

Industrial and Labor Relocations among Chinese Regions¹

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Abstract: Before and in the time when the global financial crisis hit the real economy of China, there has appeared a change in regional growth pattern of industries – that is, industrial outputs in central and western regions have grown relatively faster than that in the eastern regions. In the same time, suffering from labor costs rise and sharp drop in orders of exports, the industries in coastal areas seem to lose their role as major driver of the Chinese economic growth. However, based on empirical studies, this paper shows that the current changes in regional pattern of industrial growth, or the trends of industrial relocation, are mainly the results of central government’s implementation of favorable policies and biased investment. That formed the comparative advantage-defying industrial structure, which are dominated by heavy industries and inconsistent with the regions’ resources endowments. This paper suggests that sustaining the rapid economic growth in China requires building a domestic flying geese model so that the central and western regions can carry on the comparative advantage in labor-intensive industries. The urgent challenge facing implementation of sound regional development strategies is to transform the government intervention and investment-oriented mode to comparative advantage-following and market-oriented mode, so as to make the industrial relocation of industries become upgrading process of all eastern, central and western regions altogether.

Key words: Industrial relocation, large economy, comparative advantage, flying geese model

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1. Introduction

In the face of global financial crisis, there have appeared two phenomena in the Chinese economy. The first is the unusual mass return of migrant workers. That is, against the general trend before the crisis, in which a huge number of rural laborers migrated across township boundaries each year and the numbers amounted to 140 million in 2008, about half of the migrant workers returned home around the time of the Chinese New Year, which is believed to be partially the impacts of the current crisis. While an overwhelming part of them went back to the cities after the New Year break, some of them found more difficult to find a job than previously (Sheng, 2009). Such mass return of migrant workers is apparently the reflection of labor allocation on the labor market shock caused by sharp drop in exports in coastal areas, where the export-oriented industries concentrate. Given the adaptive ability of migrant workers towards labor market changes – that is, they shall flexibly respond to the labor market shock by accepting lower reservation wages and less favorite posts, one may allege that no massive unemployment would be found for such group of workers. However, the swing of the pendulum implies a dramatic relocation of labor force among the Chinese regions, even after all migrant workers are settled in labor market¹.

The second is the shift of national economic growth engine from the eastern to

¹ A survey conducted in November and December 2008 shows that among the returned migrant workers, those who were previously employed in the coastal areas dominate. For example, of all returned migrant workers, 49.2 percent were employed in Guangdong province, 15.3 percent in Zhejiang province, 8.6 percent in Shanghai municipality, and 5.8 percent in Jiangsu province (NPFPC, 2009).

central and western regions¹. After the negative impacts of international financial crisis appeared in China, the profile of regional growth has changed. Whereas the economic growth in the eastern region as traditional economic engine declined dramatically, the growth remains much less changed in the central and western regions. As a result, the central and western regions have become the leading drivers of China's economic growth since the second half of 2008. There are a few points worthy of discussing about this phenomenon. First of all, the less outward-orientation of industries in the central and western regions is the major reason preventing them from severe economic slowdown when external demand substantially decreased. Secondly, as early as in the years prior to the financial crisis, a change in regional pattern of the Chinese economy, particularly of China's industrial allocation, already occurred. To show such a change, what follows we compare the relative changes in growth rates of industrial output by province and among the three regions in the period of 2000 to 2007.

Annual growth rates of industrial value added by region in 2000-2003 and 2003-2007 are listed in Figure 1. Data for 2000-2006 are the industrial value added of all state owned enterprises and non-state owned enterprises with designated size (revenue from principal business is over 5 million yuan), and data for 2007 are the industrial value added of all enterprises with designated size. Industrial value added is deflated by ex-factory price index of industrial products by province. In the period of 2000 to 2003, average annual growth rate was 20.8 percent in the eastern provinces, significantly higher than that in central provinces (13.3 percent) and western provinces (15.3 percent). While comparing individual province, industrial growth in the eastern regions performed much better than that in central and western regions. During the period of 2003 to 2007, however, the relative growth performances were

¹ According to the official categorization used in the implementation of Western Development Strategy, this paper divides Chinese provinces into eastern regions (Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan), central regions (Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan) and western regions (Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Xizang, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang).

significantly reversed. While average annual growth rate in the eastern regions was 23.6 percent, average annual growth rates increased to 24.1 percent in the central regions and 26.3 percent in western regions, with most of central and western provinces growing much faster than in previous years.

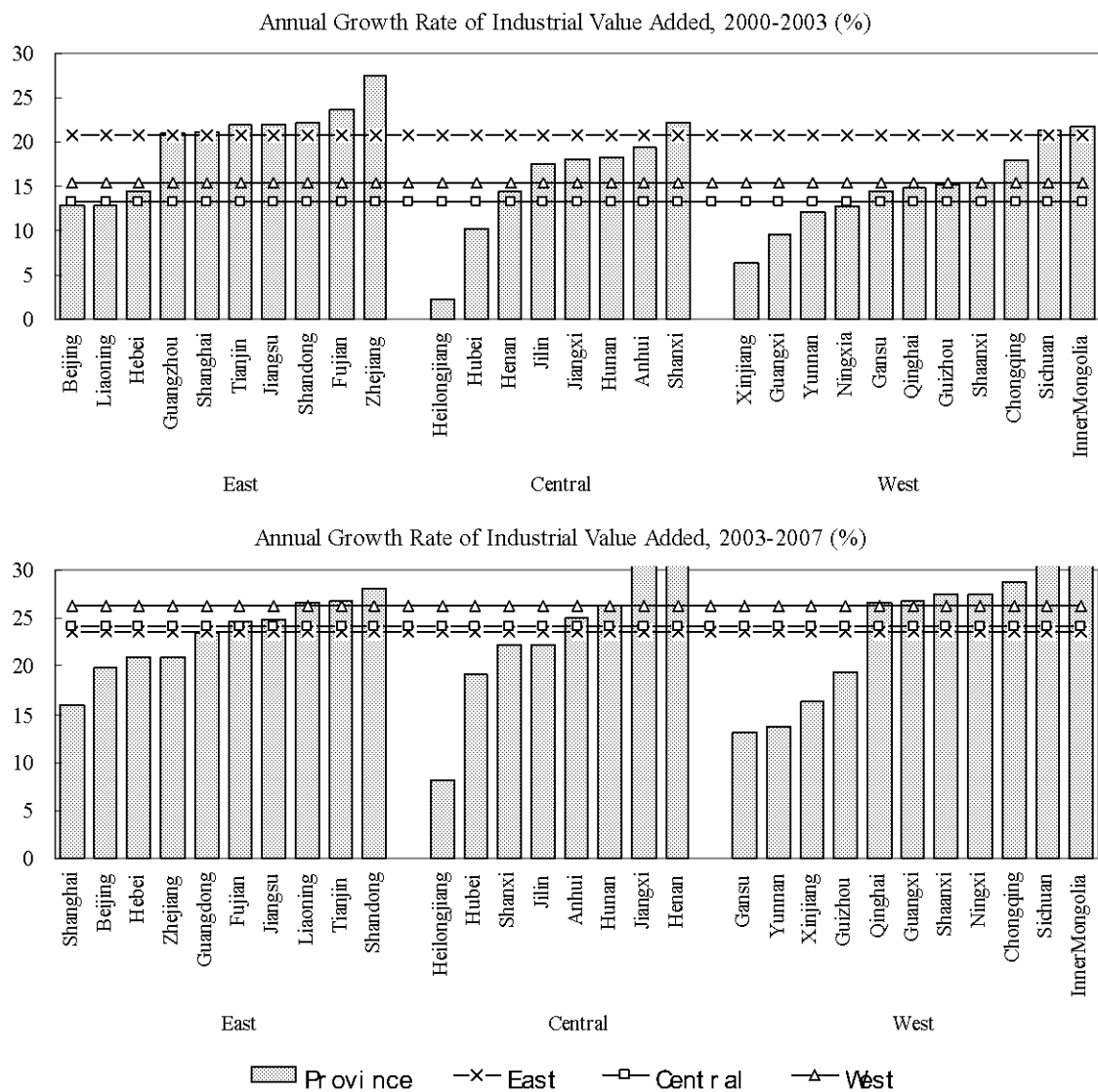


Figure 1 Growth Rates of Industrial Value Added by Region

Note: Due to lack of data of ex-factory price index for Hainan and Tibet, the calculation omitted these two provinces.

Source: NBS (various years)

As the result of this convergence of growth performance of regional industries and economies, the regional disparities in economic development levels have been

narrowed down in recent years since 2003. In the period of 1998 to 2003, Gini coefficient of unweighted per capita GDP among provinces steadily increased from 0.319 to 0.341, while Gini coefficient of population-weighted per capita GDP increased from 0.255 to 0.283. After the turning point of 2003, the unweighted and population-weighted Gini coefficients of per capita GDP declined to 0.305 and 0.265 in 2007, respectively. Given the fact that regional disparities had persistently widened for many years during the reform period, this new trend is obviously a signal indicating the change in stages of China's economic development.

The trends of industrial relocation among Chinese regions can be expected to further intensify during the time of financial crisis and in the process of adjustment in coping with the crisis-caused shocks. That implies an opportunity facing the central and western provinces to catch up with the advanced eastern regions. If the current trends can be correctly led by policy measures, it can be expected that the pattern of regional growth characterized by the eastern regions leading the fast economic growth in China in most of reform period will be replaced by that central and western regions serve as an engine to sustain the economic growth of China. The present paper tries to assemble an appropriate theoretical framework and provides empirical works in order to answer questions such as (1) in what way China's growth potential can be generated by the newly emerged regional pattern of growth, (2) through what development mode – the comparative advantage-defying, or comparative advantage-following (Lin and Wang, 2009) – the central and western regions can grasp the opportunity of catching-up, and (3) what a package of government policies is required in order to promote the new regional pattern of growth.

In its 30 years of successful development, China has both shared similarities and experienced unique reform, opening-up and growth in comparison with other developing and transition countries. Whereas those experiences proved some of the theories and policy implications of development economics, the existing economic theories are facing great challenges in fully explaining the Chinese story of reform, opening-up, and growth. For example, in his article of 1972, Lewis (1972) expects a "first turning point" of dual economy transformation, which is characterized by labor

shortage and wage inflation in modern economic sector and arrives before the turning point at which marginal productivity of labor in agricultural and modern sector becomes equalized. Such changes as labor shortage and wage enhancement have been widely observed in China in the years since 2003, thus there have been widespread debates about whether or not Lewis turning point has come. However, China as a large economy, in addition to its long-standing characteristics of dual economy, the turning point should not be expected to come homogeneously, but in a way that some regions come sooner and others later. Similarly, the characteristics of the Chinese economy may also change the traditional pattern of industrial transfer revealed by flying geese theory coined by economists – that is, industrial transfers consistent with changes in comparative advantages shall not follow the pattern of country to country, but rather region to region within the country. In addition, as have been well observed, to what extent an economy is impacted by the economic crisis, what kind of impacts an economy is faced during the crisis, and how it can turn the crisis into an opportunity all depend on the economy's previous path of development and properties of institutional arrangements. This paper reviews the recent development in industrial relocation across China's regions and related response in labor market in perspective of the characteristics of the Chinese economy and applicability of prevailing economic theories relating to the issues concerned.

Rest of the paper is organized as follows. Section 2 discusses a critical feature of the Chinese economy – namely, being a large economy, which serves important base in understanding the trends of industrial relocation in China. Based on that, Section 3 further reveals the Chinese characteristics of dual economy development, while testifying the general approaching of Lewis turning point, which tends to change the nature of resources endowments and to bring the Chinese economy into a new stage of development. Section 4 tries to unveil the actual reason behind the industrial relocation and its inconsistent with the existing labor allocation by raising and empirically answering the question of whether the current changing pattern of industrial development conforms to alternation of comparative advantages among Chinese regions, while Section 5 discusses how the pattern can be brought back to

comparative advantage-following path, by applying the Flying Geese Paradigm to China's regional case. Section 6 concludes and put forward policy suggestions concerning the formation of new regional pattern of economic development and adaption of labor allocation.

2. China as Large Economy

In the process of economic development, while countries commonly follow some of the economic laws and footprint similar development path, the economic development patterns more often than not differ from country to country, forming varieties and hybrids. One of the key factors generating the varieties is the distinction between the small economy and large economy. From the point of view of economics, while economic size no doubt plays important role in characterizing small and large economies, because it is closely interrelated to a host of features of different economies, the size *per se* is not the critical point for such distinction. This paper intends to employ an unconventional method of categorization to divide small and large economies in order to see the distinct attributes concerning the paper's topic.

Small economy can be definitively characterized by homogeneity in resources endowments and industrial structure among its regions. Under the assumption of nonexistence of systematic obstacles deterring mobility of production factors, there are no insistent discrepancies in resources endowments among small economy's regions, or they quickly disappear simultaneously with their economic take-off if ever those discrepancies exist. Consequently, small economy as an integer obtains comparative advantage in one industry or so, which intensively employ the relatively abundant factor of production, and the whole economy moves to a new stage of development as factors of production endowment changes. By this definition, Japan, the second largest economy in size, can be seen as a small economy, because there were no significant variation in factors of production endowments among its regions, or they converged to be equalized in early period of economic development (Barro

and Sala-i-Martin, 1999).

In contrast to that, the central characteristic of large economy is heterogeneity in resources endowments and industrial structure among its regions. Mainly due to institutional factors, mobility of production factors, especially of capital and labor, is restricted by systematic barriers among regions, the insistent domestic disparities in relative scarcity of production factors and other key conditions of development prevent regions from converging in economic growth. Accordingly, when some of the regions reach higher development stage, others may remain less changed and stagnate at lower stage.

By this definition, China is a typical large economy of this kind. Apart from its ranking of world's third largest economy measured by total GDP, the earmark conforming to its classification is that the long-standing segmentation of factors markets preserves domestic regions from being converged, and therefore the large gaps in resources endowments, relative prices of factors of production, and economic development levels insistent exist among its regions. Despite the successful reform, opening-up, and growth in the past 30 years have facilitated regional and sectoral mobility of production factors, particularly of labor force, narrowed down gaps in returns to factors, and even witnessed some signs of regional convergence of development, the Chinese economy is far less than what an integrated economy is defined. The most notable phenomenon in China is its regional disparities measured by indexes of inter-provincial inequality, inequality between rural and urban and among the eastern, central and western regions, as shown in a large host of empirical researches.

First is the income inequality among residents. The nation-wide Gini coefficient of residents' per capita income calculated by Martin and Chen (2004) showed an increase from 0.310 in 1981 to 0.447 in 2001, and further increased to 0.46 in 2002 (Khan and Riskin, 2004). Decompositions of the inequality indicators by dividing the total inequality into within urban, within rural and between rural and urban inequalities show that more than half of the income inequality can be attributed to the rural-urban income gap (Wan, 2007). Rural and urban income gap however is very much likely be

aggrandized by the statistical authority. That is, because the present statistical system cannot fully cover rural-to-urban migrant workers and their accompanied family members leaving their household registered residence for more than 6 months, the income of this group of population is omitted in the official household survey, which leads to overestimation of urban income and underestimation of rural income. This statistical matter has exaggerated not only the rural-urban gap but also its enhancing trend. In spite of this fact, however, the rural-urban income gap does exist and turns out to be large by international standard (Yang and Cai, 2003).

Second is the existence of insistent barriers deterring mobility of production factors and thus of differentials in returns to factors among regions in general and between rural and urban areas in particular. With regard to capital, one study shows that marginal return to capital in non-agricultural sectors in rural area was much higher than that in urban industries in 1990s, and the gap increased substantially over time. For example, the return to capital in non-agricultural sectors in rural area was 2.1 times that in urban industries in 1990, the difference increased to 3.7 times in 1995, and 5.2 times in 2001. In the period of 1990 to 2001, the growth rate of marginal return to capital in rural non-agricultural sectors was 4.3 times that in urban industries (World Bank, 2005). As for labor mobility, while institutional obstacles preventing labor from migrating from rural to urban areas have been gradually removed through various reform measures (Cai and Wang, 2003), some institutional heritages still remain to serve as divider between rural and urban labor markets. For example, the incompleteness of reform of household registration system and separate provisions of social security and social protection between rural and urban areas are still generating the gap in earnings and accessibility to social welfare between migrant and urban resident workers and between rural and urban residents.

Third is the huge difference in development levels among provinces and between eastern, central and western regions. All studies, no matter employing what measurements – Gini coefficient, Theil therapy index, or σ index (log of coefficient of variance), suggest that there is V-shaped changing path of regional disparities with decline during the period of 1978 to 1990 and increase after 1990 (for example, see

Jian, Sachs and Warner, 1996; Cai, Wang and Du, 2002)¹, with an ending sign appears in very recent years, as is mentioned in Section 1 of this paper. From the point of view of economic growth, those revealed regional disparities reflect both disparity in growth rates or σ -divergence, the cause of divergence, and disparity in per capita income levels or β -divergence, or the effect of the gap of growth rates (Sala-i-Martin, 1996). Researchers have tried to seek major factors composing the disparities by decomposing the components of inequality indicators and found that the disparities between the eastern, central and western regions made major contribution to regional disparities emerged in the reform period (Lin, Cai and Li, 1998; Cai, Wang and Du, 2002; Wan, 2007).

Comparing with small economy, large economy defined by heterogeneity among domestic regions not only has distinct performances in long-term economic growth, but also react in a substantially different ways while facing an economic turning point. That is, within an individual large economy, when the advanced regions encounter alternations in resources endowments and therefore in comparative advantage, the economically lagging regions may be far from perceiving any such changes. Furthermore, under the assumption of existence of factors prices distortions caused mainly by inappropriate policies, industrial relocation may not be efficiency-improving, and change in industrial structure among regions may not be in compliance with comparative advantage dynamics. Tackling the characteristic of China being as large economy, therefore, is an important starting point for directing a sound policy orientation.

In addition to that, small economy and large economy are supposed to show significant uniqueness under circumstances of financial crisis and in coping with it. While small economy suffers from crisis's shocks as an integer, the impacts of crisis on large economy differ from region to region and thus from sector to sector. Facing the current financial crisis, for example, the Chinese regions suffer and react in differentiated ways. Observing and assessing the impacts on regions from three

¹ Whereas notable change is witnessed in very recent years, as is mentioned in Section 1, the regional disparities are still large in absolute term and in international comparison.

angles – namely direct shocks (on financial sector and sectors of real economy highly dependent on exports), indirect shocks (on sectors which stagnate due to overall decline in demand as panic spreads), and consequences of being shocked (on social angles such as unemployment, lay off, poverty, etc.), one can find the following facts.

The economic growth in coastal areas suffers the most, because those areas are most export-oriented (Figure 2), and thus enterprises in those areas were directly affected by sharp drops in orders for exported goods, though within the coastal areas, Yangtse River Delta regions, thanks to its industrial structure features, less suffer from direct shocks than Pearl River Delta regions do. As for central and western regions, because the economies are less outward-oriented comparing with eastern regions, they are not directly exposed to the shocks of declining export. However, those regions should not expect to avoid even the indirect impacts caused in part by economic slowdown of eastern regions and in part by the shortcomings in growth pattern and industrial structure thrown out during the crisis of their own.

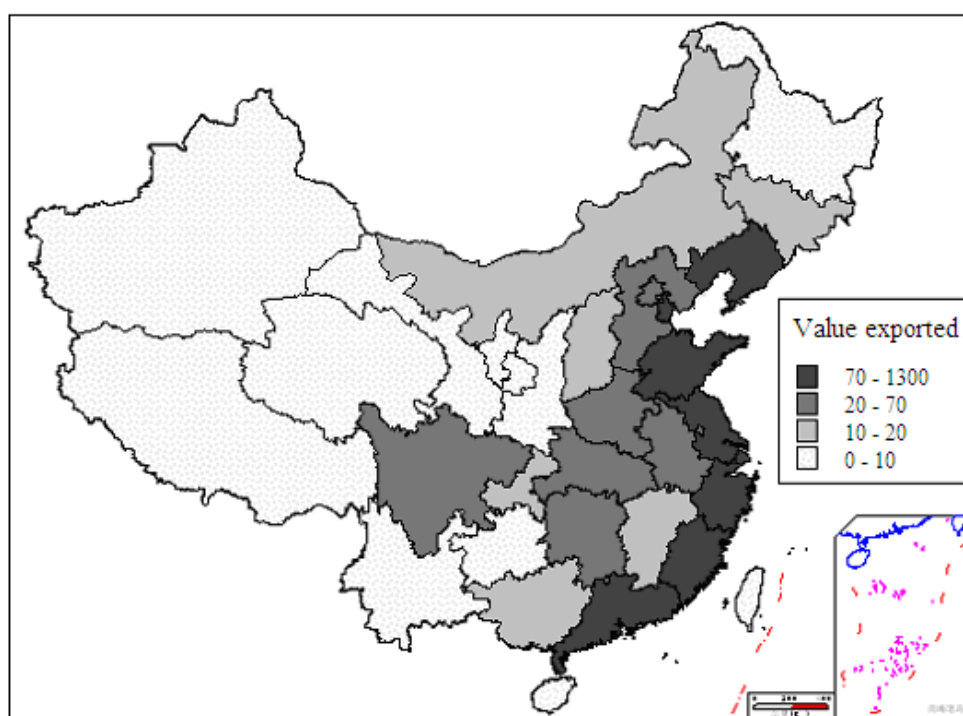


Figure 2 Regional Distribution of Value Exported of Manufacturing Goods (Billion yuan)

Source: The First National Economic Census Leading Group Office, State Council, *China Economic Census Yearbook* (2004), China Statistics Press, 2006.

Because both direct and indirect impacts of the financial crisis causes economic slowdown, increases in unemployment rate and poverty incidence, the crisis will no doubt bring about severe consequences to people's livelihood. Large economy, however, holds its advantageous position in coping with the shocks caused by the crisis, because the nature of regional pluralism and otherness of large economy provides the economy with an interspace or leeway to cope with the crisis by easy stages, on the one hand, and enables it to combine policy countermeasures coping with the short-term shocks with long-term strategy adjusting growth pattern and industrial structure, on the other. To the diversified Chinese regions, different reaction to the financial crisis can simultaneously accomplish differentiated individual tasks of development and adjustment of their own.

3. Lewis Turning Point, Chinese Characteristic

In the overall course of reform and opening-up, the economic growth in China has been characterized by development of dual economy. The Lewisian paradigm of dual economy virtually is a theoretical reflection on labor market segmentation rather than just a categorization of two sectors with different features of labor supply (Fields, 2004). Notwithstanding the labor migration from traditional to modern sectors is a marked phenomenon during the development course of dual economy (Todaro, 1969), the rural and urban labor markets are separated, because the nature of unlimited supply of labor leads to extremely low marginal productivity of labor and shared wage in traditional sector, on the one hand, and trade union activities and government regulations influence the wage determination in urban labor market, on the other. Characterized by the huge reservoir of surplus labor in agriculture, the institutional segmentation of labor market between rural and urban sectors, and thus the low and long-deflated wage of rural-to-urban migrant workers, the economic development in China can be stylized as a Lewisian development of dual economy (Cai, 2008).

Compared with Lewis theoretical model (Lewis, 1954), however, the Chinese style development of dual economy has its distinct features embodied in its accompanying the central planning system in pre-reform period and the economic transition in the reform period. Whether the labor migration from agricultural to non-agricultural sectors and from rural to urban areas and, as a result, the expansion of rural and urban employment is realized, therefore, is criteria to evaluate the successfulness of reform. By examining the labor market development and transition and the effects of economic growth on expansion of rural and urban employment, one can clearly see the combined process of dual economy development and economic transition in post-reform China. Such a process is characterized by the reallocation effect of expanded labor mobility on economic growth, active participation in global division of labor by full utilization of comparative advantage embodied in labor-intensive industries, and efficiency improvement through labor market development.

The dual economy development in the final analysis is a specific stage of economic development – that is, as per capita income increases, the relative scarcity and prices of factors of production change over time, the attribute of dual economy characterized by unlimited supply of labor will eventually vanish. That symbolizes the end of this stage of development. In the entire process, the period of time when labor supply first appears to be limited and therefore the wage rate starts to increase is an important turning point, what is called Lewis turning point. What follows, we discuss the evidence enabling us to believe that the Chinese economy is approaching its Lewis turning point.

First, we examine the new stage of demographic transition in China. Thanks to the combined effects of population policy and socioeconomic development, fertility has dramatically dropped in the past decades. For example, the nation's total fertility rate declined from 2.31 in 1980 to commonly believed 1.7 after the mid 1990s. In the mean time, following the decline in natural growth rate of population after the mid 1960s, the growth rate of working age population has been dropped since 1980s. The decline of growth of working age population has obviously accelerated since the

beginning of this century and will reach its bottom by about 2015. As is explained by the theories of demographic dividend (for example, Williamson, 1997), the declines in both fertility and working age population form two inverse U-shaped curves with an interval of about 22 years (Figure 3). If we take working age population as the base of labor force, the trends stated above imply that after experiencing a period of dual economy development with Chinese characteristics, the unlimited supply of labor will no longer be the common phenomenon and typical nature in the Chinese economy.

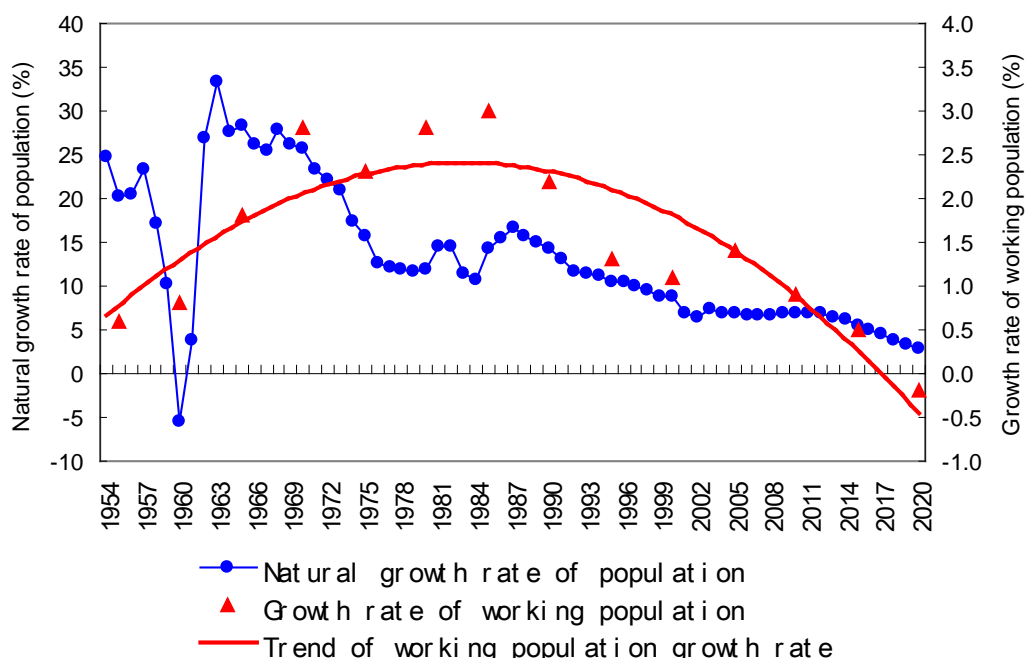


Figure 3 Demographic Transition and Resulting Dynamic of Working Age Population

Note: the Figure is drawn in a multinomial term.

Source: NBS various issues; United Nations (2005), *World Population Prospects: the 2004 Revision*, United Nations Population Division, Department of Economic and Social Affairs / United Nations Population Division.

Secondly, we examine the changes in stock of surplus laborers in rural areas. Lewisian type dual economy is characterized by unlimited supply of labor, because there is assumed a reservoir of surplus labor in agriculture. And the massive surplus labor has been long considered as significant feature of the Chinese economy. In the

mid-1980s when the impacts of rural reform on labor incentives were revealed, most scholars and policy researchers believed that because massive numbers of laborers were released from agricultural works, the size of the surplus labor force ranged between 1 and 1.5 million workers, accounting for 30–40 percent of the total labor force in rural China (Taylor, 1993, Chapter 8). Carter *et al.* (1996) estimated that in 1990 there were 172 million surplus laborers, making up 31.5 percent of total rural labor.

Since the new century, however, the magnitude and proportion of rural surplus labor have changed greatly. What follows we summarize the estimation by two of the authors (Cai and Wang, 2008). Based on various sources of survey (for example Li and Han, 2007), 230 million rural household-based laborers were engaged in non-agricultural sectors, accounting for 48 percent of total 485 million rural laborers. According to surveyed data of agricultural products costs, it is estimated that agricultural sector regularly demands for 178 million laborers. After subtracting the numbers of rural and urban non-agricultural employment and agricultural employment needed from total labor force in rural households, the residual left – namely surplus laborers – amounts to 74.7 million, accounting for 15.4 percent of rural labor force. This is rather a chary estimation. Under other two assumptions on agriculture-demanded labor, the amount of surplus rural labor can be 62.8 million, accounting for 12.9 percent of the total, and 24.8 million, accounting for 5.1 percent of the total, respectively. Meanwhile, the remaining surplus laborers became much older than before¹.

Thirdly, we examine the changes in wages of ordinary workers, especially of migrant workers. Thanks to the tremendous abatement of rural surplus labor force and relatively full employment in urban sectors, as the result of the strong demand of non-agricultural sectors for labor in the past decade, there has appeared unprecedented phenomenon of labor shortage and significant enhancement of wages for unskilled workers. It is particularly meaningful to look into the changed trends of

¹ For details of data used and estimation method, see Cai and Wang (2008).

migrant workers' wages. Due to a lack of systematic statistics on migrant workers' wages, we take different but authoritative sources to make the following conclusion. First, there was little increase in migrants' wage rate between 1997 and 2003, as suggested by some scholars and officials¹. Second, National Bureau of Statistics survey shows that in the period of 2001 to 2007, annual growth rate of wage of rural-to-urban migrant workers was 7.9 percent, while Ministry of Agriculture survey countersigns the same growth rate for migrant workers' wage between 2003 and 2007 (Du, 2008). Lastly, in the same period of 2001 to 2007, annual growth rate of wages of urban unit employees was 14.9 percent. According to Lewis's assumption, the disappearance of unlimited supply of labor is not symbolized by absolute shortage of labor, but by the fact that employers start to raise wages in order to hire adequate laborers.

Propositions on whether or not the Lewis turning point has come are competing and divide China's scholarly and policy studies. Even those who disagree can be categorized into two groups. One group of researchers disagrees with the conclusion of Lewis turning point's forthcoming by doing their own empirical works (for example Minami and Ma, 2008). Of those studies, one doubtful point is the data used. Partly because the China's economic growth has been too fast for statistical system to catch up in order to deliver sufficient information of the changes (Ravallion and Chen, 1999), there have been several famous data puzzles in quantitative studies. Some of the examples are: (1) migrant workers' and their accompanied families' income is missing from the statistical programs, which leads to overestimation of rural urban income gap and its trend of enlargement, (2) data on total labor force in rural households provided by different sources are inconsistent, which confuses people in understanding the stock of surplus labor, and (3) a lion share of informal workers over total urban employees is overslaughed, which gives rise to the underreport of employment

¹ For example, Li Deshui, the former commissioner of National Bureau of Statistics believed that comparing with their fathers' generation 20 years ago, the wage level earned by migrant workers in Pearl River Delta area in 2004 remains unchanged (People's Daily Online 2005).

expansion¹. Because of this, those empirical studies, while being serious in scholarly terms, cannot justify themselves.

Another group of researchers disagrees with the notion of coming Lewis turning point based on their experiences and perception. Although those studies are not firmly supported by empirical practices, they are worthy of thinking much of. Those opposite arguments in nature imply some valuable observations – namely, the presenting surplus labor force in underdeveloped rural areas, insistent low wages paid to migrant workers, and increasingly widened rural urban gap, and the like. While one of the authors has thoroughly responded to those empirical fallacies (Cai, 2008), sympathism should be paid to those intuitionistic observations, behind which the regional spectrum plays a role. That is, due to the nature of China as a large economy, when some regions are embracing important turning point, others witness little change and may react in a much lagged way. Perhaps, when development economists are inclined to see Lewis turning point as a period or time span (e.g. Minami, 1968), they are best testified by the fact that domestic regions within a large economy like China move to their Lewis turning points not in a simultaneous way but in an one-after-the-other way.

4. Policy Effects, or Comparative Advantage Dynamics?

A noticeably released report warns that due to tremendous rise in costs, China is losing its position as world's manufacturing center to the low labor costs countries such as Mexico, India and Vietnam (AlixPartners, 2009). While we will judge of such a verdict later, for the time being, we accept its core message that the comparative advantage embodied in labor-intensive industries is weakening because of the rise of labor costs. Since China's exports are concentrated in coastal areas (see Figure 2),

¹ Cai (2009) explained how those data issues caused scholarly and policy puzzles in related areas of the Chinese economy study.

the statement of increase in labor costs and shrink in competitive advantage actually designates the manufacturing in those areas. As for the central and western regions, because there are still abundant laborers and thus competitive wage rate, they are competent in carrying on the labor-intensive industries so as to sustain the comparative advantage of China as a whole in those industries. Following this logic, the industrial relocation revealed in the foregoing part of the paper seemingly is the representation of the adjustment process. If that is really the case, one would empirically expect to see that the new trend of growth in central and western regions is led by labor-intensive industries and the labor allocation responds to it. It is a pity, however, that the facts are against that expectation.

In China's reform and opening-up period, the government regional policies play an important role in promoting regional development while creating differentiation among provinces, especially among eastern, central and western regions. From 1980s to most of the 1990s, policies towards special economic zones and coastal development strategy gave eastern regions favored and supportive treatments, so that the regions, with their geographical advantages, became the major driving force of China's economic growth. Since the late 1990s, particularly since the new century, the central government has in succession implemented western development strategy, strategy of promoting old industrial bases in Northeastern and other areas, and central regions' grow-up strategy, under which the government emphatically invested in the central and western regions, while the government share of fixed assets investment enlarged heavily¹. As a result, the newly accelerated industrial development in the central and western regions has not been driven by labor-intensive sectors but by deflective investment.

The immediate intuition for most people is that labor in central and western regions should be more abundant and cheaper factors of production than in eastern regions, comparing with capital. Therefore, to prove whether the new trends of

¹ An economic analyst at Standard Chartered suggests that in 2005, the government share through budgetary channel was 13 percent of total investment. Adding the subsidies the government gave to state enterprises, it increased to 16 percent (Green, 2009, p. 4).

industrial growth in central and western regions are driven by policy-induced investment or by comparative advantage dynamics, we need to examine the consistency between the changes in relative intensity of production factors of industries and the current endowment of production factors of regions. Based on survey data on China's manufacturing covering information of all state-owned enterprises and non-state enterprises with designated size (revenue from principal business is over 5 million yuan) in the period of 2000 to 2007¹, we calculated the capital intensities in manufacturing sectors by region. As is shown in Table 1, the average firm size denoted by value added per firm was relative stable in the eastern regions, while that in central and western regions enlarged significantly and surpassed the former in absolute term. In the same period, capital intensity of industries denoted by capital-labor ratio in central and western regions increased by 8 to 9 percent annually and surpassed their eastern counterparts in absolute term as well.

Table 1 Firm Size and Capital Intensity by Region (million yuan/firm, thousand yuan/worker)

	2000	2001	2002	2003	2004	2005	2006	2007
Average size								
East	22.22	15.44	16.29	20.74	15.90	20.15	21.26	22.00
Central	23.34	19.94	18.60	25.23	29.39	27.53	28.34	28.51
West	28.46	21.88	22.88	30.39	31.25	31.11	32.14	33.69
Capital-labor ratio								
East	77.7	58.6	63.5	82.5	83.2	89.9	97.8	103.8
Central	67.2	61.6	58.9	81.5	101.0	101.6	114.0	124.7
West	75.6	65.7	68.4	92.9	105.0	109.5	120.7	130.7

¹ This survey was conducted by National Bureau of Statistics. It covers industrial enterprises in all 31 mainland provinces. The sampled enterprises were 150 thousand in 2000 and 2001, 160 thousand in 2002, 180 thousand in 2003, 250 thousand in 2004 and 2005, 280 thousand in 2006, and over 310 thousand in 2007.

Source: Authors' calculation based on NBS enterprises survey

The results shown in Table 1 are more likely the outcome of region-biased investment and energy, chemicals, and other heavy industries-biased investment structure than a reflection on the process of central and western regions carrying on the transferred labor-intensive industries from eastern regions. In the period of 1997 to 2007, the share of eastern provinces in total investment in fixed assets of the whole country declined from 61 percent to 56 percent, while the share of central provinces increased from 22 percent to 24 percent and that of western provinces increased from 17 percent to 20 percent. In 2007, of the sources of the total investment in fixed assets, the part from state budget accounted for 2.04 percent in eastern regions, 4.72 percent in central regions, and 6.37 percent in western regions. In general, a larger proportion of government-supported investment in fixed assets can be observed in central and western regions.

During the reform and opening-up period, the regional reallocation of labor shows two features. First, the notable labor mobility happens in rural-to-urban migration and agricultural-to-industrial relocation. Regional movement of urban labor has been limited by the close linkage between household residence and welfare provision and thus insignificant in contributing to the labor reallocation. So we focus on migrant workers from rural to urban areas when investigating labor relocation. Secondly, the spatial orientation of rural labor migration has been the movement from central and western to eastern regions, but rarely the opposite (Cai and Wang, 2003). Given those characters of labor mobility in the past, if the same distribution pattern of rural labor migration is observed, we can conclude that there is no notable labor relocation among regions.

Table 2 gives the regional distributions of migrants originated from central and western regions in 2000 and 2005. Based on 2000 census and 2005 1% population sampling survey, we divide out-migrants from central and western regions into two groups: migrants from central and western to eastern regions, and migrants within central and western regions. Comparing with 2000, the proportion of migrants from

central and western to eastern regions did not decline but increased. It was also the case when we examine migrant workers at age 16 and above. The other side of the coin is that the proportion of rural population and labor migrated within central and western regions declined in the period of time.

Table 2 Changes of Migrants Distribution Originated from Central and Western Regions (%)

years	Total migrants		Laborers aged 16 and above	
	To east	Within central-west	To east	Within central-west
2000	47.7	52.3	51.3	48.7
2005	50.3	49.7	53.5	46.5

Source: authors' calculation based on 2000 census and 2005 1% population sampling survey

It is worth of noting that due to the definition, data on rural migrants are not exactly the same between 2000 and 2005. While rural migrants in 2000 census are defined as those who left their household registered township for more than 6 months and resided in present communities for less than 5 years, rural migrants in 2005 survey are only defined as those who left their household registered township for more than 6 months. This difference of definitions does not preclude the conclusion that no obvious change is found in distribution pattern of migration between central and western regions and eastern regions.

For the sake of observing changes in magnitude and regional distributive pattern of rural migrants with relatively longer coverage of time, we use data from NBS sampling survey on rural migration to further depict the general trends. First column of Table 3 denotes total amounts of rural migrant workers, from which one can perceive both the fast growth and diminishing rates of growth in recent years. Second column shows the amounts of migrant workers of permanent rural households. Namely, the difference between columns 1 and 2 is the migrants with entire family moving out.

Columns 3 through 5 indicate the regional distribution of migrant workers as defined in column 2. The changes in migrants' distribution among three regions show very similar trends in the period covered.

Table 3 Magnitudes and Regional Distribution of Migrant Workers

Years	Migrant workers (million)	Migrant workers from permanent rural households (million)	Distribution of migrant workers from permanent rural households (%)		
			East	Central	West
2000	78.49	n.a.	n.a.	n.a.	n.a.
2001	83.99	n.a.	n.a.	n.a.	n.a.
2002	104.70	n.a.	n.a.	n.a.	n.a.
2003	113.90	89.60	69.9	14.9	15.2
2004	118.23	93.53	69.6	14.4	15.7
2005	125.78	100.38	70.3	14.4	15.0
2006	132.12	105.68	70.1	14.8	14.9
2007	136.97	108.75	69.6	15.2	15.0
2008	140.41	111.82	71.0	13.2	15.4

Source: (1) data of 2000-2007 are from Department of Rural Surveys, National Bureau of Statistics, *China Yearbook of Rural Household Survey* (various years), China Statistics Press; (2) data of 2008 is from website of National Bureau of Statistics.

5. Flying Geese: Back to Comparative Advantage

For years prior to break-out of the financial crisis, the outward-oriented enterprises in manufacturing already experienced severe shortage of unskilled workers and tremendous rise of wages (Cai, 2008). Moreover, those same kinds of enterprises suffer the most from the shocks caused by the crisis. By following the simplified flying geese paradigm, it is natural for injudicial observers to anticipate a mass transferring of labor-intensive industries from coastal China to its neighboring

countries and even farther parts of the world. The extended version of flying geese model taking into particular consideration the characteristics of large economy, however, contains much ampler implications than what it is naively understood. First, corresponding to relative changes in dynamic comparative advantages, industries containing different intensities of production factors transfer among countries and regions. Second, flying geese-shaped industrial transfers among countries are determined by a series of properties relating to life cycle of products (Vernon, 1966), in which comparative advantage changes are implied. Thirdly, the flying geese paradigm has been extended to explain changes in foreign direct investment – namely, the investment activities across borders follow the same pattern of trade (Kojima, 2000). Finally, the great variety of in countries' and regions' stages of development, resources endowments, and historical heritages are seen as critical reasoning to build the link like this between them (Okita, 1985, p.21).

Industrial transfers depicted by flying geese paradigm are directly engendered by changes in dynamic comparative advantages. That is, as per capita income increases, resources endowment changes over time. When advanced countries upgrade their industrial structure, say from labor-intensive to capital-intensive industries, the lagging countries take over the industries washed out by the former and receive foreign investment to those industries. Changing paths of comparative advantage and forms of flying geese model, however, are not the same between small and large economies. As discussed in Section 2, while for small economy, flying geese model is usually formed to transfer industries among countries, flying geese model in large economy can be formed among domestic regions¹.

Whether China can shape its domestic flying geese model to transfer industries among different regions and therefore relocate its regional pattern of industries lies on

¹ In their analysis on small country and large country, Chenery et al. (1975, Chapter 4) noticed the difference in trade patterns. This can actually well applied to explaining the characteristics of China as a large economy – that is, highly outward-oriented and inward-oriented regions coexist, and given the differential endowments of production factors, it is divided into several smaller economies, among which flying geese-shaped developments can be accomplished.

the marked differences in comparative advantages among its regions. In other words, one can judge only after evidence is found that while the eastern regions lose their comparative advantage in labor-intensive industries due to the rise of labor costs, the central and western regions still hold advantage in abundant and cheap labor. In addition, it requires in-depth and empirical analysis not only to respond to the query of whether China as a whole can sustain its competitiveness of labor-intensive industries, of which the AlixPartners (2009) says no, but also to provide policy suggestions for redirecting central and western development back to the pattern conforming to their comparative advantages.

No matter what measurements are employed, and how thorough the contents of production costs are, two indicators, namely compensation of worker and labor productivity, are vital and sufficient in denoting advantage in labor costs a country or region holds, in the final analysis. On the one hand, rise of workers' compensation will push up labor costs, lowering competitive advantage in labor-intensive industries. On the other hand, improvement of labor productivity will counteract the negative effects of wage rise to competitiveness and therefore last comparative advantage of labor-intensive industries. In the past years, the growth of average productivity represented by per capita GDP has been no less than the increase in wages. Comparing with both developed countries and newly emerged market economies, China's performance in this regard is superior (Table 4).

Table 4 Growth Rates of Labor Productivity in Selected Regions (%)

	EU-27	United States	Japan	Emerging economies	Russia	China	Brazil	India	Mexico
2000-2008	1.5	2.0	1.8	6.5	5.9	10.4	0.9	4.9	0.6
2005	1.0	1.4	2.1	6.6	5.8	9.4	-0.1	6.8	2.2
2006	1.8	0.9	1.5	7.5	6.7	10.7	15	7.0	1.3
2007	1.3	1.5	1.6	8.0	7.3	12.1	2.3	6.1	1.5
2008	0.2	1.7	0.9	5.5	6.0	7.7	3.7	4.4	0.6

(preliminary)

2009 (projected)	0.0	0.5	-0.5	5.9	3.5	9.1	4.3	3.9	0.1
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Note: Labor productivity here refers per capita GDP, therefore it is average productivity of labor by definition.

Source: The Conference Board (2009) *Performance 2009: Productivity, Employment, and Growth in the World's Economies*, <http://www.conference-board.org/>

To complement the above oversimplified comparison, based on data of manufacturing enterprises in 2000-2007 and econometric models, we estimate marginal productivity of labor and average productivity of labor for China's manufacturing enterprises, respectively, and compare the results with employees' compensation summing up wage, income in kind, and social security benefit enterprises paid to workers, which are deflated by consumer's price index. This comparison will reveal labor costs advantage of enterprises in different regions.

We first estimate production functions by region on yearly base by controlling for industries, region dummies, and composition of share-holding (proxy of ownership variable). The formula for estimation is as following:

$$\ln y = \alpha \ln k + \beta \ln l + c$$

here, y denotes production output, represented by the variable of industrial value added, k denotes capital, represented by annual average balance of net value of fixed assets, labor, l , is represented by total employees of enterprises. After running such a production function, we calculate marginal productivity (MPL) and average productivity of labor (APL) by the following formula:

$$MPL = \frac{\beta \times y}{l} = \beta \bullet c \bullet k^\alpha l^{\beta-1}$$

$$APL = \frac{y}{l} = c \bullet k^\alpha l^{\beta-1}$$

Estimated results are listed in Table 5, showing the magnitude of and changes in wages and two sets of labor productivity indicators in the period of 2000 to 2007. From the table, one can find that in the investigated period labor productivity improved

dramatically – both measures increased by about 3 times, whereas workers' compensation only increased by 92 percent. If we take the ratio of labor productivity to workers' compensation as measurement of unit labor costs (Ark, 2008), that indicator is significantly smaller than 1 in all years covered.

Table 5 Compensation and Labor Productivity in Manufacture (thousand yuan per worker, %)

	2000	2001	2002	2003	2004	2005	2006	2007	2000-07
Magnitude									
Compensation	11.48	12.25	13.09	14.08	15.35	16.96	20.74	22.02	-
MPL	25.9	32.4	38.61	46.97	56.81	62.85	78.23	95.07	-
APL	42.7	52.06	60.41	77.28	95.32	115.8	148.9	180.4	-
Growth rate									
Compensation	-	6.71	6.86	7.56	9.02	10.49	22.29	6.19	91.84
MPL	-	24.71	19.17	21.65	20.95	10.63	24.47	21.52	265.93
APL	-	21.72	16.04	27.93	23.34	21.51	28.61	21.15	321.94

Source: Authors' estimation based on NBS firm survey

By employing the same econometric methods, we also estimated work compensation and marginal productivity of labor and their growth rates during the same period, and made comparison between eastern, central and western regions. The results are listed in Table 6. Taking into account the performances of improvement of labor productivity, increases of wages in all the eastern, central, and western regions did not push up unit labor costs – ratio of wage to marginal productivity of labor, whereas this ratio in central and western regions appeared to be significantly declined. From the comparison between eastern and central and western regions, one can clearly see the trend of wage convergence and relatively smaller difference in wage levels among regions. However, given the statistical reason that is explained in Cai (2004), numbers of employees collected from enterprises survey

hardly cover all workers, particularly the reemployed, agency workers and migrant workers are often excluded from enterprises' reporting. That is, such surveyed information cannot well reflect the wage situation of those informal workers¹. Therefore, the empirical results generated by this paper are not sufficient to infer any conclusion of regional convergence of migrant workers' wage rates, though other study does show the trend of wage convergence (Cai et al., 2007).

Table 6 Work Compensation and Labor Productivity by Region (thousand yuan/worker)

	2000	2001	2002	2003	2004	2005	2006	2007
Compensation								
East	12.64	12.86	14.02	14.82	16.06	17.62	20.06	22.91
Central	8.93	11.28	10.76	11.80	13.82	14.44	16.32	18.63
West	10.87	11.08	12.39	13.81	15.81	16.64	19.37	21.27
MPL								
East	28.10	34.60	41.57	49.50	57.22	63.99	73.98	96.11
Central	20.36	25.31	30.96	38.34	50.94	57.24	72.74	94.53
West	27.10	34.12	38.57	49.38	63.08	68.40	84.69	92.00

Source: Authors' estimation based on NBS firm survey

It is also worth of noting that because the labor distribution among regions, as is shown by the data used, is the outcomes of labor migration mainly from central and western to eastern regions and the policy implementation, which favored biased investment in central and western regions, it does not accurately reflect the actual endowments of production factors of each region. In a scenario, under which three regions relocate their industrial structures in accordance with their own comparative advantages, the advantages in labor costs in central and western regions will be more outstanding.

¹ However, this series of survey per se still provides consistent data depicting the spatio-temporal changes of manufacture's development in China.

6. Conclusions and Policy Suggestions

In the course of global financial crisis, searching after the way out and potential sustainability of long-term economic growth requires comprehensive strategic thinking, which enables us to combine the short-term pressures and long-term challenges under the economic theoretical framework in accordance with the Chinese characteristics of development process. There are two implications in considering China as large economy. First of all, when there appears the sign of coming Lewis turning point, it is not necessarily the case that Chinese regions enter the new stage of development simultaneously and altogether. Such discrepancy of time well characterizes the Lewis turning point – that is, it should be expressed as a period of time rather than a point of time. Secondly, the great differential in resources endowments and sequencing, by which each region reaches its turning point, make it possible to form a domestic flying geese pattern of industrial transfer. Therefore, a regional relocation of the Chinese industries, more specifically the process of the central and western regions carrying on the labor-intensive industries vacated by the eastern region, should be expected. While an industrial relocation has been indeed witnessed in both pre-crisis years and the course of crisis, however, it is not necessarily an adjustment conforming to the dynamic change in comparative advantages.

Through a counterfactual analysis framework, this paper empirically shows that whereas there has been a trend that industrial output grew faster in the central and western provinces than in the eastern provinces, there is no clear sign of labor relocation among regions – namely, labor force continues to migrate from the central and western to eastern regions. Correlatively, the capital intensity of industries in the central and western regions swelled, which seems to deviate from the regions' resources endowments characterized by abundant labor force. In implementing the western development strategy, the northeast and other old industrial bases promotion strategy, and central regions growing up strategy, the central government has favorably invested in the central and western regions disproportionately, which gives

rise to those regions' economic growth over relying on heavy industries. Thus, the observed regional relocation of industries is not the outcome of industrial structure adjustment based on regional comparative advantages.

The vital challenge facing China's future is how it can cope with the diminishing demographic dividend characterized by population age structure change in order to sustain its economic growth. According to the findings of this paper, carrying on labor-intensive manufactures in the central and western regions through the formation of domestic flying geese model can be an effective way to maintaining demographic dividend to gain time to create new source of economic growth. The results of this paper suggest that the urgent challenge facing implementation of regional development strategies is to transform the government intervention and investment-oriented mode to comparative advantage-following and market-oriented mode, so as to make the industrial relocation of industries become upgrading process of all eastern, central and western regions altogether. The central government has been sparking plug the transformation of economic growth pattern through various policy measures. In face of the current financial crisis, the old growth pattern is further proven to be unsustainable. Therefore, soundly chosen mode of implementing the regional strategy of development will serve both the countermeasure to overcome the crisis and a breakthrough of the transformation of growth pattern.

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