inequality (73%) is considerably higher than that of interregional inequality (27%) in the initial year of 1992. The share of interregional inequality increases while the share of intraregional inequality declines during the 1990s; their shares remain quite stable during the 2000s. In 2008, the contribution share of intraregional inequality to total national inequality decreases to 63%, while the share of interregional inequality rises to 37%, indicating the increased importance of interregional inequality in determining the change in overall interprovincial inequality.

Further decomposition of intraregional inequality into intraeast, intracentral, and intrawest components shows that inequality within the eastern region is considerably higher than inequality within the other two regions and remains the major component of overall intraregional inequality. The contribution share of intraeast inequality is over 50% in 1992, but declines gradually over time. In the western region, intraregional inequality is small and exhibits an overall decline. Inequality within the central region is also small and experiences some

fluctuation, but largely remains at the same level over the entire study period. Specifically, the intracentral contribution is 9.56% of the total inequality in 1992; it drops from 9.56% to 5.99% between 1992 and 2000, and then rises again to 11.8% in 2008. The intrawest contribution is at its highest level (13.1%) in 1992 and decreases gradually after that, with slight fluctuation during the 2000s, to reach 9.79% in 2008. The intraeast contribution is also at its highest point in 1992 at 50.5% and drops continually to 41.2% in 2008. The interregional contribution is 26.9% in 1992, then peaks at 38.3% in 2006, before decreasing slightly to 37.2% in 2008.

Figure 6.9 reveals the trajectories of national and regional per capita GDP over time. The eastern region has experienced greatest growth in per capita GDP among the three regions since 1992, and the gap between the eastern region and the central and western regions combined expands throughout the remainder of the study period. Obviously, this gap contributes to the increase in interprovincial and interregional inequalities during the 1990s. During the 2000s, the divergence between regions is offset by the convergence within the eastern region, as the old economic core areas in the northeast experienced a slowdown of economic development, and the previously less-developed areas in the southeast experienced rapid economic growth (Fan, 2005).

Table 6.3 highlights interprovincial, interregional, and intraregional economic inequality by revealing variations in the level and growth rate of provincial per capita GDP over the two time periods 1992–1999 and 2000–2008. I also include the rank of each province's per capita GDP and its growth rate over each of the two periods, which sheds light on the geography of economic development by identifying the leaders and followers at specific time periods (Fan & Sun, 2008). Between 1992 and 1999, the average annual per capita GDP for the eastern region (7549.26 RMB) is almost twice of that of the central (3982.15 RMB) or the western (3338.45 RMB) regions, and the gap between the central and the western regions is relatively small. Nine

of the top ten average per capita GDP levels belong to eastern provinces; Heilongjiang, a central province, ranked tenth. The average annual growth rate of per capita GDP for the eastern region is 12.05%—much higher than that of the central (9.94%) and the western (9.13%) regions. Again, there is not much difference in growth rate between the two inland regions.

Within the eastern region, the three centrally administered municipalities—Shanghai, Beijing, and Tianjin, which are also the three old industrial centers of China's pre-reform period—are identified as the top three leaders in economic output, with average per capita GDP over 10000 RMB per year. These three old industrial core areas are followed by the provinces of Guangdong, Zhejiang, Liaoning, Jiangsu, Fujian, and Shandong in the eastern region. The latter group (with the exception of Liaoning) is sometimes referred to as the new cores (Fan & Sun, 2008). The average annual growth rates of the new cores, ranging from 12.18% to 14.56%, are above those for the eastern region (12.05%), Beijing (9.23%), Shanghai (11.16%), and Tianjin (11.33%; see table 6.3), indicating the relatively slow growth of the more-developed provinces and the rapid growth of the less-developed provinces. The net effect is the continued catching-up of the new coastal growth cores and the convergence within the eastern region between 1992 and 1999; Fan and Sun (2008) document the same trend starting prior to 1990.

As for interregional inequalities, most of the eastern provinces have considerably higher growth rates than the central and western provinces. Seven of the top ten provincial growth rates belong to eastern provinces, and the eastern-region average growth rate (12.05%; see table 6.3) is far above the averages of the other regions. Thus, the 1990s were marked by a rapid increase in interregional inequality, which rose to approximately the same level as in 1978 by the mid-1990s. Cai, Wang, and Du (2002) showed that the regional growth pattern in the 1990s reflected divergence between the eastern region and the central and western regions and convergence with

the two "clubs." The main reason for this phenomenon is that the new development cores along the eastern coast experienced considerably greater growth than either the eastern old cores or the rest of the country.

However, during the period 2000–2008, the central region's growth rate (11.28%) rose to almost the same level of that of the eastern region (11.43%), and the western region also experienced a noticeable progress in growth rate (to 10.71%; see table 6.3). Only the eastern region experienced a decline in growth rate, from 12.05% to 11.43%. The net effect is that the three regions' average rates of growth became very similar—all within one percentage point of one another. At the provincial level, growth rates also converged during this period. Although provinces with leading levels of per capita GDP were still clustered in the eastern region, the leading growth rates moved from the eastern provinces to those in the central and western regions between the 1990s and the 2000s. In particular, the three eastern old cores—Shanghai, Beijing, and Tianjin—still ranked as the top three in average per capita GDP, but were closely followed by the eastern new cores—Zhejiang, Guangdong, Jiangsu, Fujian, and Shandong. The gap between the old industrial provinces and the new growth provinces continued to shrink in the 2000s. For example, the ratio between Shanghai (ranked first in both periods) and Shandong (ranked ninth in both periods) declined from 3.34 in the 1990s to 2.81 in the 2000s.

At a time when the eastern region experienced slower growth—the average growth rate dropped from 12.05% in the 1990s to 11.43% in the 2000s—several inland provinces, especially central provinces that ranked much lower in the 1990s (between thirteenth and twenty-sixth), emerged as new growth leaders among noneastern provinces. For instance, the rank of Inner Mongolia's average per capita GDP improved from fifteenth in the 1990s to tenth in the 2000s, and the ranking of its average growth rate jumped from seventeenth in the 1990s to first in the

2000s. Given the convergence of growth rates between regions and even between provinces, it is no surprise that both interregional and intraregional inequalities remained relatively stable, and will eventually decline. Nevertheless, the absolute sizes of regional gaps remain large, and approximately unchanged from the earlier time period. As a matter of fact, the ratio between the eastern and central regions even increased slightly from 1.90 in the 1990s to 2.01 in the 2000s; the ratio between the eastern and western regions also increased, from 2.26 to 2.50.

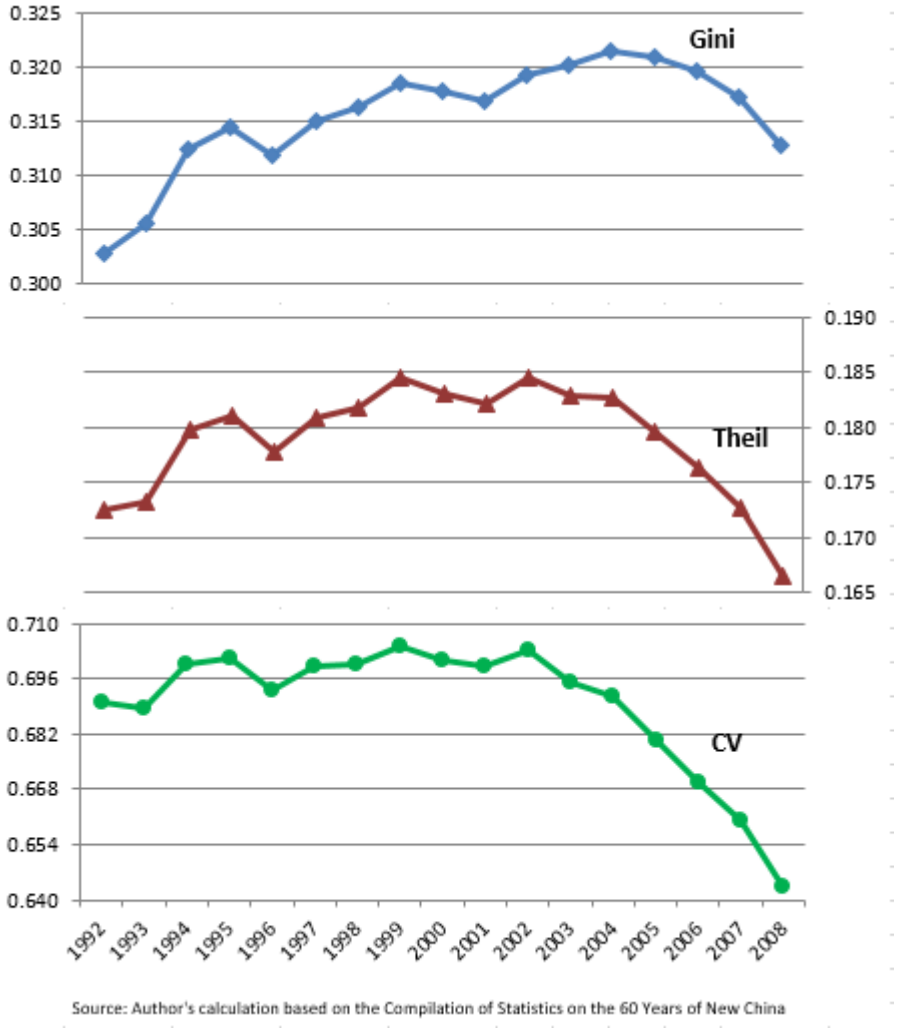
As suggested by Fan and Sun (2008), the changes that led to the gradual halting of inequality increase in recent years were not regional in scale, but were due to the growth trajectories of selected provinces. As mentioned above, within the eastern region, the new growth cores continued to grow rapidly, while the old industrial cores slowed down. However, variations do exist among the new cores. The growth rates of Zhejiang, Fujian, and Guangdong retreated from the leading level to a level near the regional average, while Jiangsu and Shandong continued to hold leading growth positions. Inner Mongolia was an outlier in terms of economic growth—its average growth rate of 16.6% was the highest among all provinces, and its level of average per capita GDP ranked tenth nationally—the only noneastern province in the top ten. Jilin, Henan, and Hubei in the central region, as well as Shaanxi and Chongqing in the western region, had growth rates above regional averages and ranked in the top ten of all provinces. In summary, while most central and western provinces remained in the below-average group in terms of absolute level of per capita GDP, selected provinces within these inland regions demonstrated rapid growth trends, causing inequalities at all levels—interprovincial, interregional, and intraregional—to have the tendency to decline since the 2000s.

Table 6.3 Per Capita GDP by Time Period and Province

	1992–1999				2000–2008			
Province	**Average per capita GDP (RMB)**	**Rank**	**Average annual growth rate of per capita GDP (%)**	**Rank**	**Average per capita GDP (RMB)**	**Rank**	**Average annual growth rate of per capita GDP (%)**	**Rank**
Eastern	***7549.26***		***12.05***		***18181.54***		***11.43***	
Beijing	17058.67	2	9.23	23	34448.73	2	8.40	31
Fujian	7296.09	8	14.48	3	17100.99	8	10.71	20
Guangdong	8970.71	4	12.18	7	20376.13	5	11.05	15
Guangxi	3331.19	27	10.87	14	7106.48	28	10.53	23
Hainan	5221.63	12	11.40	11	9906.78	15	9.33	28
Hebei	5005.15	14	12.66	5	11761.51	12	10.68	21
Jiangsu	7590.24	7	14.51	2	19612.47	6	12.30	2
Liaoning	7920.87	6	9.46	21	17735.70	7	11.39	10
Shandong	6187.62	9	13.69	4	15953.63	9	12.30	3
Shanghai	20687.44	1	11.16	13	44791.90	1	9.50	27
Tianjin	11330.59	3	11.33	12	29079.52	3	12.30	3
Zhejiang	8751.74	5	14.56	1	21624.96	4	11.13	12
Central	***3982.15***		***9.94***		***9053.39***		***11.28***	
Anhui	3234.35	28	12.44	6	7374.79	26	10.89	17
Heilongjiang	5977.48	10	7.63	28	12857.27	11	10.65	22
Henan	3711.45	22	11.41	10	8747.24	19	11.69	8
Hubei	4118.29	16	10.64	15	9695.70	16	11.66	9
Hunan	3773.12	21	9.68	20	8511.20	20	10.99	16
Inner Mongolia	4369.77	15	10.08	17	13039.96	10	16.60	1
Jiangxi	3423.74	24	9.09	24	7556.08	25	11.08	14
Jilin	5104.20	13	9.80	18.5	11547.22	13	11.72	7
Shanxi	4006.40	17	9.80	18.5	9378.40	17	11.34	11
Western	***3338.45***		***9.13***		***7268.54***		***10.71***	
Chongqing	3813.23	20	11.53	8	9073.36	18	11.83	6
Gansu	2913.72	30	8.76	26	6337.06	30	10.39	24
Guizhou	2050.88	31	7.41	29	4056.86	31	9.60	26
Ningxia	3926.00	18	7.20	30	7987.89	22	9.85	25
Qinghai	3816.97	19	6.94	31	8065.92	21	10.75	18
Shaanxi	3342.20	26	9.31	22	7965.92	23	11.89	5
Sichuan	3357.16	25	10.44	16	7744.53	24	11.12	13
Tibet	2983.48	29	11.49	9	7215.41	27	10.73	19
Xinjiang	5576.82	11	7.64	27	10433.20	14	8.47	30
Yunnan	3496.92	23	8.85	25	6710.57	29	8.72	29

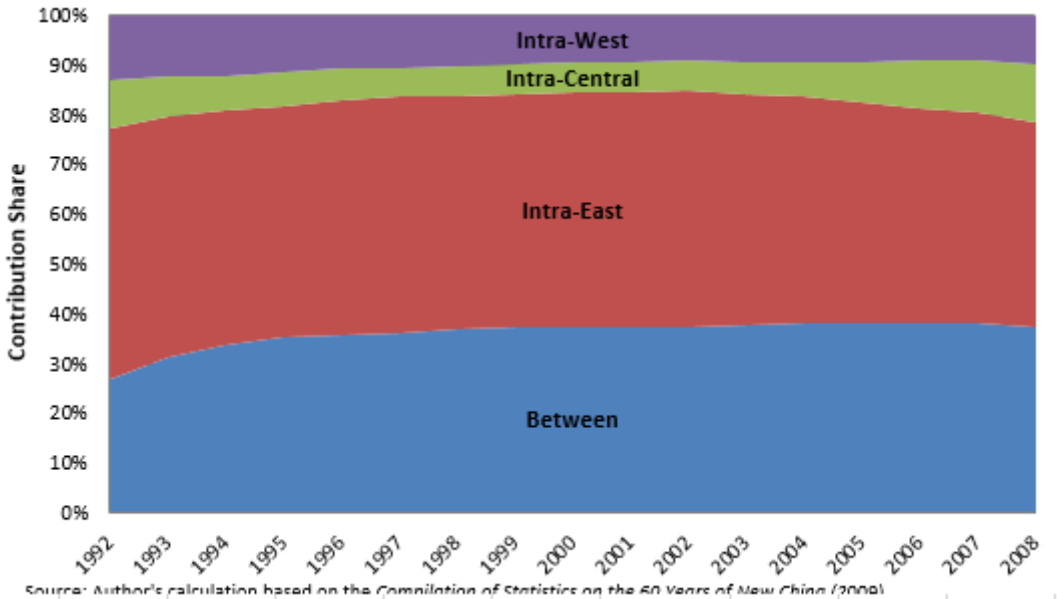
Source: Author's calculation based on *Compilation of Statistics on the 60 Years of New China* (2009).

Figure 6.7 Interprovincial Inequality of Per Capita GDP



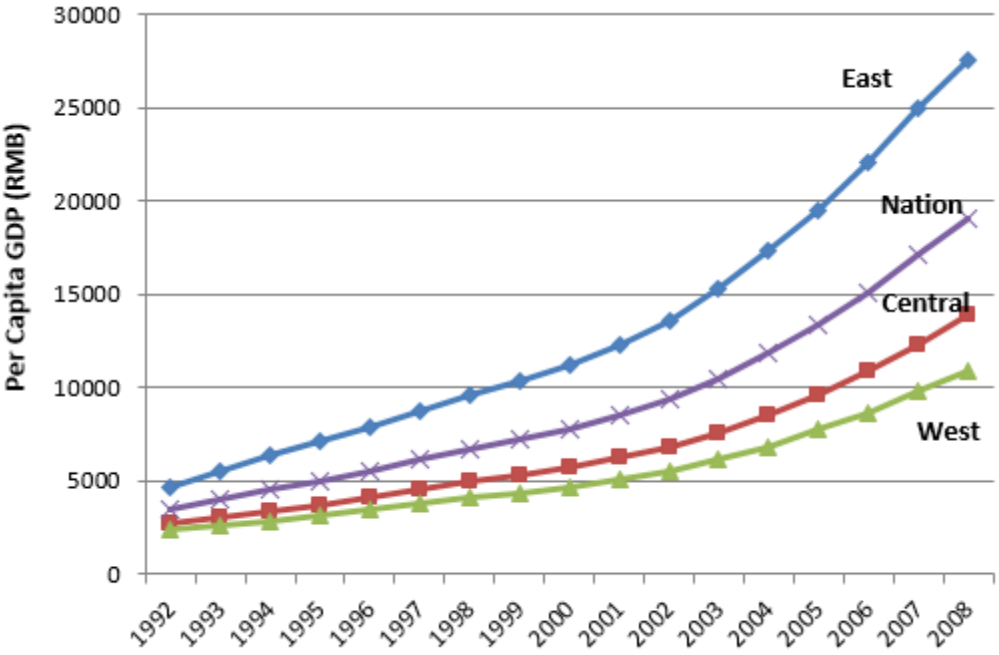
Source: Author's calculation based on the Compilation of Statistics on the 60 Years of New China

Figure 6.8 Intraregional and Interregional Contributions to Total Inequality of Per Capita GDP



Source: Author's calculation based on the Compilation of Statistics on the 60 Years of New China (2009)

Figure 6.9 Per Capita GDP by Region and Year



Source: Author's calculation based on the *Compilation of Statistics on the 60 Years of New China* (2009).

6.3 MIGRATION STATISTICS

I now describe patterns and trends in internal migration in China. I focus on the migration that took place between 1992 and 2008, using yearly information from *hukou* registration. In my data, I break down in-migration to each province and out-migration from each province into urban and rural migrants. I broadly define city and town as urban regions and county as a rural region. Given the structure of the data, I am able to observe various migration patterns.

6.3.1 Intraprovincial Migration

First, let us examine the characteristics of intraprovincial migration. A large part of migration took place within provinces. Table 6.4 depicts intraprovincial migration by time period and province. Based on the figures presented in the table, we can identify the overall pattern of intraprovincial migration flows, as well as changes over time. During the time period 1992–1999, all provinces experienced positive net migration in urban areas, implying that rural-to-urban migration was the dominant flow during that time period. In particular, Guangdong Province attracted the most net migration in its urban areas (more than 1.3 million), followed by Henan (more than 1.1 million) and Hubei (more than 1 million). On the other hand, Tibet received the least net migration in urban areas (7951), followed by Tianjin (38,436), Qinghai (65,993), and Ningxia (92,757). Surprisingly, the eastern province of Tianjin received the least net migration in urban areas except for Tibet. Comparing the three regions during the time period 1992–1999, the eastern region had the highest net urban migration, followed by the central

region and the western region, which had the least net urban migration. The net effect is that intraprovincial rural-to-urban migration was the most active in the eastern region during the 1990s.

In rural areas, the majority of central and western provinces gained population, while most eastern provinces experienced population loss. Since we are presenting descriptive statistics for intraprovincial migration, ideally, the net migration between urban and rural areas would cancel out. However, as explained previously, we do not observe such an effect, due to the systematic underestimation of rural-in migration. What we do observe from table 6.4 is that, during the time period 1992–1999, most rural-to-urban migration was concentrated in the eastern region.

During the time period 2000–2008, the intraprovincial migration pattern did not change much. As in the preceding decade, all provinces experienced positive net migration in urban areas, showing that rural-to-urban migration was still the dominant flow during the 2000s. However, Henan took the place of Guangdong and became the province with the highest net migration in urban areas (more than 1.7 million), followed by Guangdong, Anhui, Sichuan, and Jiangsu (all above 1 million). Tibet remained the province with the lowest net migration in urban areas, followed by Beijing, Shanghai, and Tianjin, in which migrant workers came mostly from other provinces.

In rural areas, we observe a similar pattern as in the preceding decade. Most eastern provinces experienced population loss, implying again that rural-to-urban migration remained active in the eastern region. However, most western provinces gained population overall, indicating the effect of the Western Development Program on labor mobility in the western region. In the central region, the trend was not so dominating. Though Henan, Hunan, Jiangxi,

and Inner Mongolia gained population in rural areas, Anhui, Heilongjiang, Hubei, Jilin, and Shanxi experienced population loss.

Regarding the intertemporal pattern, both periods show a positive net migration in urban areas for all three regions, suggesting that most migration flows went to urban areas from rural areas. Clearly, we can observe that the central region lost population on average, compared with the eastern and western regions. Across the two periods, most western provinces except Yunnan experienced higher net migration in urban areas. Most central provinces except Hubei and Jilin experienced higher net migration in urban areas. This pattern is not so clear among the eastern provinces; Beijing, Guangdong, Guangxi, Hainan, Hebei, Liaoning, and Shanghai had lower net migration in urban areas, while Fujian, Jiangsu, Shandong, Tianjin, and Zhejiang had higher net migration in urban areas. In rural areas, all western provinces except Gansu and Yunnan experienced higher net migration. All central provinces except Hubei, Jiangxi, Jilin, and Shanxi experienced higher net migration. In particular, Hubei had positive net migration in rural areas during the time period 1992–1999, but had negative net migration in rural areas during the time period 2000–2008. Among eastern provinces, intraprovincial migration in rural areas was more volatile: Beijing, Guangdong, Liaoning, Shandong, Shanghai, and Tianjin had larger net migration, while Jiangsu, Fujian, Guangxi, Hainan, Hebei, and Zhejiang had smaller net migration.

Figure 6.10 shows patterns of intraprovincial migration by region and year. It suggests that both eastern and central regions exhibited a decreasing pattern in terms of intraprovincial migration. The western region, on the other hand, exhibited a slightly increasing pattern in terms of intraprovincial migration, particularly during the time period 2000–2008. Overall, both the

volume and the discrepancies among these three regions grew smaller across these two periods, indicating that more and more migration became interprovincial as time went on.

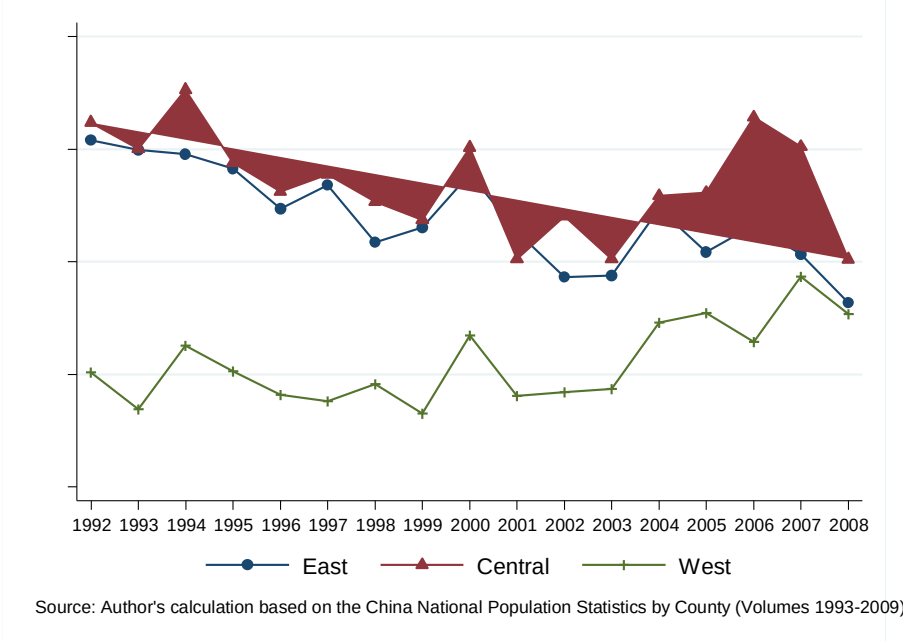
Now let us examine different regions respectively. Figure 6.11 shows that urban areas in the eastern region had slightly increasing intraprovincial migration all the time, since urban in-migration was always larger than urban out-migration. Not surprisingly, within provinces, most migration takes place from rural areas to urban areas. Rural areas in the eastern region lost population all the time, since rural out-migration was always larger than rural in-migration. Clearly, the discrepancies between urban and rural areas grew larger as time went on. Figure 6.12 shows that urban areas in the central region gained population during the time period 1992–1999, but lost population during the time period 2000–2008. Rural areas in the central region exhibited decreasing intraprovincial migration most of the time, though they had slightly increasing migration after 2005. Overall, intraprovincial migration in the central region became more volatile during the time period 2000–2008. Figure 6.13 shows that the volume of migration in rural areas was much larger than that in urban areas during the time period 1992–1999, while the volume of migration in urban areas exceeded that in rural areas during the time period 2000–2008, indicating the effect of the Western Development Program. In the time period 2000–2008, intraprovincial migration in the western region became much more volatile than it was during the time period 1992–1999, and the discrepancies between rural and urban areas became smaller.

Table 6.4 Intraprovincial Migration by Time Period and Province

	Intraprovincial Migration 1992–1999						Intraprovincial Migration 2000–2008					
	Urban			Rural			Urban			Rural		
Province	**In**	**Out**	**Net**	**In**	**Out**	**Net**	**In**	**Out**	**Net**	**In**	**Out**	**Net**
Eastern	***25880561***	***20320950***	***5559611***	***19606321***	***21220693***	***-1614372***	***31697269***	***25960101***	***5737168***	***14671051***	***16552820***	***-1881769***
Beijing	201649	89445	112204	547002	632740	-85738	93398	69560	23838	319872	338810	-18938
Fujian	1173984	798947	375037	1342315	1632307	-289992	2015914	1578050	437864	1337631	1806770	-469139
Guangdong	5420144	4089234	1330910	2970740	3164882	-194142	5672826	4392008	1280818	2024962	1973037	51925
Guangxi	1939775	1332693	607082	2479331	2336461	142870	2555572	2121045	434527	1851217	1921838	-70621
Hainan	324433	202943	121490	307123	328844	-21721	483229	388206	95023	160841	196476	-35635
Hebei	3252578	2314805	937773	3161432	2970835	190597	3644776	2741308	903468	2431833	2642815	-210982
Jiangsu	4474341	3973022	501319	2411435	2728261	-316826	6066860	5047190	1019670	1497896	1823240	-325344
Liaoning	2333639	1854499	479140	1350053	1638735	-288682	2136233	1734737	401496	698517	848488	-149971
Shandong	4121220	3456738	664482	2965505	3325057	-359552	4560602	3875252	685350	2849622	3111194	-261572
Shanghai	262533	130236	132297	312464	471681	-159217	103096	62853	40243	33645	74589	-40944
Tianjin	59714	21278	38436	270109	301371	-31262	1111470	1058286	53184	252279	270487	-18208
Zhejiang	2316551	2057110	259441	1488812	1689519	-200707	3253293	2891606	361687	1212736	1545076	-332340
Central	***23853169***	***18168404***	***5684765***	***23105135***	***22359366***	***745769***	***29486592***	***22013032***	***7473560***	***20511425***	***19020958***	***1490467***
Anhui	2484005	1743588	740417	2872873	2972714	-99841	3881983	2686654	1195329	2720196	2810576	-90380
Heilongjiang	2179251	1674292	504959	1580242	1681369	-101127	3007487	2430939	576548	1486761	1488116	-1355
Henan	4640379	3483785	1156594	5428292	4792141	636151	6580045	4837709	1742336	5700243	4180064	1520179
Hubei	3891863	2851095	1040768	2344142	2283690	60452	3297119	2455290	841829	1140658	1148223	-7565
Hunan	3707793	2987643	720150	4161182	4126971	34211	3766387	2900374	866013	2828267	2744144	84123
Inner Mongolia	1141007	801208	339799	1472057	1445432	26625	1456057	1016430	439627	1343271	1274289	68982
Jiangxi	1719644	1286173	433471	2483509	2180157	303352	2607558	1964855	642703	2755674	2595485	160189
Jilin	2548042	2244580	303462	914926	1013335	-98409	2260163	1969842	290321	608176	736941	-128765
Shanxi	1541185	1096040	445145	1847912	1863557	-15645	2629793	1750939	878854	1928179	2043120	-114941
Western	***12998482***	***10121700***	***2876782***	***18156874***	***17668048***	***488826***	***19777666***	***15518979***	***4258687***	***18785580***	***17240708***	***1544872***
Chongqing	1631690	1117559	514131	1649390	1992203	-342813	3394956	2825960	568996	2781481	2656414	125067
Gansu	955094	612408	342686	1686688	1427664	259024	1700081	1175384	524697	1719949	1631222	88727
Guizhou	1817307	1445199	372108	1703623	1543254	160369	2414702	1993807	420895	2109660	1843128	266532
Ningxia	299393	206636	92757	521064	421631	99433	652837	505291	147546	867062	760884	106178
Qinghai	194656	128663	65993	393032	400436	-7404	508141	375786	132355	626603	565307	61296
Shaanxi	1184076	804348	379728	2463671	2400791	62880	2053418	1287946	765472	2079101	1958767	120334
Sichuan	4090241	3644695	445546	6371954	6069628	302326	4822301	3628612	1193689	5036770	4445957	590813
Tibet	54025	46074	7951	107211	92528	14683	52822	40768	12054	138183	120127	18056
Xinjiang	1062294	735697	326597	990626	1047890	-57264	1365561	1014305	351256	1242238	1025716	216522
Yunnan	1709706	1380421	329285	2269615	2272023	-2408	2812847	2671120	141727	2184533	2233186	-48653

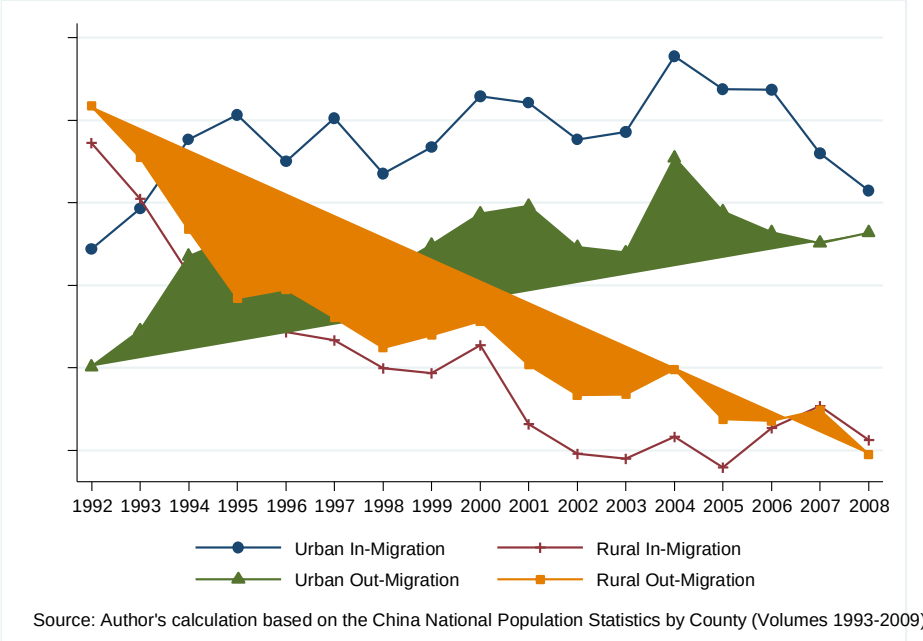
Source: Author's calculation based on *China National Population Statistics by County* (Volumes 1993–2009).

Figure 6.10 Intraprovincial Migration by Region and Year



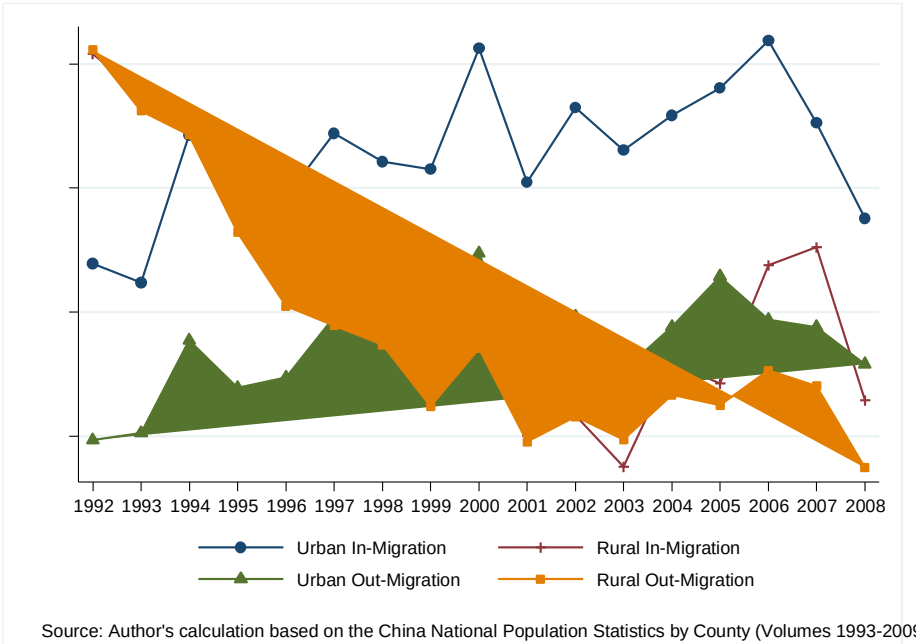
Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

Figure 6.11 Intraprovincial Migration in Easter Region by Year



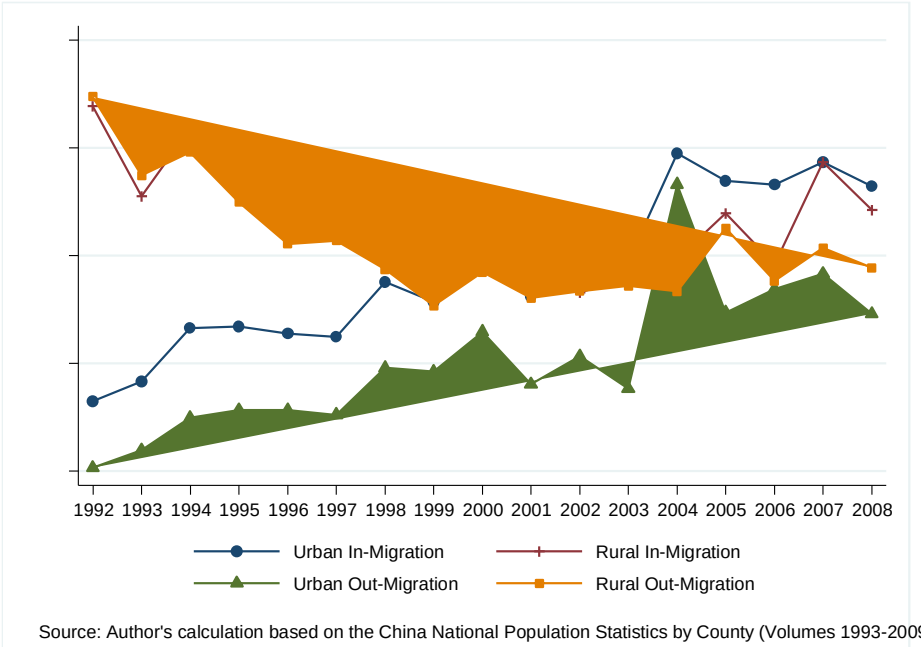
Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

Figure 6.12 Intraprovincial Migration in Central Region by Year



Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

Figure 6.13 Intraprovincial Migration in Western Region by Year



Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

6.3.2 Interprovincial Migration

Second, let us summarize the patterns of interprovincial migration. Table 6.5 depicts interprovincial migration by time period and province. Guangdong had the highest net migration volume in both the 1990s and the 2000s. Sichuan had the lowest net migration in the 1990s, and Heilongjiang had the lowest net migration in the 2000s. Net migration also exhibited significantly bigger volumes and larger range; the highest net migration figure increased from 864,560 (in Guangdong) in the 1990s to 1,642,555 (in Guangdong) in the 2000s, and the lowest net migration figure decreased from -303,676 (in Sichuan) in the 1990s to -508,077 (in Heilongjiang) in the 2000s. These changes indicate that receiving places were gaining population through migration, while sending places lost more through it (Fan, 2005).

During the time period 1992–1999, most eastern provinces except Fujian experienced positive net migration in urban areas. A majority of central provinces except Anhui, Heilongjiang, and Jiangxi experienced positive net migration in urban areas. Similarly, a majority of western provinces except Guizhou, Qinghai, Sichuan, and Tibet experienced positive net migration in urban areas. On average, eastern provinces had higher net migration in urban areas than did central provinces, which in turn had higher net migration in urban areas than did western provinces. Besides being the province with the largest intraprovincial net migration in urban areas, Guangdong was also the province with the largest interprovincial net migration in urban areas during the time period 1992–1999. Not surprisingly, Shanghai and Beijing had the second and third largest interprovincial net migration in urban areas. Among eastern provinces, Fujian was the only province that had negative interprovincial net migration in urban areas. The central region had more provinces with negative interprovincial net migration in urban areas, and

Jiangxi Province had the largest negative interprovincial migration in urban areas. The western region had even more provinces with negative interprovincial net migration in urban areas; Qinghai Province had the largest negative number. Among all provinces with negative interprovincial net migration in urban areas, the most prominent were located in south-central and southwestern China, including Anhui, Jiangxi, Qinghai, Sichuan, Guizhou, and Tibet; these provinces are among the least developed in China. Among all provinces with positive interprovincial net migration in urban areas, Chongqing Province had the smallest number, followed by Guangxi, Gansu, and Hainan.

In rural areas, a majority of eastern provinces except Beijing, Guangdong, Hebei, Shanghai, and Tianjin had negative interprovincial net migration during the time period 1992–1999. Most central provinces except Henan had negative interprovincial net migration, and most western provinces except Ningxia and Xinjiang had negative interprovincial net migration. On average, the western region was a population-losing area, with larger negative intensity than both the central and eastern regions. Henan Province had the largest interprovincial net migration in rural areas, followed by Guangdong and Xinjiang. Among all the provinces with negative interprovincial net migration in rural areas, Sichuan had the largest number, followed by Anhui, Heilongjiang, and Chongqing.

Table 6.5 combines interprovincial net migration in both urban and rural areas to show that Guangdong was the largest population-receiving province, followed by Henan, Shanghai, and Beijing. The southern half of the eastern region, along with Beijing and Tianjin, received the largest share of interprovincial migration, and also led most provinces in increase in development levels over the time period. On average, the eastern region was the population-receiving area, while the central region was the population-losing area. The western region was something in

between. In particular, Sichuan is the largest source of interprovincial migration. The increased prominence of western provinces such as Xinjiang, Chongqing, and Tibet in attracting migrants is reflected by the fact that Xinjiang's net migration volume rose by almost 60%, from 448,312 to 706,644, and both Chongqing and Tibet switched from being net exporters in the 1990s to being net importers in the 2000s.

Both periods show positive net migration for the eastern region and negative net migration for the western region. The central region had positive net migration in the 1990s and negative net migration in the 2000s. Moreover, in the latter period, we observe that both the absolute number of net migration and the disparity among the three regions became larger. The net result is that the eastern region experienced a greater gain in interprovincial migration; the central region was a net importer but replaced the western region to become the largest net exporter; and the western region remained a net exporter, but its loss of population through interprovincial migration dropped. In other words, these changes indicate the predominance and acceleration of migration flows from the two inland regions to the coastal region, with a possible step migration phenomenon—western migrants moved to the central region, and then to the eastern region—between the early 1990s and the late 2000s.

During the time period 2000–2008, table 6.5 shows that Guangdong remained the province with the largest interprovincial net migration in urban areas, again followed by Beijing and Shanghai. All eastern provinces, including Fujian, had positive interprovincial net migration in urban areas, pulling migrants from many especially poor provinces. Moreover, most eastern provinces had much larger interprovincial net migration between 2000 and 2008 than during the time period 1992–1999. Shandong and Hebei are two exceptions: they both had less interprovincial net migration in urban areas. Most central provinces except Shanxi, however, had

negative interprovincial net migration, while in the time period 1992–1999 there were only three provinces—Anhui, Heilongjiang, and Jiangxi—that had negative interprovincial net migration in urban areas. Interestingly, in the time period 2000–2008, most western provinces except Gansu had positive interprovincial net migration in urban areas. This is quite different from the time period 1992–1999, during which more western provinces, such as Guizhou, Qinghai, Sichuan, and Tibet, had negative interprovincial net migration in urban areas.

Table 6.5 show that during the time period 2000–2008, most western provinces except Xinjiang and Tibet experienced negative interprovincial net migration in rural areas. Most central provinces except Henan experienced negative interprovincial net migration in rural areas. In the eastern region, the pattern is not so clear. The most-developed provinces, such as Beijing, Shanghai, Guangdong, Tianjin, and Zhejiang, had positive interprovincial net migration even in their rural areas, while the less-developed provinces, such as Fujian, Guangxi, Hainan, Hebei, Jiangsu, and Shandong, had negative interprovincial net migration in rural areas.

Now let's identify more specifically the gainers and losers of migration at the provincial level. In the time period 1992–1999, Guangdong revealed the highest net migration. Eight other eastern provinces (including Shanghai and Beijing), five central provinces (including Henan), and two western provinces (Xinjiang and Ningxia) also demonstrated positive net migration. The rest of the country had negative net migration. In the time period 2000–2008, variations in provincial net migration increased. Guangdong, Beijing, and Shanghai led the nation with close to or over 1 million. Guangdong was the most sought-after destination of interprovincial migration for both decades. Other eastern provinces, except Guangxi and Hebei, all showed positive net migration volumes. As in the previous period, the two western provinces of Xinjiang and Ningxia continued to have positive net migration; they were joined in the time period by

Chongqing and Tibet in the southwest. In particular, Xinjiang attracted a larger volume of net migration than most other inland provinces, partially due to its trade-related economic growth (Loughlin & Pannell, 2001).

Combining the effects of interprovincial migration in both urban and rural areas, Guangdong was the province with the largest net interprovincial migration during the time period 2000–2008, again followed by Beijing and Shanghai. The next-highest population-absorbing provinces were Xinjiang, Jiangsu, and Zhejiang.

Regarding intertemporal patterns in urban areas, most eastern provinces except Hebei and Shandong experienced significant increases in interprovincial migration. Fujian had negative interprovincial migration in urban areas during the time period 1992–1999, but had positive interprovincial migration in urban areas during the time period 2000–2008. Interprovincial migration in urban areas in Guangxi increased by more than twenty-six times across these two periods. Most western provinces except Gansu had significant increases in interprovincial migration in urban areas across these two periods. In particular, interprovincial migration in urban areas in Chongqing increased by more than 120 times across the two periods. However, all central provinces had significant decreases in interprovincial migration in urban areas. Generally speaking, as time went on, urban areas in most eastern and western provinces witnessed population gain in terms of interprovincial migration, which is consistent with the continuing development of coastal areas and the influence of the Western Development Program proposed by the central government in the late 1990s.

Considering the intertemporal patterns in rural areas, most eastern provinces except Fujian, Hainan, and Zhejiang experienced significant deceases in interprovincial migration. Most central provinces except Hunan also experienced significant decreases in interprovincial

migration in rural areas. Most western provinces except Sichuan, Tibet, and Xinjiang experienced significant decreases in interprovincial migration. Generally speaking, as time went on, rural areas in most provinces all over China witnessed a drop in population in terms of interprovincial migration, which is consistent with the urbanization process in modern China over the past twenty years.

Except for Xinjiang and Ningxia, all previously net-importing provinces in the inland regions, including Henan, Hubei, Hunan, Jilin, and Shanxi, turned into net exporters in the 2000s. Among provinces with negative net migration across China, the most prominent during the time period 1992–1999 were concentrated in south-central and southwestern China, including Fujian, Guangxi, Anhui, Jiangxi, Chongqing, Guizhou, and Sichuan. Heilongjiang was also a prominent migrant exporter during the 1990s. These provinces were among the least developed in China. In the time period 2000–2008, only Sichuan, Anhui, and Heilongjiang remained among the most prominent sending places; they were joined by the western province of Gansu. Sichuan was the largest source of interprovincial migration in the 1990s, but in the 2000s its rank dropped to fourth in net out-migration, and the central provinces of Heilongjiang and Anhui moved ahead of it. Clearly, Heilongjiang and Anhui contributed significantly to changing the central region from a net importer in the 1990s to a net exporter in the 2000s. These changes also reflect the fact that the origins of interprovincial migration flows became more and more diverse, partly because many more poor provinces, following the model of Sichuan, aggressively utilized labor exports as an economic strategy.

Figure 6.14 shows that net interprovincial migration in the eastern region exhibited a significant increasing pattern across these two periods. Net interprovincial migration in the central region exhibited a significant decreasing pattern across the two periods. Net

interprovincial migration in the western region remained stable, and showed a slight increasing trend during the time period 2000–2008, indicating the effect of the Western Development Program. Moreover, we can observe clearly that both the net volume and the discrepancy among these three regions grew larger. During the time period 1992–1999, net interprovincial migration in the central region was larger than that in the western region, but the ranking reverses in the time period 2000–2008, indicating that the eastern region became more and more concentrated in terms of attracting migrants from both the central and western regions. In particular, the central region was a population-gaining area during the time period 1992–1999 and a population-losing area during the time period 2000–2008.

Now let us examine the different regions respectively. Figure 6.15 shows that urban areas in the eastern region exhibited a significant increasing pattern across these two time periods, and that urban-in migration was much more intense than urban-out migration. The pattern of interprovincial migration in rural areas in the eastern region looks stable, though rural out-migration was slightly larger than rural in-migration. Overall, it is no surprise that most interprovincial migration in the eastern region flowed to urban areas. Figure 6.16 shows that urban areas in the central region gained population during the time period 1992–1999, since urban in-migration was larger than urban out-migration. However, the relation reversed during the time period 2000–2008, because urban in-migration became less than urban out-migration. Most of the time, rural areas in the central region lost population to the eastern region in particular, and to the western region as well. Figure 6.17 shows that urban areas in the western region gained population during the time period 1992–1999, and the volume of the gain significantly increased during the time period 2000–2008, thanks to the Western Development Program. Rural areas in the western region lost population all the time.

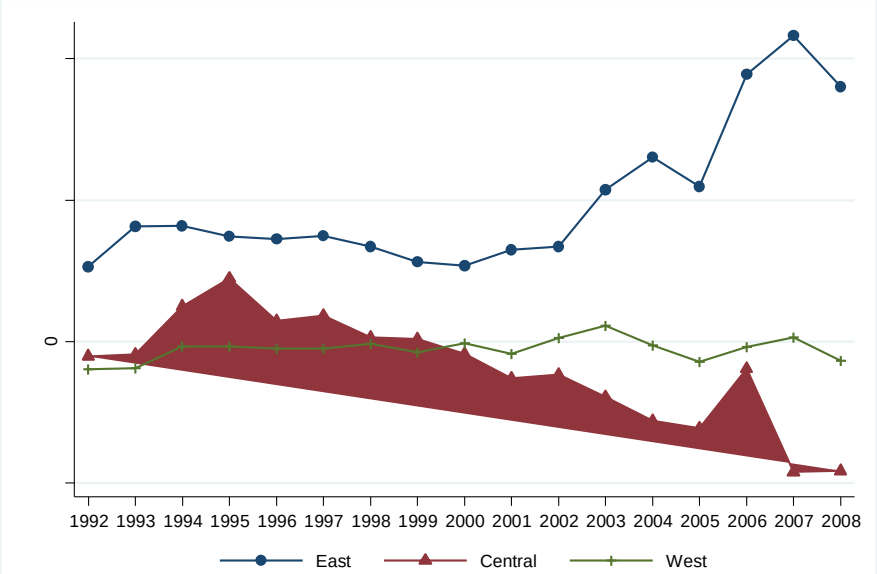
In the following three sections, I address two sets of explanations for interprovincial and interregional inequalities. I test whether intraprovincial and interprovincial migration help offset inequalities and whether the offsetting effects differ across regions and time periods.

Table 6.5 Interprovincial Migration by Time Period and Province

	Interprovincial Migration 1992–1999							Interprovincial Migration 2000–2008						
	Urban			Rural			Total	Urban			Rural			Total
Province	In	Out	Net	In	Out	Net	Net	In	Out	Net	In	Out	Net	Net
Eastern	***7485228***	***4692076***	***2793152***	***2605393***	***2601638***	***3755***	***2796907***	***14089902***	***8022706***	***6067196***	***3254659***	***3729438***	***-474779***	***5592417***
Beijing	716529	296568	419961	131208	49760	81448	501409	1545135	444523	1100612	54649	10471	44178	1144790
Fujian	305908	332127	-26219	128935	219428	-90493	-116712	633230	535074	98156	286064	353123	-67059	31097
Guangdong	1251825	642212	609613	488627	233680	254947	864560	2447208	984390	1462818	427529	247792	179737	1642555
Guangxi	164639	161952	2687	158283	311255	-152972	-150285	493667	418748	74919	423722	587440	-163718	-88799
Hainan	81473	66045	15428	43836	94928	-51092	-35664	309117	209996	99121	41309	73138	-31829	67292
Hebei	630293	419365	210928	457689	381851	75838	286766	1137576	976445	161131	634369	800605	-166236	-5105
Jiangsu	876335	657725	218610	258387	276527	-18140	200470	1920553	1210822	709731	345102	466031	-120929	588802
Liaoning	749446	454780	294666	189253	207222	-17969	276697	1057628	726868	330760	182935	201434	-18499	312261
Shandong	1016135	728766	287369	415189	513778	-98589	188780	1311454	1083203	228251	404531	582720	-178189	50062
Shanghai	880534	404354	476180	100205	57506	42699	518879	1286773	357275	929498	31676	11531	20145	949643
Tianjin	328155	175801	152354	63112	52973	10139	162493	731914	385586	346328	56933	55854	1079	347407
Zhejiang	483956	352381	131575	170669	202730	-32061	99514	1215647	689776	525871	365840	339299	26541	552412
Central	***4202884***	***3395041***	***807843***	***2639594***	***3011419***	***-371826***	***436017***	***6566841***	***7438703***	***-871861***	***3647153***	***4868806***	***-1221653***	***-2093514***
Anhui	301281	318162	-16881	272344	434171	-161827	-178708	508193	690821	-182628	467350	755663	-288313	-470941
Heilongjiang	564655	582702	-18047	293693	460933	-167240	-185287	706618	1001161	-294543	263039	476573	-213534	-508077
Henan	793824	423983	369841	891988	608548	283440	653281	911090	1016656	-105566	805932	768567	37365	-68201
Hubei	748274	562557	185717	170190	198142	-27952	157765	1488559	1606301	-117742	355106	507955	-152849	-270591
Hunan	537921	391760	146161	267826	353600	-85774	60387	760758	808792	-48034	596240	669925	-73685	-121719
Inner Mongolia	221479	202888	18591	202828	270307	-67479	-48888	349655	384652	-34997	284790	417886	-133096	-168093
Jiangxi	201564	252443	-50879	156457	261580	-105123	-156002	649019	701349	-52330	475399	663742	-188343	-240673
Jilin	491262	423728	67534	204565	228234	-23669	43865	652807	732965	-80158	126803	209441	-82638	-162796
Shanxi	342624	236818	105806	179703	195904	-16201	89605	540142	496006	44136	272494	399054	-126560	-82424
Western	***2161909***	***1813039***	***348870***	***1541634***	***2215866***	***-674232***	***-325362***	***4579461***	***3695245***	***884216***	***2691694***	***3712770***	***-1021076***	***-136860***
Chongqing	245717	243619	2097	128700	288781	-160081	-157984	841531	580732	260799	268044	488336	-220292	40507
Gansu	256571	244131	12440	103190	175879	-72689	-60249	347957	455369	-107412	216233	517443	-301210	-408622
Guizhou	141847	159106	-17259	101838	217568	-115730	-132989	291767	291251	516	219544	391421	-171877	-171361
Ningxia	82966	56122	26844	59329	56773	2556	29400	182280	132383	49897	78861	92308	-13447	36450
Qinghai	44208	65619	-21411	37777	80286	-42509	-63920	87346	84025	3321	66093	119848	-53755	-50434
Shaanxi	402816	296330	106486	180167	298484	-118317	-11831	807252	688367	118885	366118	497769	-131651	-12766
Sichuan	388319	404310	-15990	381333	669019	-287686	-303676	887166	844542	42624	714846	1034360	-319514	-276890
Tibet	23926	24754	-828	18914	20753	-1839	-2667	36405	23524	12881	42827	28005	14822	27703
Xinjiang	449507	223474	226033	383100	160821	222279	448312	793283	381933	411350	512202	216908	295294	706644
Yunnan	126032	95574	30458	147286	247502	-100216	-69758	304474	213119	91355	206926	326372	-119446	-28091

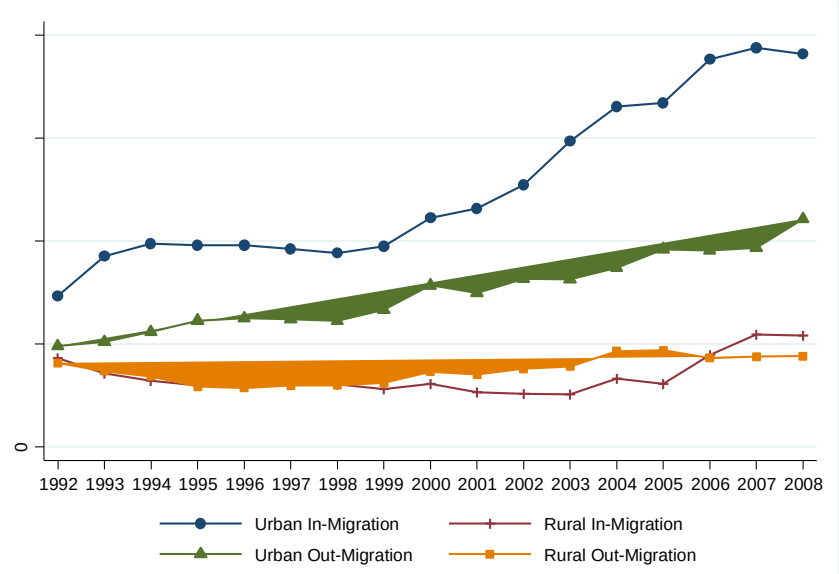
Source: Author's calculation based on *China National Population Statistics by County* (Volumes 1993–2009).

Figure 6.14 Net Interprovincial Migration by Region and Year



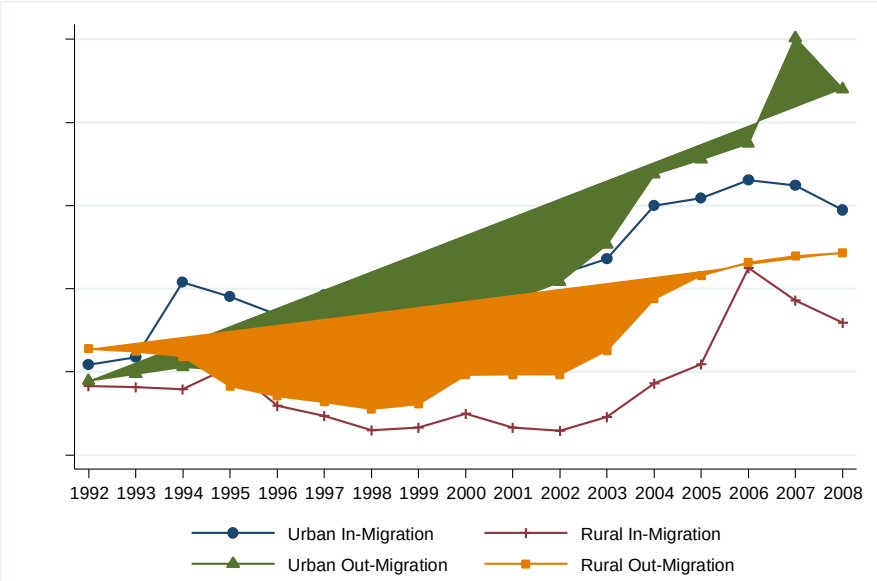
Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

Figure 6.15 Interprovincial Migration in Eastern Region by Year



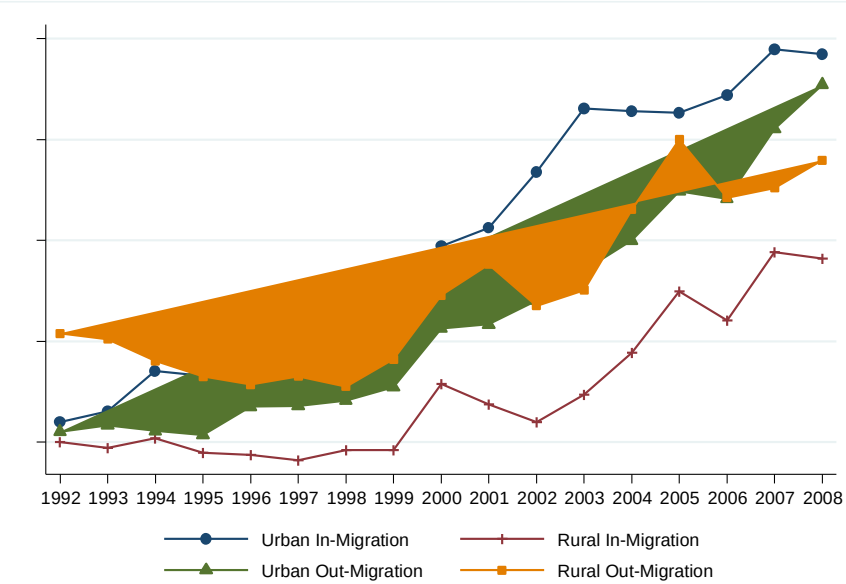
Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

Figure 6.16 Interprovincial Migration in Central Region by Year



Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

Figure 6.17 Interprovincial Migration in Western Region by Year



Source: Author's calculation based on the China National Population Statistics by County (Volumes 1993-2009).

7.0 MIGRATION AND CONVERGENCE ANALYSIS

In this chapter, I address two sets of explanations for interprovincial and interregional inequalities. I test whether intraprovincial and interprovincial migration helps offset inequalities and whether the offsetting effects differ across regions and time periods. Specifically, I present and discuss the results of statistical models for the growth rate of provincial per capita GDP and for provincial contribution to the national Theil Index, with main input variables being intraprovincial migration variables and interprovincial migration variables, respectively.

7.1 UNCONDITIONAL AND CONDITIONAL CONVERGENCES

It has been mentioned in the descriptive statistics that interprovincial inequality increases with fluctuation between 1992 and 1999, remains relatively stable and increases only slightly from around 1999 to around 2004, and declines after 2004. This indicates a possible convergence tendency across provinces within my study period. There are two important concepts of convergence in the neoclassical growth model: absolute or unconditional α-convergence, and conditional β-convergence. The former refers to the reduction in the variance of income across economies, while the latter occurs when poorer economies catch up to the richer ones (holding only within groups of economies that share the same steady states). In other words, conditional β-convergence should control for the differences in the determinants of their steady states in the

convergence regression equation. The differences included in the following convergence regressions are initial per capita GDP, initial human capital level, employment rate, comparative agricultural productivity, investment rate, and government intervention. In theoretical growth models, β-convergence is based on the assumption of diminishing returns to capital—that is, the marginal productivity of capital decreases with its accumulation (Barro & Sala-i-Martin, 2004; Phan, 2008).

In this section, I discuss the results of statistical models for unconditional and conditional convergences. Model 1 in table 7.1 presents the result of a standard unconditional or absolute convergence regression for China, in which the log of average growth rate of per capita GDP from 1993 to 2008 is regressed against the log of 1992 per capita GDP. There is no evidence of either convergence or divergence: initial economic condition plays no role in determining subsequent growth rates for the entire study period, which confirms our previous observation in figure 6.1.

It has often been argued that subnational economic units (e.g., provinces) within a nation should not differ too much in their steady states, so poorer units growing faster than richer ones and the with-country unconditional convergence is expected (Phan, 2008). However, sometimes there are reasons for developing countries to not expect similar steady states across subnational units. For instance, as noted by Phan (2008), if product markets and factor markets are less well integrated and capital is highly concentrated by location, the mechanism for convergence will operate imperfectly, and unconditional convergence within a country might be prevented. Studies of subnational convergence within other developing countries also find no evidence of unconditional convergence due to similar reasons (Phan (2008) on Thailand; Toya et al. (2004) on the Philippines; Kirdar & Saracoglu (2006) on Turkey). Another possible explanation is

related to the famous Kuznets curve—the inverted *U*-shaped relationship between income and inequality—which states that for low-income countries, the distribution of income first becomes more unequal as income increases, and then inequality decreases as income continues rising. This reason seems more relevant to this study based on the findings in the descriptive statistics section.

I next investigate conditional convergence by including all the control variables (i.e., initial per capita GDP, initial mean years of schooling of working population, employment rate, comparative labor productivity, investment rate, and government expenditure share) in the equation. These control variables represent a set of province-specific characteristics that determine the long-run steady state growth path of per capita GDP. The analytic results of conditional convergence for all Chinese provinces and for the three regions (SEM) are presented in model 2a and model 2b in table 7.1. Despite only partially controlling for steady-state variables, most coefficients are statistically significant with expected signs, including that of initial per capita GDP. In addition, I regress the dependent variable measuring provincial contribution to the national interprovincial Theil Index against the aforementioned control variables, for all provinces and for the three regions (SEM), to provide supplementary explanations for interprovincial convergence.

First, I consider the initial conditions—per capita GDP and human capital stock in 1992. Controlling for other control variables measuring provincial characteristics, the relationship between initial per capita GDP and economic growth is negative and significant, consistent with the conditional convergence hypothesis. The estimated coefficient implies that a 1% increase in initial level of per capita GDP is estimated to result in about a 0.05% decrease in provincial economic growth, holding other factors constant. The results of SEM or seemingly unrelated

regression equations (model 2b in table 7.1) show that the negative relationship between initial per capita GDP and economic growth is significant only for the eastern region. This finding confirms my previous observation in the descriptive statistics section that when the old industrial provinces in the eastern region experience slower growth, several coastal provinces—Guangdong, Zhejiang, Jiangsu, Fujian, and Shandong—with much lower initial developmental conditions continue to grow at rapid rates and emerge as new growth cores. The net effect is a convergence in per capita GDP within the eastern region.

Initial human capital endowment has a significantly positive impact on economic growth. A 1% point higher initial mean years of schooling of working population is associated with a 0.11% higher growth rate of per capita GDP. Since human capital is a cumulative factor and is essential to the long-term growth process, investment in education helps reduce spatial economic disparity (Cai, Wang, and Du, 2002; Fleisher & Chen, 1997); my results confirm this hypothesis. The results of SEM (model 2b in table 7.1) show that the positive relationship between initial human capital level and economic growth exists only for the western and central regions, and is significant only for the western region. A possible explanation for this finding is that over my study period, the inland regions, especially the western region, were in the process of adopting new and advanced technologies imported from the eastern region to speed up economic development. It is often argued that high levels of human capital facilitate technology adoption and therefore promote economic growth.

Second, the estimated coefficient of the variable measuring the comparative productivity of agricultural labor has unexpected negative sign and no significance. The region-wise SEM does not generate significant results either. The literature suggests that improvements in intersectoral allocative efficiency of labor, indicated by the comparative productivity of

agricultural labor, contribute to the economic growth (e.g., Cai, Wang, and Du, 2002). My results contradict the literature and imply that there are certain impediments to labor allocation, which might explain its inability to affect local economic growth and reduce spatial inequality. As discussed earlier, internal labor migration in China is heavily controlled and regulated by *hukou* system, and thus it is understandable that labor allocation is not efficient enough to boost convergence.

Last, the estimated coefficients of the following three variables have their expected signs and reasonable significance. The implications are as follows. The correlation between employment rate and provincial growth rate is positive and statistically significant, as expected. An increase of 1% in the employment rate is associated with an increase in the growth rate of 0.19%. Based on the results of the SEM, the positive relationship between employment rate and provincial growth is significant only for the eastern and western regions. I find these results intuitive, as the coastal areas have long concentrated in labor-intensive manufacturing and service industries, and thus their unemployment rates have been relatively low compared to those of the rest of the country. On the other hand, the Western Development Program launched in 1999 promoted industries that rely on the west's comparative advantages in minerals and other resources, crops (such as fruit in Xinjiang), and cattle, and encouraged tourism and related service industries in the west. All of the above efforts created employment opportunities, facilitated labor reallocation, and reduced unemployment and underemployment.

The share of investment in GDP has a positive and significant effect on provincial growth. An increase of 1% in the share of investment in GDP raises annual economic growth by 0.31%. According to the SEM, the positive relationship between investment and growth exists in all three regions but is significant only in the central and western regions. Again, the Western

Development Program supported massive investments in infrastructure and income-generating activities in the inland areas. Moreover, less-developed regions (e.g., the western and central regions) grew faster because investment in capital produced higher returns than in richer regions (e.g., the eastern region) with ample accumulated capital. In other words, poorer regions tend to use their resources more efficiently, and there are diminishing returns to capital. Thus, as my results imply, the positive impact of investment on growth speed only shows significance for the two inland regions.

The impact of government consumption expenditure in GDP on provincial economic growth is negative and statistically significant. An increase of 1% in the share of government expenditure in GDP is associated with a 0.23% decrease in growth rate. The SEM results show that this negative relationship between government intervention and economic growth exists for all three regions, but it is only statistically significant for the eastern and central regions. The magnitude of its regression coefficient is greatest for the eastern region, followed by that for the central region. Along with the fact that government consumption in GDP takes on the highest value in the western region and the lowest value in the eastern region, these findings indicate that areas closer to the outside world are more on the side of market-oriented mechanisms in which government intervention may hinder economic growth, and the inland areas are still on the side of legacy central planning, in which top-down policies like the Western Development Program can be quite beneficial to economic development.

As noted in previous studies, analytic results based on conventional OLS regression need to be interpreted with caution, given that there are many omitted variables and that correlations exist among the independent variables on the right side of the regression equation (Phan, 2008). Therefore it is necessary to utilize the fixed-effects method to control for all time-invariant

differences between provinces, so the estimated coefficients of the fixed-effects models cannot be biased due to omitted time-invariant characteristics, such as geographic conditions, weather, culture, etc. However, one side effect of the features of fixed-effects models is that they cannot be used to examine time-invariant explanatory variables (e.g., initial per capita GDP and initial mean years of schooling of working population) because those variables are constant for each province (Torres-Reyna). Therefore, for the first two models testing unconditional and conditional convergence hypotheses, I use pooled OLS regression to explain the relationship between initial state and growth rate. For the following models that incorporate migration-independent variables, I use fixed-effects models to deal with the potential problem of omitted variables and to control for time-invariant characteristics of provinces.

Now let us consider the link between migration and convergence. As discussed earlier, the neoclassical growth model predicts that labor typically flows from low-wage areas to high-wage areas to maximize personal income, which equalizes the capital-labor ratio and per capita GDP growth across areas, speeding up convergence (Phan, 2008). Models 3a and 3b in table 7.2 and models 4a and 4b in table 7.3 show fixed-effects estimates using the same group of control variables, except for the initial-conditions variables, due to their invariability over time, as well as intraprovincial migration variables as the main predictors. The signs of fixed-effects estimates for control variables are largely the same as those of the OLS estimates, with slight changes in statistical significance. These changes might be caused by multicollinearity between the two dropped variables measuring initial state conditions and the remaining control variables; the latter are sensitive to the former even if the former are not significant variables. Regarding the impact of intraprovincial migration, urban in-migration has a positive effect on the provincial

GDP growth rate, while urban out-migration has a negative effect on provincial growth. These effects are statistically significant only for the western region.

7.2 INTRAPROVINCIAL MIGRATION AND CONVERGENCE

After examining unconditional and conditional convergence in China, the next task is to introduce the influence of the labor market into the discussion and to consider the link between migration and convergence. As discussed thoroughly in the review of existing literature, the theoretical impact of labor migration on economic convergence and the related empirical findings are ambiguous, even within the paradigm of neoclassical models. For example, conventional neoclassical models predict that labor will flow from less-developed places (and hence lower wages) to more-developed places (and hence higher wages), and that labor mobility tends to equalize the ratio of capital to labor across places, therefore facilitating spatial convergence (Phan, 2008). On the other hand, theories like the new economic geography introduce the effect of agglomeration externalities: there are economies of scale in the production function, and thus labor migration from poor to rich areas promotes rich areas' high growth and facilities poor areas' low growth and income traps (Phan, 2008). Similarly, Rapport (2005) argued that under the assumption that migrants do not bring much capital with them, the exit of labor from poor economies lowers the return to capital there, and therefore hinders gross capital formation (Phan, 2008).

Against this background, I add migration variables into the convergence regression and examine the link between migration and convergence. I test the impact of intraprovincial migration in this section and the impact of interprovincial migration in the next section. For each

section, I separate the four migration variables (urban in-migration, urban out-migration, rural in-migration, and rural out-migration) into two groups based on the urban/rural division within a province—urban in-migration and urban out-migration versus rural in-migration and rural out-migration—and analyze two separate regression equations. The reason for doing this is to remedy the imperfect multicollinearity resulting from highly correlated explanatory variables such as urban in-migration and rural out-migration. As frequently reported in news and academic research, a majority of the rural out-migrants in China choose urban areas as their destinations. As Chan (2012) noted, the last three decades witnessed the world's "Great Migration," in which an estimated 200–250 million members of the rural population moved to cities and towns within China. Therefore, it is intuitive that rural out-migration and urban in-migration are highly positively correlated, if not perfectly correlated, which is confirmed by examining the simple correlation coefficients between them using my dataset. Moreover, the Variance Inflation Factors (VIFs) calculated for both independent variables equal 36.0, confirming the quite severe multicollinearity we already suspected to exist.

The results (model 3a in table 7.2) show that a firm conclusion about the impact of intraprovincial migration related to urban areas cannot be drawn on the full sample, because the coefficients of urban in-migration and urban out-migration are neither of them statistically significant. However, one can find in the SEM results that, for intraprovincial migration in western provinces, urban in-migration has positive and significant effects on the GDP growth rate, while urban out-migration has negative and significant effects. These effects are not significant at all for the rest of the country.

For intraprovincial migration in central provinces, urban in-migration has no significant effect on growth, but its interaction with the time period dummy has a negative and significant

effect. To further examine why and how its impact differs across time for the central region, I break the sample into two separate subsamples by the two time periods and estimate the SEM regression separately for each subsample. The SEM results for subsamples, not reported in table 7.2, show that for the central region, intraprovincial urban in-migration has a positive and significant effect on growth for the 1990s subsample, but the positive effect decreases and loses significance in the 2000s subsample. This difference can explain why intraprovincial urban in-migration has no significant effect for the central region but significant difference across time periods.

Based on model 4a in table 7.3, intraprovincial rural out-migration has a positive and significant effect on the growth rate, while intraprovincial rural in-migration has a negative and significant effect on the growth rate. Their effects are stronger during the 1990s than in the 2000s, due to the significant period interaction terms. Moreover, when looking closely at the SEM results, one can find that these effects mostly come from the western region. Specifically, the effects of intraprovincial rural in-migration and out-migration are statistically significant only for the western region.

The next step is to test how intraprovincial migration affects overall inequality in China. In the conventional convergence analysis reported above, we consider the potential convergence or divergence tendency through the relative growth speed of each province. With the decomposition methodology using the additively decomposable Theil Index (explained in the methods section), one can assess the relative contributions over time of each province to the evolution of overall inequality in China. In other words, the first method studies whether migration leads to convergence by looking at individual provinces' behavior at the local level, while the second method focuses on the simultaneous behavior of all relevant locations at the

national level and considers the costs and benefits of migration for both the home and host provinces (and regions).

The results are reported in models 5a and 5b in table 7.4 and models 6a and 6b in table 7.5, in which the provincial contribution to the overall Theil Index is regressed against intraprovincial migration variables. In such models, a positive estimated coefficient means a diverging effect, while a negative estimated coefficient means a converging effect. There is no evidence of either convergence or divergence in the pooled model, except that the result of the time slope dummy variable indicates that the effect of intraprovincial urban in-migration on growth rate differs across time periods. Further examination of the same regression equation for subsamples based on time period shows that intraprovincial urban in-migration has a negative and significant effect on total inequality in the 1990s subsample; this converging effect decreases and loses significance in the 2000s subsample.

The SEM results in model 5b show that intraprovincial urban in-migration has a negative and converging effect on overall inequality; this effect is statistically significant only for the central and western regions. For the central region, the negative effect of urban in-migration becomes smaller as we move from the time period 1992–1999 to the period 2000–2008. The estimated coefficient of intraprovincial urban out-migration has significance only for the central region. It has a positive and diverging effect on overall inequality during the 1990s; the effect becomes negative and converging during the 2000s. The estimated coefficient of intraprovincial rural out-migration is significant only for the central region again. It has a negative and converging impact on overall inequality for the time period 1992–1999, and the effect becomes positive and diverging for the period 2000–2008. The estimated coefficient of rural in-migration is not significant for the central region, but it differs significantly across time periods. Further

examination of period-based subsamples shows that the estimated coefficient of intraprovincial rural in-migration is positive (diverging) and significant on the 1990s subsample, but turns to negative and significant on the 2000s subsample.

Now let's summarize the findings of the link between intraprovincial migration and spatial economic convergence. For the entire country, urban in-migration reduced overall inequality only for the 1990s; rural out-migration accelerated economic growth, but its effect diminished over time. These effects came largely from the western region, and to a lesser extent from the central region.

In the eastern region, intraprovincial migration had no significant impact on economic growth rate or total national inequality.

For intraprovincial migration in the central region, urban out-migration accelerated economic growth only in the 1990s; it reduced overall inequality, but this effect diminished over time. Urban out-migration increased overall inequality during the 1990s, but decreased inequality during the 2000s. Rural out-migration reduced overall inequality in the 1990s, but increased inequality in the 2000s. Rural in-migration increased overall inequality during the 1990s, and decreased inequality during the 2000s.

For intraprovincial migration in the western region, urban in-migration accelerated economic growth and reduced overall inequality, while urban out-migration reduced the growth rate. Rural out-migration increased the growth rate, while rural in-migration reduced the growth rate, but its effect diminished over time.

In short, the results imply that rural-to-urban migration within a province accelerated the province's economic growth in general. This effect was particularly prominent in the western provinces, followed by the central provinces. And this effect was stronger during the time period

1992–1999 than during the period 2000–2008. As for its convergence effect, intraprovincial rural-to-urban migration generally reduced the total inequality across all provinces, especially for intraprovincial migration occurring in inland provinces. However, this effect diminished over time; for the central region, the converging effect even switched to a slightly diverging effect in the 2000s.

These results are in line with the predictions of neoclassical growth theory that migration plays a critical role in promoting efficient factor allocation, arbitraging labor productivity differentials, and spreading the benefits of growth. Along with the implementation of economic reforms, the relaxation of migration controls brought about a sharp increase in mobility from low-productivity regions/sectors to high-productivity ones. Mass labor movement from the rural hinterland to urban areas has been the most impressive result. My results confirm that rural-to-urban migration within a province contributes greatly to the province's GDP growth by transferring underemployed or surplus rural labor to unskilled jobs in urban industrial sectors, thereby facilitating urban development and allowing the sending back of remittances to finance consumption and investment in rural areas.

The reason the positive impact of migration on growth is not significant for the eastern region is perhaps that the coastal region has had advantages in developing rural nonagricultural sectors and creating employment opportunities for local surplus labor. Thus, large numbers of rural laborers who were previously engaged in agriculture shifted to rural nonagricultural sectors such as the Township and Village Enterprises (TVEs), while rural underemployed laborers in inland regions had fewer opportunities to be employed locally, making migration the best option for them to better themselves through higher wages, and to better their families left behind through remittances. As a result, intraprovincial rural-urban migration seems to benefit the

economic growth of inland provinces and to reduce the coastal-inland gap, and thus the overall inequality level.

The beneficial effects of intraprovincial migration declined over time and became statistically insignificant or even reversed (in the case of the central region) during my second study period, the years between 2000 and 2008. The declining effects might be explained by the fact that the relative importance of intraprovincial migration declined and was replaced by increasingly active interprovincial and interregional migration through the 2000s, as elaborated in the descriptive statistics section. Moreover, the transfer of surplus rural labor to the urban sectors in the same provinces played an important role in efficiently reallocating factors of production and facilitating urban economic development in the initial years of the decade. However, since labor mobility within a province does not lead to change in the (physical and human) capital-to-labor ratio at the provincial level due to the low levels of physical capital in the inland areas, it is unable to cause sustainable growth in the long run.

7.3 INTERPROVINCIAL MIGRATION AND CONVERGENCE

Now let's consider whether migration across provinces has any impact on convergence at all. The results of the growth model (model 7a in table 7.6) show that no inferential conclusion about the impact of interprovincial migration can be drawn, because interprovincial migration variables' coefficients are not statistically significant at all for the full sample.

After getting into the SEM results, we find that for interprovincial migration occurring in eastern provinces, urban in-migration has a positive and significant impact on the provincial growth rate of per capita GDP; this impact increases over time.

For interprovincial migration occurring in central provinces, urban out-migration has a positive and significant impact on the growth rate. Urban in-migration has no significant effect on growth, but its coefficient differs over time. Further examination of subsamples separated by time period shows that for the central region, interprovincial urban in-migration has a positive and significant effect on growth in the 1990s subsample, but this effect decreases and becomes negative and significant in the 2000s subsample.

For interprovincial migration occurring in the western region, rural out-migration has a positive and significant effect on growth, while rural in-migration has a negative and significant effect that weakens over time.

In model 10a in table 7.9, the provincial contribution to the overall Theil Index is regressed against interprovincial migration variables. In the pooled model, interprovincial rural in-migration has a negative (converging) and significant impact on total inequality; this converging effect gets stronger during the second time period. Interprovincial rural out-migration has a positive and significant impact on total inequality.

Detailed results from the SEM model indicate that the abovementioned findings for the full model come mainly from the influence of the central region, and to a lesser extent the eastern region. For the eastern region, interprovincial rural out-migration has a positive (diverging) and significant effect on national inequality; this effect increases over time.

For the central region, interprovincial urban in-migration has a negative (converging) and significant effect on overall inequality; this negative effect weakens during the 2000s. Rural out-migration is a diverging factor between 1992 and 1999, but becomes a weak converging factor (coefficient negative but close to 0) between 2000 and 2008 due to the significance of the time period slope dummy. Rural in-migration has no significant effect on the full sample, but there is

a significant difference of estimated coefficient between the two time periods. Further analysis of the SEM on time-based subsamples shows that for central provinces, interprovincial rural in-migration has no significant effect on overall inequality during the 1990s but does have a negative (converging) and significant effect during the 2000s.

For the western region, the estimated coefficient of interprovincial urban out-migration is negative (converging) and statistically significant for the 1990s, but becomes positive and diverging for the 2000s. Rural in-migration has a positive and diverging effect on overall inequality; the effect is greater before 2000 than it is after. Rural out-migration has a negative and converging effect on overall inequality, but this effect turns positive and diverging after 2000.

Now let's try to synthesize and explain the findings of the relationship between interprovincial migration and spatial economic convergence. For the entire country, rural out-migration increased overall inequality; rural in-migration reduced overall inequality, and the converging effect was greater in magnitude and significance after 2000 than before. And both effects came mainly from the central region, and from the eastern region.

For the eastern region, urban in-migration accelerated the GDP growth of the receiving province; this effect increased over time. Following Deng Xiaoping's call for economic acceleration and further opening of China to the world in 1992, more cities—mostly concentrated in the eastern region, including the new cores of growth as discussed in the descriptive chapter—were opened, and China became a main trading country in the world and the largest recipient of Foreign Direct Investment (FDI) among the developing countries. The eastern region benefits much more from this push and various associated preferential policies than inland regions, in terms of attracting FDI and developing export industries (Zhang, 2012).

As a result, a vast volume of labor migration is attracted to the fast-growing eastern cities from the inland areas, as well as from relatively less-developed eastern areas, which helps the coastal region maintain rapid growth.

As in-migration to fast-growing coastal cities continued to relax labor supply constraints and attenuated the decrease in the marginal productivity of capital, fast growth was sustainable in the 2000s (Faini, 1996; Fu, 2004). Moreover, sufficient labor supply through in-migration might have interacted with increasing returns to scale to create industrial agglomeration or the so-called cumulative causation effect (Golley, 2002; Zhang, 2012). As a result, coastal provinces enjoyed higher growth rates, driven by the agglomeration effect and scale economies, during the 2000s. It is worth mentioning that in comparing the two time periods, the relative demand (and supply) for various skills has altered as a consequence of the change in the division of labor on the world scale. The majority of the leading coastal areas, as well as some following inland areas, now have stronger demand for skilled labor and reduced demand for unskilled workers (Zhang, 2012). Thus, urban in-migration has been an important driving force to meet the growth in demand for labor (increasingly for skilled labor) in the eastern provinces and enable their sustainable growth.

Moreover, for the eastern region, rural out-migration raised overall inequality, and this effect grew over time. Similarly, in the inland areas, rural surplus or underemployed labor was an issue at the beginning of the economic reforms. Those rural surplus laborers along the coast either moved to coastal cities that had large demand for labor to sustain their rapid development, or stayed where they were to be employed in local rural nonagricultural sectors such as TVEs. In other words, they mostly left their provinces but did not leave their regions.

On the one hand, rural out-migrants to eastern cities constitute an increasingly important group that meets the growth in demand for labor and enables cities and the entire coastal region to sustain their rapid growth. Remittances sent back to the eastern countryside can help rural areas overcome capital constraints and fuel rural growth, which is beneficial to the eastern economy as well. As a result, rural out-migration of eastern provinces may lead to a widening gap between the coastal and inland regions.

On the other hand, large numbers of migrants moved from the rural agricultural sector to rural nonagricultural sectors in the eastern fast-growth provinces, especially in the 1990s when reforms led to rapid growth of TVEs. As discussed earlier, the rural areas surrounding the coastal urban growth cores have benefited as some of the growth areas spilled over into these rural areas (Kanbur & Zhang, 1999). Consequently, these rural nonagricultural employees helped the development of the rural economy and received skill training in various export-oriented industries such as electronics and computer parts and textiles and footwear. During the late 1990s and the 2000s, the TVEs experienced major restructuring and decline, possibly due to increased deregulation of China's market economy and the resulting increase in private and foreign-owned enterprises. As a result, skilled labor gradually moved from relatively slow-growth eastern areas (including rural nonagricultural sectors) to fast-growth eastern areas to meet the growth in demand for skilled labor. Since these interprovincial rural out-migrants left their provinces but not their regions, their movements enabled the coastal region to sustain rapid growth as a whole and thus enlarge regional gaps. This effect was greater in magnitude and statistical significance after 2000 than it was before.

For the central region, interprovincial urban out-migration sped up the economic growth of the sending provinces. As a large proportion of the inland out-migrants moved to the coastal

areas, and emigrants usually remit 20 to 50 percent of their income back home (Fu, 2004; World Bank, 1997), it is not surprising that urban out-migration had a positive impact on the economy of the central region.

Interprovincial urban in-migration in the central region accelerated the growth of the receiving provinces during the 1990s but decelerated the growth of the receiving provinces during the 2000s. Moreover, urban in-migration reduced overall inequality; this effect diminished over time. Central urban in-migrants have mostly been underemployed laborers from rural areas and unskilled workers migrating from the relatively less-developed western provinces. During the 1990s, the marginal product of these migrants was much more than their wage rate, and they generated a large amount of surplus over their earnings; this surplus contributed to the development of selected central host provinces. During the 2000s, the coastal regions kept attracting FDI while the inland regions (especially the central region) had low levels of physical capital; urban in-migration in the central provinces lowered the (physical plus human) capital-to-labor ratio there (Zhang & Zou, 2012). Increasing out-migration of skilled labor from the inland to the coast also led to a decrease in the capital-to-labor ratio—the key determinant of per capita GDP growth in the neoclassical growth model (Phan, 2008)—and a decrease in marginal productivity of unskilled labor. As a result, urban in-migration decelerated the growth speeds of the central provinces and attenuated the decrease in regional gaps, as well as overall inequality.

Interprovincial rural out-migration in the central provinces raised overall inequality during the 1990s, but this diverging effect declined significantly, becoming a slightly converging effect during the 2000s. In the 1990s, most of the rural out-migrants in the central region chose coastal cities and the surrounding rural nonagricultural sectors where they could find better

opportunities and receive higher wages as their destinations. Out-migrants' remittances helped their home regions to alleviate capital constraints and promote economic growth, but the host coastal region tended to benefit more from these labor movements because they helped overcome labor supply constraints and contributed to sustainable growth in the east. Therefore, rural out-migration of central provinces led to an enlarged gap between the eastern and central regions and rising overall inequality during the 1990s. In the 2000s, the demand for and supply of skill levels changed in the coastal areas in a manner corresponding to changes in the division of labor on a world scale, relatively strengthening demand for skilled labor along the coast. The marginal productivity of unskilled labor decreased, and the surplus of output over average earning of unskilled labor also decreased in the eastern region. Hence, the contribution to the eastern development of rural migration from the central areas declined in the 2000s; its widening of regional gaps also declined significantly.

Interprovincial rural in-migration in central provinces reduced overall inequality only for the period after 2000. As discussed previously, the demand for unskilled rural labor in the coastal areas declined during the 2000s, thereby increasing the number of return migrants to inland home regions. Returnees brought back skills and capital and thus facilitated growth in the home economies and helped narrow the gap between their home regions and the fast-growth eastern region.

For the western region, both interprovincial urban out-migration and interprovincial rural out-migration reduced overall inequality in the 1990s while increasing overall inequality in the 2000s. As most of the out-migrants of western provinces flowed into eastern and central cities, the implications are as follows. During the 1990s, due to labor surplus and insufficient capital inflow in the western region, out-migration to capital-rich areas benefited the home region

through remittances, which raised household incomes and increased labor productivity resulting from resource reallocation. In addition, out-migration in the western region also helped relieve the fiscal burden imposed on native taxpayers. Thus, both urban and rural out-migration in western provinces helped narrow the regional gaps, and therefore reduced overall inequality. Moreover, as discussed in the descriptive statistics section, a proportion of the western out-migrants chose central cities to be their initial destinations as part of their step migration during the 1990s, which benefited the central economies and thus helped close the gap between the central and eastern regions (see findings for the central region above).

However, the beneficial effects of western out-migration were mostly due to the one-time (physical and human) resource reallocation and started to decrease after 2000. In addition, the western region lost the relatively young and educated population to out-migration. As Fu (2004) noted, a shortage of educated, working-age labor appeared in some inland provinces. Therefore, out-migration in western provinces may have caused the coastal and inland regions to grow at different rates, bringing about increasing economic disparity in the long run. Moreover, as some of the western out-migrants flowed to the central cities as unskilled laborers and were no longer in high demand in the central region during the 2000s, the fiscal burden imposed on the central region by these migrants may increase while the surplus generated by them may decrease. Hence, both urban and rural out-migration in western provinces may decelerate the growth rates of the central provinces and attenuate the decrease in regional gaps as well as overall inequality.

Last but not least, interprovincial rural in-migration in the western region decelerated the economic growth of the receiving provinces; this effect was greater in the 1990s than it was in the 2000s. Moreover, interprovincial rural in-migration raised overall inequality, though this effect diminished over time. As estimated in the previous literature (e.g., Cai, Wang, and Du,

2002; Carter, Zhong, and Cai, 1996), the ratios of surplus labor to the total supply in the central and western regions were higher than that in the eastern region, meaning underemployment in the agricultural sector of the inland regions remained greater than that in the coastal region. As a result, rural out-migration in the western region facilitated resource reallocation and benefited local economies, and thus rural in-migration may have had the opposite effects in general. However, my finding that the impact of interprovincial rural in-migration in the western region differs between the two time periods may reflect the fact that more and more returning migrants brought skills and capital back to their home regions and thus contributed to both human and physical capital accumulation and promoted growth in the home economies (Fu, 2004).

To sum up, both intraprovincial and interprovincial analyses provide evidence of the impact of migration on provincial growth rates and overall economic inequality. This impact varies widely and depends on the urban/rural status and geographic region of the sending place or the receiving place—indicating that different industrial structures and thus population movements from or to different places may represent entirely different types of migration, as well as the time period indicating different stages of economic development. How this study contributes to the literature and to society overall and its policy implications and limitations are discussed in the following chapter.

Table 7.1 Unconditional and Conditional Convergence Regressions (OLS)

Dependent Variable: ln(per capita GDP growth rate)	Model 1		Model 2a		Model 2b (SEM)					
					East		Central		West	
	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.	Coef.	Std. Err.
ln(1992 per capita GDP)	-0.001	0.026	-0.080*	0.042	-0.081	0.083	-0.189	0.186	-0.221*	0.099
1990 mean yrs. of schooling of working pop.			0.008	0.016	-0.014	0.043	-0.014	0.049	0.115**	0.034
ln(employment rate)			0.321**	0.112	0.650**	0.214	-0.463†	0.265	0.656**	0.222
ln(comparative labor productivity)			-0.005	0.034	-0.017	0.104	-0.063	0.046	0.123*	0.051
ln(investment rate)			0.278**	0.047	0.039	0.108	0.405**	0.088	0.018	0.105
ln(government expenditure share)			-0.201**	0.042	-0.260**	0.088	-0.230*	0.107	0.276**	0.111
Constant	2.342**	0.213	1.172**	0.490	1.090	0.784	5.100**	1.884	-0.457	1.442
N		496		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.2 The Impact of Intraprovincial Urban Migration on Provincial Growth Rate (Fixed Effects)

Dependent Variable: ln(per capita GDP growth rate)	Model 3a		Model 3b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged intraprovincial urban in-migration)	-0.038	0.091	-0.324	0.236	0.068	0.248	0.309*	0.140
ln(lagged intraprovincial urban out-migration)	0.024	0.077	0.242	0.196	-0.011	0.282	-0.214†	0.130
ln(lagged intraprovincial urban in-migration) × period	0.059	0.092	0.117	0.195	-0.402†	0.224	-0.018	0.121
ln(lagged intraprovincial urban out-migration) × period	-0.041	0.087	-0.092	0.160	-0.438	0.278	0.054	0.131
ln(employment rate)	0.129	0.260	0.401	0.345	-0.138	0.537	0.377	0.492
ln(comparative labor productivity)	-0.067	0.059	0.072	0.142	-0.120	0.081	-0.009	0.072
ln(investment rate)	0.365**	0.064	0.344**	0.110	0.596**	0.074	0.041	0.117
ln(government expenditure share)	-0.223*	0.088	-0.328*	0.147	-0.618**	0.149	0.187	0.129
Constant	1.604†	0.912	0.780	1.216	2.539	1.984	-0.235	1.945
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.3 The Impact of Intraprovincial Rural Migration on Provincial Growth Rate (Fixed Effects)

Dependent Variable: ln(per capita GDP growth rate)	Model 4a		Model 4b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged intraprovincial rural in-migration)	-0.382**	0.152	0.054	0.380	-0.010	0.390	-0.597**	0.215
ln(lagged intraprovincial rural out-migration)	0.426**	0.151	-0.004	0.378	0.197	0.379	0.511*	0.230
ln(lagged intraprovincial rural in-migration) × period	0.293*	0.147	-0.027	0.315	-0.135	0.403	0.386†	0.219
ln(lagged intraprovincial rural out-migration) × period	-0.364*	0.157	-0.108	0.335	-0.122	0.392	-0.213	0.233
ln(employment rate)	0.005	0.275	0.157	0.435	-0.718	0.580	0.662	0.500
ln(comparative labor productivity)	-0.077	0.057	0.120	0.114	-0.186*	0.080	-0.051	0.066
ln(investment rate)	0.363**	0.064	0.310*	0.136	0.600**	0.070	-0.060	0.118
ln(government expenditure share)	-0.186**	0.071	-0.204	0.176	-0.496**	0.132	0.219†	0.128
Constant	2.508**	0.960	1.540	1.645	4.877*	2.149	-0.687	1.975
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.4 The Impact of Intraprovincial Urban Migration on Provincial Contribution to National Theil Index (Fixed Effects)

Dependent Variable: ln(provincial contribution to national Theil)	Model 5a		Model 5b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged intraprovincial urban in-migration)	-0.0002	0.0011	-0.0016	0.0028	-0.0048**	0.0013	-0.0017**	0.0005
ln(lagged intraprovincial urban out-migration)	0.0011	0.0009	0.0031	0.0024	0.0037**	0.0014	0.0006	0.0004
ln(lagged intraprovincial urban in-migration) × period	0.0018†	0.0011	0.0041	0.0026	0.0028**	0.0010	0.0005	0.0005
ln(lagged intraprovincial urban out-migration) × period	-0.0002	0.0010	-0.0015	0.0023	-0.0042**	0.0015	0.0001	0.0005
ln(employment rate)	-0.0030	0.0031	-0.0099	0.0094	-0.0009	0.0029	0.0054**	0.0019
ln(comparative labor productivity)	-0.0005	0.0007	0.0006	0.0020	-0.0024**	0.0008	-0.0010**	0.0002
ln(investment rate)	0.0055**	0.0008	0.0097**	0.0019	0.0034**	0.0006	0.0008	0.0005
ln(government expenditure share)	-0.0064**	0.0010	-0.0058†	0.0034	-0.0057**	0.0012	-0.0027**	0.0009
Constant	-0.5980**	0.0109	-0.5846**	0.0287	0.0157†	0.0098	-0.0098	0.0065
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.5 The Impact of Intraprovincial Rural Migration on Provincial Contribution to National Theil Index (Fixed Effects)

Dependent Variable: ln(per capita GDP growth rate)	Model 6a		Model 6b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged intraprovincial rural in-migration)	0.0011	0.0018	-0.0007	0.0044	-0.0022	0.0020	0.0010	0.0006
ln(lagged intraprovincial rural out-migration)	0.0024	0.0018	0.0050	0.0043	0.0031†	0.0019	0.0007	0.0006
ln(lagged intraprovincial rural in-migration) × period	-0.0022	0.0018	-0.0049	0.0036	0.0038*	0.0020	-0.0012	0.0008
ln(lagged intraprovincial rural out-migration) × period	0.0006	0.0019	0.0042	0.0036	-0.0049**	0.0020	0.0001	0.0006
ln(employment rate)	-0.0037	0.0033	-0.0032	0.0094	-0.0054*	0.0027	0.0042**	0.0016
ln(comparative labor productivity)	-0.0024**	0.0007	-0.0037†	0.0024	-0.0028**	0.0009	-0.0010**	0.0003
ln(investment rate)	0.0058**	0.0008	0.0099**	0.0018	0.0034**	0.0007	0.0009†	0.0005
ln(government expenditure share)	-0.0062**	0.0009	-0.0081**	0.0026	-0.0051**	0.0014	-0.0020**	0.0007
Constant	-0.5877**	0.0117	-0.6020**	0.0258	0.0315**	0.0096	-0.0093†	0.0058
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.6 The Impact of Interprovincial Urban Migration on Provincial Growth Rate (Fixed Effects)

Dependent Variable: ln(per capita GDP growth rate)	Model 7a		Model 7b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged Interprovincial urban in-migration)	0.025	0.063	0.051	0.147	0.059	0.091	-0.029	0.087
ln(lagged Interprovincial urban out-migration)	0.049	0.067	0.030	0.173	0.217*	0.109	0.081	0.088
ln(lagged Interprovincial urban in-migration) × period	0.042	0.062	0.246†	0.133	-0.241*	0.111	0.028	0.095
ln(lagged Interprovincial urban out-migration) × period	0.005	0.062	-0.209	0.135	0.124	0.115	0.050	0.092
ln(employment rate)	0.015	0.260	0.088	0.365	-0.080	0.514	0.500	0.479
ln(comparative labor productivity)	-0.056	0.058	0.173	0.139	-0.102	0.081	-0.087	0.077
ln(investment rate)	0.361**	0.066	0.341**	0.133	0.458**	0.073	0.039	0.119
ln(government expenditure share)	-0.171*	0.079	-0.295	0.194	-0.597**	0.129	0.190	0.122
Constant	2.714**	0.981	3.721*	1.722	3.027	1.924	-0.260	1.909
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.7 The Impact of Interprovincial Rural Migration on Provincial Growth Rate (Fixed Effects)

Dependent Variable: ln(per capita GDP growth rate)	Model 8a		Model 8b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged Interprovincial rural in-migration)	-0.012	0.055	0.094	0.150	0.107	0.089	-0.282**	0.079
ln(lagged Interprovincial rural out-migration)	0.048	0.058	-0.046	0.143	-0.016	0.099	0.364**	0.104
ln(lagged Interprovincial rural in-migration) × period	0.001	0.435	-0.038	0.131	-0.102	0.100	0.089	0.059
ln(lagged Interprovincial rural out-migration) × period	-0.010	0.048	-0.008	0.134	0.056	0.112	-0.073	0.073
ln(employment rate)	0.199	0.273	0.333	0.448	-0.192	0.529	0.748†	0.472
ln(comparative labor productivity)	-0.081	0.061	0.074	0.126	-0.160*	0.078	-0.164*	0.073
ln(investment rate)	0.337**	0.068	0.275†	0.155	0.579**	0.075	0.063	0.117
ln(government expenditure share)	-0.207†	0.085	-0.293	0.190	-0.658**	0.147	0.113	0.122
Constant	1.241	0.997	1.526	1.962	3.312†	1.976	-0.846	1.883
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.8 The Impact of Interprovincial Urban Migration on Provincial Contribution to National Theil Index (Fixed Effects)

Dependent Variable: ln(provincial contribution to national Theil)	Model 9a		Model 9b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged Interprovincial urban in-migration)	-0.0011	0.0008	-0.0016	0.0034	-0.0014**	0.0005	0.0005	0.0004
ln(lagged Interprovincial urban out-migration)	0.0008	0.0009	0.0021	0.0041	-0.0005	0.0008	-0.0009*	0.0004
ln(lagged Interprovincial urban in-migration) × period	-0.0004	0.0008	-0.0001	0.0027	0.0014†	0.0009	-0.0016**	0.0004
ln(lagged Interprovincial urban out-migration) × period	-0.0006	0.0008	-0.0015	0.0028	-0.0010	0.0008	0.0015**	0.0004
ln(employment rate)	-0.0052**	0.0033	-0.0119	0.0115	-0.0034	0.0030	0.0036**	0.0015
ln(comparative labor productivity)	-0.0007	0.0007	-0.0010	0.0032	-0.0026**	0.0009	-0.0003	0.0002
ln(investment rate)	0.0064**	0.0008	0.0111**	0.0019	0.0044**	0.0008	0.0010*	0.0005
ln(government expenditure share)	-0.0070**	0.0010	-0.0093**	0.0032	-0.0051**	0.0011	-0.0018**	0.0006
Constant	-0.5889**	0.0126	-0.5687**	0.0389	0.0174†	0.0101	-0.0096†	0.0057
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

Table 7.9 The Impact of Interprovincial Rural Migration on Provincial Contribution to National Theil Index (Fixed Effects)

Dependent Variable: ln(per capita GDP growth rate)	Model 10a		Model 10b (SEM)					
			East		Central		West	
	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.	Coef.	Robust Std. Err.
ln(lagged Interprovincial rural in-migration)	-0.0017**	0.0006	-0.0015	0.0015	-0.0008†	0.0005	0.0016**	0.0004
ln(lagged Interprovincial rural out-migration)	0.0045**	0.0006	0.0056**	0.0012	0.0016**	0.0006	-0.0008†	0.0005
ln(lagged Interprovincial rural in-migration) × period	-0.0009†	0.0005	-0.0020**	0.0008	0.0016**	0.0006	-0.0013**	0.0003
ln(lagged Interprovincial rural out-migration) × period	0.0006	0.0005	0.0018*	0.0008	-0.0017**	0.0006	0.0014**	0.0003
ln(employment rate)	0.0058*	0.0029	0.0127†	0.0080	-0.0041	0.0029	0.0039**	0.0015
ln(comparative labor productivity)	-0.0022**	0.0007	-0.0049*	0.0021	-0.0028**	0.0010	-0.0004†	0.0002
ln(investment rate)	0.0031**	0.0007	0.0038**	0.0014	0.0032**	0.0006	0.0001	0.0004
ln(government expenditure share)	-0.0060**	0.0009	-0.0059**	0.0025	-0.0052**	0.0014	-0.0020**	0.0006
Constant	-0.6266**	0.0107	-0.6719**	0.0285	0.0286**	0.0097	-0.0045	0.0053
N		496		496		496		496

Note: †p<0.1, *p<0.05, **p<0.01 (two-tailed tests)

8.0 DISCUSSION AND CONCLUSIONS

8.1 SUMMARY OF RESULTS AND DISCUSSION

This dissertation has aimed at understanding the role of internal migration in China's economic development, which is characterized by high growth, rapid globalization, rapid poverty reduction, and rising spatial inequality. In order to discuss the ambiguous theoretical relationship between labor migration and spatial inequality, I have attempted to answer a number of the following questions. Are there any links between migration and spatial economic inequality in China? Does migration contribute to spreading the benefits of growth spatially and reducing economic inequality? If so, does it work through the local growth channel or through the national dynamic channel? What are the effects of intraprovincial migration and interprovincial migration on spatial inequality, respectively? What are the effects of urban migration and rural migration on spatial inequality, respectively? Does the effect of migration on spatial inequality differ across regions? Does the effect of migration on spatial inequality differ across time periods? What policy implications can be drawn from this study against the background of rising spatial inequality and relaxed but still highly restricted migration policies in China?

I have used aggregate data to answer the above questions and empirically examine the relationship between migration and inequality in China, through both the local growth channel and the national dynamic channel. Regarding the local channel, there is evidence that within-province rural-to-urban migration had no statistically significant effect on economic growth

speed in the coastal provinces but had a positive effect on growth in the inland provinces, especially during the 1990s. Interprovincial migration flowed from the western rural areas to efficiently reallocate surplus rural labor and thus speed up GDP growth of the western sending provinces, especially during the 1990s. Interprovincial migration flowing into the eastern cities was beneficial to the economic growth rate of the eastern receiving provinces, where most of China's trade-oriented industrial investments are located, and this effect became stronger over time. The impact of interprovincial migration on growth is more complicated for the central region. During the 1990s, interprovincial movements from central cities and into central cities both had positive effects on local economic growth, though for different reasons. During the 2000s, because of continued low levels of physical capital and gradually saturated low-skilled labor, the capital-to-labor ratio declined, and further movements into central cities would reduce the local growth rates.

Regarding the national channel—overall interprovincial inequality at the national level—there is evidence that within-province rural-to-urban migration in the eastern region had no statistically significant effect on overall inequality, while within-province rural-to-urban migration in the inland regions reduced overall inequality at the national level, especially during the 1990s. Interprovincial migration from the western provinces reduced overall inequality in the beginning of the study period, but turned out to increase overall inequality at the end. Interprovincial migration flows from eastern rural areas, mostly from the countryside of the relatively less-developed eastern provinces to the cities of more-developed eastern provinces, tended to increase overall inequality, particularly during the later time period. The impact of interprovincial migration in the central region on overall inequality is again more complicated. During the 1990s, interprovincial migration into the central cities reduced overall inequality

against the background of fast urbanization and economic development in central cities, partly due to globalization and spillover effects from the eastern region. In the 2000s, growth in the central region was attenuated due to the lack of continued and sufficient supply of both physical and human capital, as well as a surplus of unskilled labor. Consequently, further movements into the central urban areas made a much smaller contribution to the reduction of overall inequality compared to the earlier decade.

Everything considered, the evidence found in this study confirms that there are strong but complicated relationships between internal migration and economic growth and between migration and spatial inequality in China. In response to the research questions raised earlier, at least five important propositions may be drawn from this dissertation.

First, intraprovincial rural-to-urban migration in inland provinces accelerates provincial economic growth and reduces overall national inequality. These effects are consistent over time for western provinces, while they decrease dramatically over time for central provinces. Intraprovincial migration is beneficial to inland provinces and thus reduces the economic gap between the coastal and inland regions due to the following reasons. Remittances sent back home raise rural household incomes, which may be used to finance consumption or productive investments that bolster economic growth in the rural areas. Out-migration also increases rural labor productivity due to resource reallocation. Moreover, in-migration facilitates urban development and the urbanization process in inland provinces. Migration within inland provinces, however, diverts part of the migration flow to the coastal region, which supplies almost unlimited cheap labor to power coastal development and ensure the sustainability of its faster growth. Everything considered, intraprovincial rural-to-urban migration in inland provinces narrows the gap between inland and coastal regions and thus reduces overall spatial

inequality. These effects are consistent over time for western provinces, possibly because the Western Development Program has brought foreign and domestic investments to the western region, boosting the western economy, creating more employment opportunities, and thus keeping the demand for labor at about the same level in western cities. The central region has not enjoyed such preferential policies for development, and eastern growth has generated only limited spillover to the adjacent central region. Hence, the effects of intraprovincial migration decreased with time for central provinces due to continued low levels of physical capital and gradually saturated low-skilled labor, and thus declined the capital-to-labor ratio in the 2000s.

Second, interprovincial migration into eastern cities accelerates the GDP growth of the receiving provinces, and this effect increases with time. Interprovincial migration from eastern rural areas to eastern core cities enlarges overall inequality, and this effect increases with time. On the one hand, the fiscal burden imposed by in-migration tends to be low in coastal areas, since the majority of in-migrants are not eligible for regular welfare benefits, social services (e.g., local schools, urban pension plans, and public housing), and other entitlements. On the other hand, the benefits brought by in-migrants to host areas are large, due to their contribution to sustainable growth in the entire coastal region as a whole and to the newly emerged core cities in particular. In-migration from slower-growing areas supplies almost infinite low-cost human labor to power the economic engine in the faster-growing areas and attenuates the decrease in the marginal productivity of capital so that faster growth is sustainable in receiving areas (Faini, 1996; Fu, 2004). In addition, industrial agglomeration took place gradually, and the coastal region enjoyed persistently higher-than-average growth rates driven by the economy of scale (Zhang & Zou, 2012). As a result, the growth rate of the coastal region tends to be accelerated due to increasing returns to scale and the agglomeration effect (i.e., the so-called cumulative

causation effect) (Golley, 2002; Zhang & Zou, 2012), and the gap between the coastal and inland regions is likely to widen over time. The inequality could be further exacerbated when a few eastern cities emerged as new growth cores and attracted substantial volumes of labor to migrate from not only inland provinces but also less-developed eastern areas. Interprovincial migration within the eastern region has increasingly beneficial effects on both ends of the movement—e.g., relaxed labor supply constraints in faster-growing core cities, increased labor productivity of rural households due to resource reallocation, and remittances that account for a large proportion of the total household income in home areas. As these migrants leave their provinces without leaving their region, benefits remain and accrue to the eastern region as a whole, and interregional gaps are likely to increase.

Third, both interprovincial in- and out-migration in central cities are positively associated with the provincial GDP growth rate in the 1990s, but the positive impact of interprovincial in-migration turns negative in the 2000s. Similarly, interprovincial in-migration in central cities reduces overall inequality in the 1990s, but this effect decreases in the 2000s. These findings about the central region imply limited spillover effects from coastal to inland areas and lack of technology transfer and physical and human capital to support long-term economic growth in the central region. FDI-funded processing-type exports have been the major driving force of economic growth for the coastal region but generated only limited backward linkages and weak spillover to the inland regions (Fu, 2004). Coastal cities have served as growth engines for the surrounding areas (e.g., coastal urban areas and coastal less-developed areas), but provided only weak and short-term spillover even to adjacent central provinces due to the structure of the export sector, and the spillover effects were not strong enough to lead the inland regions to catch up. As export-led rapid growth served as the growth engine for the

surrounding central provinces through weak spillover effects in the early stages of reform, migration induced to relatively faster-growth central cities enabled the host provinces to sustain their growth and catch up to the rich coastal provinces. However, as technology transfer and knowledge spillover from foreign investment to indigenous firms and from the coastal region to inland regions were very limited (Fu, 2004), the inland regions were unable to sustain their development without advanced production technology. The situation of the central region during the later period of reform was further aggravated by the shortage of skilled labor, the surplus of unskilled labor, and low levels of physical capital, and thus decreased the capital-to-labor ratio. As a result, central in-migration accelerated central growth rates before 2000 but decelerated central growth rates after 2000, and its role in narrowing the gap between central and coastal regions decreased with time.

Fourth, interprovincial migration from western rural areas is beneficial to the GDP growth of sending provinces in both decades, while interprovincial migration from western provinces reduces overall inequality in the 1990s but enlarges overall inequality in the 2000s. It is intuitive that out-migration would always bring back some benefits to the home economy through channels like remittances, investments, and resource reallocation. First, remittances sent back by out-migrants can be used to finance consumption, raise the levels of income and welfare, and relax capital constraints in source communities. Second, remittances can also be used to finance productive investments and support economic growth in home regions. Third, out-migration can play an important role in promoting efficient resource reallocation and thus increase the labor productivity of laborers remaining in home regions. However, the impact of migration on overall spatial economic inequality depends not just on the above benefits accruing to sending regions but also on the costs and benefits of migration for both sending and receiving

regions. That is why studying the national dynamic channel in addition to the local growth channel is necessary to answer questions about convergence or divergence. Western out-migration reduced overall inequality before the year 2000 but increased overall inequality after 2000. The implications are as follows. For the western region, exporting labor to labor-shortage and high-growth areas such as the coastal provinces might be a short-term solution to stimulate local economic growth, increase labor productivity, and reduce unemployment through remittances and one-time resource reallocation as we discussed above. However, without the basic ingredients of sustainable development, such as technological progress and sufficient physical and human capital (e.g., skilled labor), the long-term effect of out-migration on the western region can be unfavorable on balance, even though the benefits generated to the home region cannot be ignored. Moreover, the western sending region may suffer from losing relatively more-educated and skilled laborers to out-migration, and the coastal region as the main destination may enjoy those skilled migrants' contributions to sustainable and faster growth. As a result, different regions grow at different rates, and economic inequalities between them will increase.

Fifth, interprovincial migration into western rural areas decelerates provincial growth and increases overall inequality; however, these effects diminish over time. This particular finding may reflect the recent trend and potential role of return migration partly related to western development initiatives starting around 2000. Although returning migration may impose welfare costs on sending areas and worsen local labor market inefficiency due to a surplus of unskilled labor, the more important and increasingly apparent trend is that returning migrants bring capital and skills back to their original areas and thus promote economic growth and generate employment opportunities there. Moreover, returning migrants may contribute to

productive investments, market intelligence accumulation, and labor training in their home areas (Fu, 2004). Against the background of western development efforts including the development of infrastructure, the enticement of foreign and domestic investments, and the stimulation of the region's output, skilled laborers that remain in or even be attracted to the western region have become increasingly critical for the sustainability of development, and their growth-inducing positives will eventually exceed the negatives in the long run.

8.2 THEORETICAL IMPLICATIONS

This dissertation contributes to the literature and to society overall in various ways. The theoretical, methodological, and policy implications are discussed in the following three sections. Let's begin with the theoretical implications.

Labor migration has been the subject of vast amounts of academic literature, as researchers have attempted to understand how many migrants there are, who migrates, why they migrate, and what the determinants and consequences of migration are. In terms of the relationship between migration and regional economic inequality, migration is commonly considered to be responsive to regional differences in economic development and market wage rates, as people migrate to better themselves economically. Economists also view migration as an outcome of regional differences in labor demand and supply and of individuals' rational calculation of costs and benefits. However, studies investigating the impacts of migration on regional inequality display a mixture of conclusions.

The neoclassical theory is the dominant one, viewing migration as the means by which surplus labor in less-developed and lower-wage areas is transferred to more-developed and

higher-wage areas. As a result, migration leads to changes in the supply of and demand for labor at both ends, and eventually wage differentials will reflect only the costs of migration at the equilibrium stage. For the economy as a whole, labor migration serves as an equilibrating factor, and both sending and receiving areas benefit because it eventually optimizes the distribution of human capital among regions and evens out regional inequality. Several theories that challenge the neoclassical approach suggest that underdevelopment is a by-product of development, and inequality between sending and receiving areas is perpetuated and reinforced through the brain-drain effect of migration (Arango, 2000). In other words, migration leads to a loss of valuable labor and a slowdown in economic growth in sending areas, and thus widens spatial inequality, instead of the other way around as predicted by the neoclassical approach. Furthermore, theories such as the new economic geography emphasize the economies of scale in production and argue that labor migration facilitates increasingly faster growth and higher wage levels in richer areas due to agglomeration effects, which worsen the gap between richer and poorer areas.

In short, there is not much doubt that internal labor migration is to some extent driven by regional or spatial inequality, because people tend to move to better themselves economically. However, the effect of migration on inequality is ambiguous in existing theories and empirical studies (Phan, 2008). The findings of this dissertation imply that previous research often presents mixed or even contradictory conclusions due to the following reasons.

First, studies focusing on different developmental stages and industrial structures of areas may generate different results. For example, during the 1990s western provinces might benefit greatly from exporting their unemployed and underemployed workers to the labor-needy provinces along the coast. Remittances from migrants and increased labor productivity should then stimulate economic growth in the west. Since the 2000s, the Western Development Program

and massive investments have boosted western output, and some western provinces have started to switch from a labor-intensive industry structure to a capital-intensive one that increased their capacity to retain or even absorb laborers. As a result, exporting labor became less beneficial to the western economy during the more recent time periods of the reform. On the other side of the story, the positive effect of in-migration on the host coastal provinces was great during the 1990s due to the relaxation of labor supply constraints and contributions to sustainable growth, and this positive effect became even larger during the 2000s due to increasing returns to scale and agglomeration effects (Fu, 2004).

Second, the distance of migration does matter. Distance is generally considered in theories and empirical studies to be one of the major factors influencing the volume and characteristics of migration. My research suggests that distance not only affects migration itself but also how migration affects economic growth and spatial inequality. I adopt two broad distance categories for migration—migration within a province (intraprovincial migration) and migration between provinces (interprovincial migration)—and find a difference between the two in terms of their impacts on growth and inequality. For instance, intraprovincial migration is almost always good for the economy of the western provinces over my entire study period, as it helps the reallocation of various resources, reduces the surplus of labor and increases labor productivity in rural areas, maintains the supply of cheap labor for urban development, and accelerates the urbanization process of the province. However, the influence of interprovincial migration on the western economy is mixed and inconsistent. Initially out-migration may benefit the western economy through remittances and resource reallocation, and thus it may appear to have a catch-up effect for the western region and a convergence tendency for the economic gap between richer and poorer regions. As time goes by and the one-time benefits of out-migration

fade out, the western economy may lose the more capable and educated people due to migration and thus may lose the growth engine in the long run. As a result, the gaps between richer and poorer regions may first stagnate or even decrease, but then eventually gradually increase.

One of the main differences between shorter-distanced (intraprovincial) and longer-distanced (interprovincial) migration is that the former has a higher probability of inducing return migration. Returnees may bring capital and skills back to their hometowns and therefore contribute to the accumulation of both human and physical capital, the creation of employment, investments in infrastructure development, market intelligence and labor training, and the growth of both home and provincial economies as a whole (Fu, 2004). The changes in the effects of western rural in-migration across time periods in this study also indicate that the benefits of western return migration began to appear and rise along with the transition of economic structure and policy-driven capital inflow.

Third, different conclusions may be drawn based on whether you focus on "local" or "global" relationships between migration and inequality. In my research, the growth channel (i.e., conventional convergence analysis) represents how migration influences inequality locally. Neoclassical theory argues that labor-sending places tend to grow faster and eventually catch up to receiving places, as migration promotes efficient resource allocation, reduces labor surplus, and raises labor productivity in sending places. Against this theoretical background, most empirical studies measure migration as a territorial attribute—particularly for labor-exporting places—and test how migration influences local growth speed and whether it facilitates or impedes the local catch-up effect and spatial convergence. However, such operationalization of migration loses sight of the relational mechanism of migration as a linkage between sending and receiving places. Thus, I introduce a second national dynamic channel to take into consideration

the relativity of places in terms of their uneven economic positions and analyze the direct effect of migration on the national GDP inequality level. It turns out that the findings from the two channels in this study provide us with some seemingly contradictive insights generated from different angles of the story. For example, western rural out-migration speeds up local economic growth throughout the whole study period, which helps equalize the regional differential for the earlier study period. But this equilibrating impact decreases over time and turns to the opposite for the second study decade. In other words, both boats rise, but the gap between them increases. The above example displays the importance of relational measures, which should be considered as further migration theoretical frameworks are developed.

8.3 METHODOLOGICAL IMPLICATIONS

The fixed effects panel data analysis conducted in this dissertation suggests that longitudinal methods are clearly superior to cross-sectional methods. There are two major advantages of longitudinal methods for analyzing the relationship between migration and inequality. First, simple methods used for longitudinal data, like taking a one-year lag of the response variable, can reduce potential problems caused by reciprocal relationships between migration and economic growth and between migration and spatial inequality. Taking into consideration the temporal order of independent variables is also important when there is a spurious or chain relationship between independent and dependent variables. Second, panel data with enough time points allows us to adopt methods such as fixed effects to control for the heterogeneity between entities (e.g., provinces), test the true relationship between independent and dependent variables within each entity, and generate unbiased estimates. This is especially critical to cross-national

studies or cross-province/cross-state studies for large countries like China, assuming there are many unobserved, immeasurable, and time-invariant characteristics unique to each entity, such as weather conditions, geographic attributes, historical attributes, and culture and customs. Few previous studies have explored the relationship between migration and inequality across time periods, partly due to the scarcity of reliable and consistent longitudinal data for all the relevant variables. However, if data allows, longitudinal analysis is the most appropriate method to uncover the relationship between migration and spatial inequality.

The second methodological implication, related to the first, is that "time" is not only useful in determining model structure (such as the fixed-effects model), it is also vital to be considered as an explanatory variable and to be included in the model. This is particularly applicable for studies on developing countries such as China. As we see in this dissertation, the relationships between migration and growth and between migration and inequality differ greatly across the two time periods (1992–1999 and 2000–2008). As they move toward their steady states, developing countries like China grow and change quickly over time. Change of trade share in GDP, change of industrial structure, change of governmental development policies, infrastructure development, urbanization, industrialization, and privatization all contribute to China's ongoing rapid growth and transformation. Therefore, it is important to conduct our research with the effect of time taken into account.

The final methodological implication of this dissertation has to do with the regionalization scheme in China studies. Although the "three economic belt" scheme based on the seventh Five-Year Plan (1986–1990) is well recognized in research on regional inequality in China, sometimes scholars combine the central and western regions into one category and adopt a more convenient "inland versus coastal" two-region scheme for their empirical analysis or

hypothesis tests (e.g**.,** Chen & Fleisher, 1996; Fan & Sun, 2008; Fujita & Hu, 2001; Kanbur & Zhang, 1999, 2005). There is no doubt that the eastern region has had the most rapid economic growth and that the gap between the eastern region and the central and western regions combined is the greatest and has widened over time. However, my findings show that the western and central regions are different in terms of their own comparative advantages, economic specializations, and growth engines. As a result, the impacts of migration on growth rates are different between the two inland regions. Especially more recently, due in part to the Western Development Program that increases capital inflows and investment in western China and boosts western economic development as a whole, the increased demand for labor—particularly skilled labor—and the brain-drain problem start to attract some attention. These patterns are not evident in the central region partly due to a lack of similar preferential developmental policies and insufficient capital inflow and investment.

8.4 POLICY IMPLICATIONS

Rapid export-oriented manufacturing growth, concentrated in coastal urban centers, has made China the "world's factory" in the global economy. Regional wage differences and enormous employment opportunities along the coast have attracted epic-scale migration of inexpensive human labor from the inland regions. The findings of this dissertation indicate that eastern cities serve as growth engines for surrounding areas such as eastern suburban and rural areas, but the spillover effects generated by richer eastern regions are very limited and too weak to lead the poorer inland regions to catch up. Fu (2004) argued that the weak economic growth spillover

effect is because coastal exports through labor-intensive manufacturing and processing trade have limited backward linkages to remote regions.

Therefore, for less-developed hinterlands, simply sending labor to capital-rich areas with labor shortages does generate growth benefits and raise income levels in home regions due to one-time resource reallocation and remittances, but it tends to benefit receiving communities more than sending communities and thus eventually widens regional inequality. In addition, the costs of exporting labor may exceed the benefits for poor inland provinces in the long run due to the brain-drain effect of out-migration, which may cause severe and permanent harm in sending areas. Thus, retaining the relatively more-educated, skilled, and able labor is crucial for the long-term development of inland provinces, and the role of governmental intervention is very important in regard to resource allocation, local employment creation, information distribution, and so on.

One possible measure that could be taken by the government is to encourage short-distance migration (e.g., within-province migration) and urbanization in the inland regions. To do so, many conditions should be met, among which rural education is the most important (Johnson, 2002). More resources should be shifted to rural education in order to enhance the skill levels and productivity of the rural population and prepare them for nonagricultural employment, and thus increase their ability and propensity to move from farm to city. An equally important condition is that the government should promote more capital flow and investment in labor-rich but capital-scarce inland areas so that more employment opportunities will be generated and skilled labor will remain in or even be attracted to inland areas. The government should use tools like the Western Development Program to stimulate growth in the central region and to reduce the economic gap between the central and eastern regions.

8.5 DIRECTIONS FOR FUTURE RESEARCH

This study has expanded on existing understanding about the relationship between migration and inequality across various dimensions. Although this work has provided new evidence on the topic, it has also raised new questions and issues within the migration and health body of research. Evidence from this dissertation supports the notion that the effect of migration on spatial inequality changes across regions and time periods. Future research should expand on these findings to explain not simply whether the interconnection between migration and inequality changes across these dimensions, but how and why it does so. For instance, rather than using provincial migration summary statistics, further analyses could collect and utilize dyadic migration data between pairs of provinces (or regions) to estimate whether net migration flows between pairs of provinces affect the economic gaps between the two ends, and in turn affect overall national inequality. In this way, we can better measure the distance of migration with such categories as "migration within a province," "migration between contiguous provinces," and "migration between noncontiguous provinces," or we could even treat distance as a continuous variable instead of adopting the "within a province" and "between provinces" scheme. Moreover, we could implement more sophisticated research techniques such as Social Network Analysis (SNA) to address potential interdependence across observations due to dyadic autocorrelation.

Most existing research does not make a clear distinction between human capital and labor, and often uses them interchangeably. The flow of human capital involves the movement of high-skilled workers, such as technicians, professionals, and managers, in order to receive relatively high returns on their skills when they reach their destinations. Highly skilled workers have much more bargaining power and face relatively less competition in the labor markets than

low-wage, unskilled workers do. Therefore, the flow of labor should be kept conceptually distinct from the flow of human capital, and the heterogeneity of migrants' skill levels should be clearly recognized in future studies (Massey et al., 1993). The distinction of migrants along skill lines would help us better understand the issue of brain drain—the sustained out-migration of relatively well-educated, skilled, and productive workers that leads to the depletion of human capital and stagnation or even decrease of productivity in home regions, and hence widened regional gaps.

A final recommendation is that further research should incorporate more recent years of data as they become available. Additional data collection and analysis will allow further investigation of time periods and test whether the effects of migration on development and regional inequalities continue to change.

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