Flying geese within borders
How does China sustain its labour-intensive industries?

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Introduction

In explaining how the current financial crisis happened, most studies are looking for the root causes in the prevailing financial institutions and credit system. And, since the crisis broke out in the United States and was channelled to other countries' financial systems and the real economy through financial, industrial and trade links, most countries have chosen to claim this crisis as an external shock imposed on their economies. Viewing the current crisis through the lens of economic history, however, we can see that the impacts of economic crises differ among countries, among regions and sectors within a country and even among enterprises within a sector. Whereas a crisis can be said to result from external sources, the degree of the shocks will be dependent on certain domestic conditions such as the pattern of growth, the state of the industrial structure, the stage of development and the technological structure and operational mechanisms of enterprises. In this regard, one needs to go beyond the framework by which the business cycles are explained simply by the operation of the monetary and credit systems and seek to find the root causes of crises from the point of view of the real economy, looking especially at what happens to the industrial structure. As one of a few economists who made a contribution to the interpretation of the business cycle from the angle of the real economy, Schumpeter (1961:Ch.6) pointed out that there were some real opportunities for economic development in an economic crisis.

While there have been no symptoms of crisis in its financial system—which is connected but not integrated with those in the United States and Europe—China has suffered from a severe economic slowdown and unemployment, because of a fall in exports brought about by the global financial crisis and the internal imbalance between consumption and investment in the domestic economy. Our observation that the impacts of the financial crisis on the real economy differ from region to region,

from sector to sector and from enterprise to enterprise is consistent with Schumpeter's opinion of economic crises (Cai 2009). This is because Schumpeter does not see economic development as a smooth movement, but a process of jumps with tempestuous fluctuations. That is, the business cycle is built within the process of economic development. In Schumpeter's opinion (1961:Ch.6, 1976:Ch.7), economic development is driven by the invention and production of new consumer goods, the new methods of production or transportation, the new markets and the new forms of industrial organisation that enterprises create. This kind of innovation, however, proceeds in unevenly distributed intervals and emerges discontinuously in groups or swarms. Innovative new enterprises appear side-by-side with old enterprises and try to take their place and eventually replace them. As an adaptation, the changes in development conditions caused by the competition between the new and old enterprises act as and take the form of a business cycle—known as a process of 'creative destruction'. As a result, more and more new enterprises follow and imitate the innovation of the early enterprises, impelling an economy to boom. Because the economic boom is pushed partly by the latecomer enterprises, which are progressively less qualified in innovation, and the old enterprises' struggle for survival, the economic crisis eventually comes and is in turn followed by recession.

Furthermore, in a financial crisis, the degree of shocks and the time lag between economic recovery and employment recovery depend on the characteristics of a country's growth pattern, industrial structure and the countermeasures implemented by the government to tackle the negative impacts of the crisis. In the process of economic recovery and subsequent growth, there can be a phenomenon known as a 'jobless recovery'—that is, a time lag between the end of the recession and the time when employment finally rises above the level at the end of the recession. In explaining the reason for the jobless recovery after the 1990–91 recession, the prevailing propositions agree that it had to do with the adjustments made by industries and/or enterprises during the economic slowdown. To cope with the shocks brought about by economic crisis, enterprises are forced to strengthen their competitiveness in the market by cutting costs or restructuring, for example, and as a consequence, industrial structural adjustment takes place at a faster speed and takes a more radical form. First of all, enterprises often try to replace workers with robots and machinery in order to enhance labour productivity and reduce the costs of production. As a result, the numbers of workers needed for the same unit of production falls. Second, relatively labour-intensive industries shift abroad to adjust

domestic production to its changing underlying comparative advantage. While international competitiveness can be sustained, the domestic structure of industries becomes more capital intensive. Third, as a result of all the adjustments mentioned above, the changes in the industrial structure modify the skills demanded of workers. While workers adjust their human capital to meet the changes in the skills demanded, structural unemployment can increase, because the match between employees who want to find jobs and employers who want to hire workers takes time.

Due to the close link between the Chinese and global economies, some factors that help reduce unemployment can lurk in the process of economic recovery. Before the financial crisis hit China, export-oriented enterprises—located mostly in the coastal provinces—had already begun suffering from labour shortages and wage inflation (Cai 2008). It was no accident therefore that the enterprises hit most severely by the crisis were those with rising costs of production. According to the 'flying geese' paradigm, labour-intensive industries are expected to transfer to other developing countries, where business can reduce costs of production by hiring workers at much lower costs. If one applies an extended theoretical framework of flying geese—namely, a model containing overall explanations of industrial transfer among localities—and combines it with Schumpeter's paradigm of creative destruction to analyse the characteristics of regional development in China, we can conclude that the comparative advantage in labour-intensive industries will be sustained in the Chinese economy as a whole.

Mainly thanks to the contributions made by Akamatsu (1962), Okita (1985), Vernon (1966) and Kojima (2000), the theoretical model of flying geese has experienced stages of formation and extension, eventually becoming an integrated theoretical framework interpreting industrial transfer among regions.[1] This model was created to depict how Japan—as a latecomer in development—could catch up with more advanced countries through an integrated process of moving from imports, via import substitution, to exports, and it later became a widespread notion for interpreting and understanding the development pattern of East Asian economies. That is, the production of labour-intensive goods has shifted from Japan—the leading goose—in turn to the four Asian tigers of South Korea, Taiwan, Singapore and Hong Kong, to Association of South-East Asian Nations (ASEAN) countries and to the coastal provinces of China as a result of the dynamic changes of the underlying comparative advantages in the region.

The major propositions of the extended version of this theory can be summarised as follows. First, it firmly holds its original idea that in responding to the relative change in comparative advantage, industries containing different intensities of production factors will transfer among economies. Second, flying geese-like industrial transfer is related to the characteristics of the life cycle of products (Vernon 1966), which implies its pertinence to the dynamics of comparative advantage. Third, its scope of explanatory power has been extended to foreign direct investment (FDI)—namely, its flow follows a pattern similar to that of trade among countries (Kojima 2000). Finally, the great variety in countries' and regions' stages of development, resource endowments and heritage is seen as critical reasoning with which to build such links between them (Okita 1985:21).

Industrial transfers depicted by the flying-geese pattern are directly engendered by changes in dynamic comparative advantage. That is, as a country's per capita income increases, its resource endowment changes over time. When advanced countries upgrade their industrial structure—say, from labour-intensive to capital-intensive industries—the latecomers can take over the industries washed out by the former and receive foreign investment to those industries. Changing paths of comparative advantage and forms of the flying-geese model, however, are not the same between small and large economies. This is because a small economy is characterised by the homogeneity of its resource endowment and hence its industrial structure. Once its comparative advantage changes, the economy as a whole enters a new stage of development. In contrast, a large economy is characterised by heterogeneity in its resource endowment and its industrial structure among different regions. While some regions move to a new stage of development, the development stage of others might remain unchanged. Therefore, the flying-geese pattern means industrial transfer among independent economies for a small economy, but industrial transfer among different domestic regions within an individual economy for a large country.

In a financial crisis, understanding this regional pattern of industrial structure requires combining the flying-geese model with relevant theory of the business cycle. According to Schumpeter, during times of economic crises, there is a greater chance than otherwise to form a process of creative destruction—namely, production factors can be recombined, old patterns of growth can be replaced by new ones, new technologies wash out the old technologies and productivity improvement contributes a larger and larger role to economic growth. It is obvious that intense

changes in the industrial structure are the by-product of economic crises, and the acceleration of industrial transfers among regions can be given impetus on the way out of the crisis. Given the characteristics of previous regional patterns of economic growth in China, we expect to see the central-western regions—or in a broader sense, the regions that were not major engines of China's economic growth in previous years—obtain faster rates of productivity and output growth, so that they are bound to catch up with their advanced eastern counterparts and sustain the further development of China's labour-intensive industries.

The rest of this chapter is organised as follows. Section two depicts and summarises the characteristics of the regional pattern of industrial evolution in China. Section three estimates the contribution of total factor productivity (TFP) to manufacturing by region and reveals the possibility that the provinces in the central and western regions will become major drivers of China's growth. Section four calculates the real labour costs of manufacturing by region, exploring the opportunities that central and western regions will receive from the reallocation of labour-intensive industries. Section five concludes and draws policy implications by responding to some of the questions about the potential for China's economic growth and international competitiveness.

The spatial characteristics of industrial evolution

The past 30 years of rapid growth in the Chinese economy have some outstanding spatial characteristics. For a long time, China's growth has been driven by its coastal regions. Thanks to their geographical advantages, the migration of abundant cheap labour from central and western regions and, most of all, favourable and preferential government policies, the eastern provinces have been successfully receiving transferred industrial opportunities and FDI and gaining competitiveness in international markets. While the central and western provinces have gained their share more or less through spill-over effects, they have begun to catch up quickly since the beginning of this century. As a result, China's economic growth has been much more balanced than in the past since the beginning of this century. On the other hand, some serious structural shortcomings still exist—related partly to China's stage of development and partly to the incomplete nature of institutional reform.

First, thanks to its longstanding dual economy characterised by the existence of an unlimited supply of labour, China's economic growth has

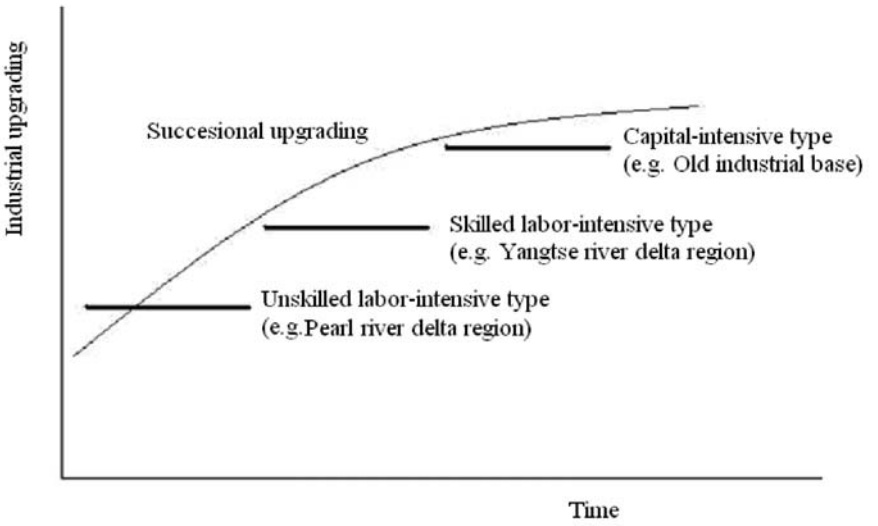
benefited from its significant demographic dividend, it has avoided the phenomenon of diminishing return to capital and has broken the 'Young–Krugman curse'.[2] On the one hand, it has also been trapped in a pattern in which economic growth is driven mainly by inputs of capital and labour and less by technological advancement, industrial upgrading and productivity enhancement (Cai 2008). Such a growth pattern is embodied in the heavy dependence of growth on demands created by export and investment and not by domestic consumption, which has been insufficient. The other manifestation of this pattern is the overwhelming share of government revenue and enterprises' profits in national income, which leaves an extremely small part for residents' income in total national income.

Second, the regional disparities in economic development existing during the reform period have formed a path-dependent sequel. That is, the implementation of the strategy of coastal development, while spurring the economic growth in eastern provinces, has locked in a regional pattern of industrial allocation, preventing the eastern and central-western regions from upgrading their industries and leading to regions' industrial structure deviating from their comparative advantages. The over-active government intervention in economic activities, while filling the gap of entrepreneurship at the early stage of market maturity, creates no adequate incentives for regions to upgrade their technological and industrial structures. In the entire reform period, central and local governments have been deeply involved in regional economic development, not only by artificially depressing prices of land and other local resources in order to create favoured policies for attracting more foreign investment and ambitiously planning local industrial structures based on maximising regional gross domestic product (GDP), but by being directly involved in negotiating over and participating in some projects. Owing to such a close relationship between local governments and regional economic activities and the heavy reliance of government budgets on a small group of enterprises and projects with overwhelmingly large scales, local governments' industrial policies have been captured by vested interests in these industries and enterprises. Protected enterprises continually receive fiscal subsidies, physical assistance, monopoly status and other institutional rents and, as a result, the allocation of factors of production is continuously distorted and entrepreneurs are no longer capable of judging the changes in relative scarcities of production factors and hence comparative advantage dynamics. In short, when expected innovation is replaced by rent-seeking activities, the process of industrial upgrading is postponed and an outmoded growth pattern gives way to inertia.

The transformation of the economic growth pattern, which has been preached by the central government for a very long time, is in its nature a process of creative destruction. Because of the reasons described above, however, Chinese enterprises have little incentive to play their part in transforming the current pattern of economic growth—or, in other words, they do not feel that transformation through creative destruction is financially or physically affordable. As a result, the inevitability of such a transformation of the growth pattern—as required to maintain sustainable economic growth—through upgrading technologies and industries in the long term takes the form of regional leapfrogging. Given the variety of geographical features and economic endowments in China's regions, and particularly the characteristics of regional competition led by fiscal decentralisation (Jin et al. 2005), while the advanced regions are reluctant to upgrade their growth pattern, the latecomer regions will start building their industrial structure rapidly by leapfrogging, as a substitution for the trudging method of industrial upgrading undertaken in the advanced regions. This type of industrial upgrading, due to the existence of the wave phenomenon (Lin 2007), tends to depart from or overrun the requirement of changes in comparative advantage.

Using the example of manufacturing in three Chinese regions—the Pearl River Delta region, the Yangtse River Delta region and some old industrial bases such as the north-eastern provinces—Figure 11.1 illustrates such a unique mode of industrial upgrading. It shows that instead of the theoretically expected smooth process of industrial upgrading in the country as a whole, there has been an alternative pattern in which newly emerged regions have jumped to an industrial structure with higher-graded manufactures, whereas the industrial structure of the early developed regions remains little changed.[3] The Pearl River Delta region, for example, started its industrialisation with processing trades based on external orders and formed an unskilled or semi-skilled labour-intensive industrial pattern. It is generally believed that the industrial structure in this region has not changed significantly despite its experiences with wage inflation and labour shortages in recent years. Instead, the more technology-intensive industries are emerging in the Yangtse River Delta region, which relies more on skilled workers in production. In the meantime, as the result of the boosting of old industrial bases, north-eastern provinces and other regions have developed their equipment-manufacturing sectors, which are more capital intensive.

Figure 11.1 Leapfrogging pattern of regional growth in China



Such a pattern of regional development and industrial structural change is to some extent the outcome of government intervention in regional economic growth. It also reflects the need for industrial upgrading and the transformation of the growth pattern as it is required now. Therefore, this leapfrogging type of regional development can be seen as a variant form of the required upgrading and transformation because it is indeed accompanied by enhancement of productivity and it does not necessarily reflect the changing features of comparative advantage among regions. The mass migration of labour from central and western regions to eastern regions, the wave phenomenon in the process of industrial upgrading and the price distortion of production factors lead to the separation of revealed comparative advantage from the real resource endowments in those regions.

Estimating total factor productivity by region

Total factor productivity (TFP) is often used to evaluate economic performance and the quality of growth in a country (region or industry). It has two components: allocative efficiency and technological efficiency (Lau and Yotopoulos 1971; Barro 1999). In China, regional competition has caused large differences in growth performance and TFP across regions. The developing areas might have plenty of room to realise more rapid

technological progress through technological diffusion and spill-over. In contrast, leading areas have formed mature industrial structures in the process of their growth and will have to face the constraints of high adjustment costs and the shocks of creative destruction—probably leading to their technological progress being temporarily or permanently locked at a certain level.

In terms of growth accounting (Solow 1957), economic growth can be decomposed into two sources: factor accumulation and TFP advancement. Capital and labour are two important factors of production in economic activities, and growth can benefit from their accumulation, but they are not the major determinants of growth—due to the law of marginal diminishment. In growth accounting equations, TFP is measured by the Solow residual, which accounts for the effects of total output not caused by inputs and is considered to be the most important driving force for growth in the long run.

Economic activities can be viewed as a process of production by means of various inputs, in which output (Y) is a production function of TFP (A), capital (K), labour (L) and intermediate input (I)—that is, $Y = F(A, K, L, I)$. Intermediate input is an essential part of industrial production and often contains technological progress attached to capital goods, so it can be categorised as a type of production factor. According to the theory of TFP, output growth can be decomposed into two parts: changes in the accumulation of capital, labour and intermediate inputs, and changes in technological progress. Based on the Cobb-Douglas (CD) production function equation, the source of output growth has the following three components: $g_Y = g + \alpha * g_K + \beta * g_L + \gamma * g_I$, in which g_Y represents output growth and g_K, g_L, g_I represent the growth of capital, labour and intermediate input, respectively. α, β, λ are elasticities of capital, labour and intermediate input, respectively. If technological progress is Hicks-neutral, g measures TFP. Its formula is as in Equation 11.1.

Equation 11.1

$$g = g_Y - \alpha * g_K - \beta * g_L - \gamma * g_I$$

This chapter utilises the data for manufacturing firms that include all state-owned enterprises (SOEs) and non-state-owned enterprises with annual revenue greater than CNY5 million from 2000 to 2007. It covers the manufacturing enterprises in 31 provinces (cities and autonomous areas). The number of manufacturing enterprises was about 150 000 in 2000 and

2001 and 160 000 in 2002, 180 000 in 2003, 250 000 in 2004 and 2005, close to 280 000 in 2006 and more than 310 000 in 2007.

In order to compare changes in TFP by region, we divide 31 provinces (cities and autonomous areas) into six regions: South China coastal region (including Guangdong, Fujian and Hainan), East China coastal region (including Shanghai, Jiangsu and Zhejiang), North China coastal region (including Beijing, Tianjin, Hebei and Shandong), the North-East region (including Liaoning, Jilin and Heilongjiang), the Central region (including Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan) and the Western region (including Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang).

This chapter will estimate the production function to obtain the elasticities of capital, labour and intermediate inputs, and then calculate annual growth and the contribution of TFP to regional economic growth. When estimating the production function, the industrial gross output value is chosen as the output variable, net fixed assets as the capital variable, the employment number as the labour variable and the value of intermediate input products as the intermediate input variable. Among these, the industrial gross output value is deflated using the output price index. Net fixed-asset values equal the original fixed-asset value minus depreciation and plus newly added fixed assets. Net fixed-asset values are also deflated using the fixed-assets price index to calculate the stock of capital. The employment number is the number of workers employed at the end of the year. Intermediate input is also deflated using the price index for raw materials.

The regression equation of output on capital, labour and intermediate input is given in Equation 11.2.

Equation 11.2

$$\ln Y_{ji} = a_j + \alpha_j \ln K_{ji} + \beta_j \ln L_{ji} + \gamma_j \ln I_{ji} + \mu_t D_t + \mu_n N_n + \mu_m M_m + e_j$$

In this equation, $j = 1,2,...,6$ represents six areas; i represents individual enterprise; D, N, M are the dummy variables of years, provinces and industries. μ is the coefficient of dummy variables; t, n, m are the number of years, provinces and industries and e is the error term. $a_j, \alpha_j, \beta_j, \gamma_j, \mu_t, \mu_n, \mu_m$ are the parameters to be estimated. Based on the data for manufacturing enterprises, the regression results are reported in Table 11.1.

The regression results show that statistic values of capital, labour and intermediate input variables are significant at 1 per cent and their coefficients are consistent with theoretical expectation. The elasticity values of capital, labour and intermediate input, however, vary across regions. Among them, the elasticity values of capital range between 0.012 and 0.039, those of labour range between 0.057 and 0.1, and those of intermediate input range between 0.812 and 0.910. Summing the elasticity coefficients of capital, labour and intermediate input falls between 0.951 and 0.993 in six regions—close to 1—indicating the existence of constant returns to scale for the production function. The values of the goodness of fit from six regression equations are 0.90–0.97, showing the results have a good power for explanation.

We can calculate the growth rates of TFP in six regions by using the results of the above coefficients (Table 11.2). From 2000 to 2007, all three coastal regions saw a faster growth of output than the North-East, Central and Western regions, with an annual rate of more than 22 per cent. The growth rate of output in the Central region was close to that in the coastal regions. The North-East and Western regions had a lower growth rate of output—standing at 19.74 per cent and 21.38 per cent, respectively. The accumulation of factors varied significantly from region to region. The growth rates of capital, labour and intermediate input are much higher in coastal regions than in the North-East, Central and Western regions. The East China coastal region topped the growth rate of capital, followed by North China and then South China. The North-East region had the slowest growth rate of capital. In contrast, the South China coastal region had the fastest labour growth rate, followed by East China and North China coastal regions. The North-East region even had a negative growth rate of labour. Changes in growth rates of labour input from six regions are very much in line with the observed reality. That is, many jobs have been created in the coastal regions through high-speed growth in the industrial sector. North China had the highest growth rate of intermediate input, followed by East China while the North-East region was the lowest.

Table 11.1 Regression results of gross output values in log form

	ln(Capital)		ln(Labour)		ln(Intermediate input)		Constant		Observations	R^2
South China coastal	0.03	(68.62)[a]	0.091	(125.1)[a]	0.867	(1429.17)[a]	0.764	(101.33)[a]	274 109	0.95
East China coastal	0.023	(93.85)[a]	0.061	(152.2)[a]	0.909	(2644.23)[a]	0.68	(213.13)[a]	577 948	0.97
North China coastal	0.033	(48.35)[a]	0.085	(80.84)[a]	0.847	(1161.80)[a]	1.013	(148.04)[a]	271 732	0.92
North-East region	0.018	(20.17)[a]	0.057	(39.97)[a]	0.894	(804.92)[a]	0.861	(88.22)[a]	96 914	0.94
Central region	0.039	(47.39)[a]	0.1	(80.82)[a]	0.812	(904.56)[a]	1.132	(136.09)[a]	215 713	0.90
Western region	0.012	(16.28)[a]	0.061	(50.16)[a]	0.910	(1043.96)[a]	0.756	(71.87)[a]	157 645	0.95

[a] represents significance at 1 per cent

Notes: For simplicity, the coefficients of dummy variables of years, industries and provinces are deleted; the absolute values of z statistics are in parentheses.

Source: Authors' estimations.

Table 11.2 Growth and contribution of total factor productivity

Growth rate (%)	Output	Capital	Labour	Intermediate input	TFP
South China coastal	22.51	14.07	12.87	18.81	4.60
East China coastal	23.84	18.17	11.59	20.17	4.38
North China coastal	24.28	14.77	5.26	20.95	5.60
North-East region	19.74	8.08	–0.05	15.82	5.46
Central region	22.98	12.32	2.00	19.86	6.17
Western region	21.38	10.34	1.05	18.76	4.13
Contribution rate (%)					
South China coastal	100.0	1.88	5.21	72.47	20.45
East China coastal	100.0	1.75	2.96	76.91	18.37
North China coastal	100.0	2.01	1.84	73.09	23.06
North-East region	100.0	0.74	–0.02	71.63	27.65
Central region	100.0	2.09	0.87	70.20	26.84
Western region	100.0	0.58	0.30	79.82	19.30

Source: Authors' estimations.

It is interesting that the TFP growth rates in the South and East China coastal regions are similar to that of West China, but lower than that of the North China, North-East and Central regions. Among all regions, the Central region had the highest TFP growth rate (6.17 per cent) and the Western region had the lowest TFP growth rate, of 4.13 per cent—2 percentage points lower than the former. Higher TFP growth rates in the North-East and Central regions can be attributed largely to innovation from industrial upgrading and technological diffusion in these two regions and therefore their achievement of faster technological progress. Such empirical evidence illustrates the evolved characteristics of China's industrial structure, as discussed earlier, and the mismatched outcome between factor endowments and comparative advantage. In contrast, despite faster output growth driven by an export-oriented economy, coastal regions are lagging behind in terms of the TFP growth rate, which means that the efforts in transforming the growth pattern in coastal regions through innovation and industrial upgrading are lagging behind the requirement for changes in dynamic comparative advantage.

The above results also demonstrate that, apart from the contributions of intermediate input (70–80 per cent in six regions), TFP is an important source of China's industrial growth—contributing between 18 and 28 per cent. The TFP contributions in the North-East, Central and Western

regions are much higher than in coastal regions. The North-East region topped the TFP contribution with 27.7 per cent, followed by the Central region with 26.8 per cent. The East China coastal region had only 18.4 per cent TFP contribution—the lowest among all regions. Relatively speaking, the contribution of capital ranged from 0.58–2.1 per cent and the contribution of labour ranged from –0.02–5.2 per cent. Our micro-data and subregional analysis, however, do not capture the reallocation effects of factors through regional mobility and the accumulation effects of human capital and changes in the intensities of working time in production.

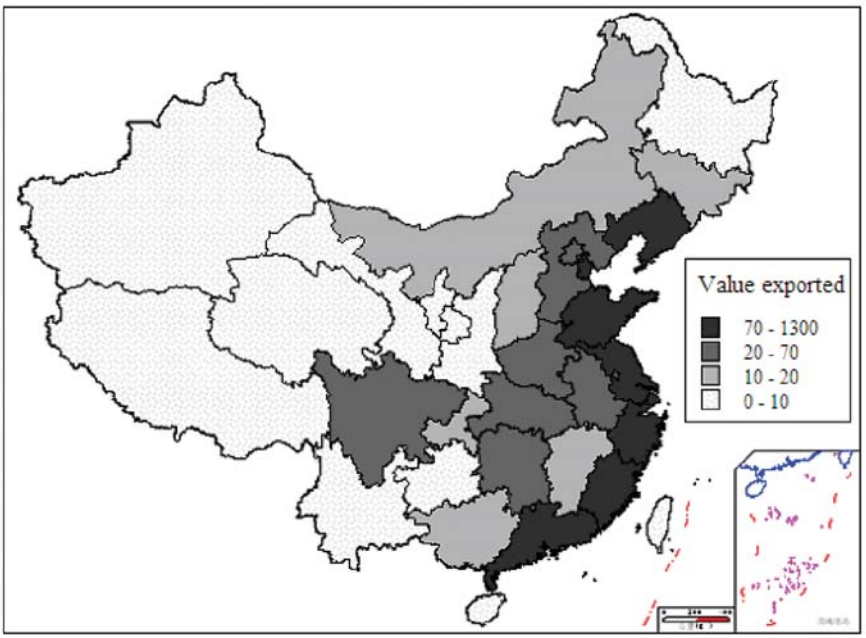
Opportunities for the central and western regions to catch up

The task of transforming the growth pattern requires a switch from the present track of regional development to one conforming with the comparative advantages of the regional economies. China's regions are at different stages of development and hence the difference in resource endowments is not smaller than that among countries. Therefore, the flying-geese model that previously explained industrial transfers and investment flows among countries could be fully applied to predict the path of regional shifts in economic activities among the Chinese regions. The expected scenario of creative destruction to cope with the financial crisis provides opportunities to realise the objective. The relationship among regions within a country, however, has fundamental differences from that among countries. When we employ the flying-geese theory to predict and analyse industrial transfers among regions, some distinguishing features among the eastern and central-western regions should be borne in mind.

While there are still large differentials in prices of production factors, due to their relative scarcity among the Chinese regions, the degrees of the relative differences in prices of production factors differ, because of the variation of mobility of each factor of production. First of all, with regard to land—an immobile factor of production—while its relative price has substantially increased in coastal areas, where industries are concentrated, it remains relatively low in central and western areas. Second, thanks to the improved mobility of labour migration, relative prices of labour have largely converged among regions (Cai et al. 2007), though the regional difference in wage rates still exists. Third, though capital is a highly mobile factor of production, its relative prices are far from equalised among regions, because of the existence of various kinds of institutional constraints (World Bank 2005).

Such regional differences in relative prices of factors of production—as one of the factors determining performances in attracting FDI and therefore industrial development—are consistent with development levels and the extent of outward orientation among the Chinese regions—namely, descending from eastern, central and western regions (Cai 2009). Figure 11.2 demonstrates such a characteristic of export levels among regions. The current distribution of industries and export-oriented production to a large extent reflects the outcomes of the spatial reallocation of factors of production after China's period of reform and opening up. For instance, the overwhelming proportion of manufacturing workers in coastal sectors come from migrants flowing from central and western regions. That indicates that while the interior provinces hold advantages in cheap labour, the coastal areas have so far had the most efficient allocation of resources.

Figure 11.2 Regional distribution of export value of manufacturing goods (CNY billion)



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

To answer the question of whether or not the central and western regions are ready to receive the transfer of labour-intensive industries from eastern regions, one needs to investigate the relative changes in potential for labour productivity among regions. In the period of successful reform and rapid growth, cheap labour was believed to be the major reason for the competitiveness of China's manufacturing products. As wages rise, however, observers tend to believe that China is losing its comparative advantage in the manufacture of labour-intensive products and that the new producers of manufacturing products, and thus foreign investment, will tend to move to other developing countries with lower labour costs (for example, AlixPartners 2009). Since the wage rise is real, the question needing an answer is whether the enhancement of labour productivity will be faster than the rise of wage rates in China as a whole and in different Chinese regions. Assertions and misgivings about China losing comparative advantage in manufacturing dominated by labour-intensive industries are beneath methodological accuracy, because the factors determining comparative advantage in labour-intensive industries include labour costs and labour productivity. Considering both factors—namely, dividing the wage rate by the productivity of labour—we can obtain a better indicator to reflect the real cost of labour used in industries: the unit labour cost (Van Ark 2008). The smaller the magnitude of this indicator, the lower will be the costs of labour employed to produce the same volume of products.

While workers' compensation pushes up labour costs—thus lowering the competitive advantage in labour-intensive industries—the improvement of labour productivity counteracts the negative effects of wage rises on competitiveness and therefore sustains comparative advantage in labour-intensive industries. In past years, the growth of average productivity represented by per capita GDP has been no less than the increase in wages. Compared with both industrialised countries and newly emerging market economies, China's performance in this regard is superior (The Conference Board 2009). To complement the above oversimplified comparison, based on the same data set of manufacturing enterprises explained in section three, we can estimate the average productivity of labour and the marginal productivity of labour for six regions between 2000 and 2007 and compare the results of labour productivity performance with workers' compensation, which includes wages, income in kind and social security benefits enterprises paid to employees.

After estimating the production functions for the country as a whole and for six regions categorised, we use Equations 11.3 and 11.4 to calculate marginal and average productivities of labour, respectively.

Equation 11.3

$$MPL = \frac{\partial Y}{\partial L} = \frac{\beta \times Y}{L}$$

Equation 11.4

$$APL = \frac{Y}{L}$$

The estimated results are listed in Table 11.3, which shows the changing trends of labour compensation and two indicators of labour productivity in 2000 and 2007. Because the average productivity of labour contains the contribution of other factors (such as capital and intermediate inputs) to output, it is bigger than the marginal productivity of labour in volume. Those two indicators of productivity also tend to diverge.

From the table, we can clearly see that in the first years of this century, wage rises and labour productivity enhancement in China's manufacturing sectors have not been increasing at the same rate. That is, although wage rates increased rapidly, labour productivity increased much faster, which offset the effects of wage inflation on labour costs and actually lowered the unit labour costs in the sectors concerned. No matter how one compares with the marginal or the average productivity of labour, the calculated unit labour costs—the ratio of workers' compensation to labour productivity—declined by more than 30 per cent, or more than 5 per cent annually.

Table 11.3 Compensation and labour productivity of China's manufacturing, 2000–07

	2000	2001	2002	2003	2004	2005	2006	2007	Annual growth (%)
Magnitude (CNY thousand per person)									
Compensation	11.48	12.25	13.09	14.08	15.35	16.96	20.74	22.02	9.75
MPL	12.31	14.44	16.65	19.93	22.29	25.09	28.91	34.3	15.76
APL	163.07	191.35	220.63	264.06	295.33	332.44	383.01	454.52	15.77
Unit labour costs									
Compensation/MPL	0.933	0.848	0.786	0.707	0.689	0.676	0.718	0.642	−5.20
Compensation/APL	0.07	0.064	0.059	0.053	0.052	0.051	0.054	0.048	−5.25

Note: Compensation here is the average—namely, the sum of wages, income in kind and social security benefits paid by enterprises divided by total employees.

Source: Authors' own calculations.

Having grasped the overall picture of labour costs in the country as whole, we are in a position to look further into the different trends in wages and labour productivity among the six regions categorised. Those differences in real labour costs can be large, based on theoretical expectation, because of the diversities in resource endowments, institutional environments and, most of all, development levels among the regions. If that assumption can be proven, the systematic transfer of labour-intensive industries from coastal to interior provinces instead of to other countries should be a realistic strategy to sustain comparative advantage in the industries in China. Table 11.4 shows the results of calculation on workers' compensation and the marginal productivity of labour for six Chinese regions.

As shown in Table 11.4, the levels and changing trends of wages and labour productivity differ significantly among regions, which is expected, based on observation of the changing regional patterns in the relevant years. For example, the south-eastern coastal areas held relatively high wage rates but relatively slower growth rates of labour productivity, which made those areas disadvantageous in unit labour costs, whereas the rest of the regions had lower wage rates and faster growth of labour productivity and more advantageous labour costs. While 2003 was a turning point for the speedy wage rises in all regions, and the increase in labour productivity was even faster, the unit labour costs actually declined, except in the South China coastal area. In general, the central and western regions performed extraordinarily well in reducing labour costs. Given the potential of productivity gains in those areas and the trend of backflow of labour migration that tends to enlarge the supply of labour in the regions, the bigger advantages in labour costs can be expected. With the central and western regions moving towards industries based on their comparative advantages in labour, labour-intensive industries will be sustained within China.

Table 11.4 Compensation and marginal productivity of labour by region

	2000	2001	2002	2003	2004	2005	2006	2007	Annual growth
Compensation (CNY thousand per worker)									
South China coastal	13.20	13.32	14.69	14.89	15.71	17.46	21.27	25.69	10.0
East China coastal	13.93	14.12	15.25	16.20	16.49	18.41	20.27	22.08	6.8
North China coastal	11.14	10.99	11.89	12.77	15.19	16.65	18.16	20.01	8.7
North-East China	10.80	11.86	13.38	14.52	16.66	16.97	19.80	23.49	11.7
Central China	8.61	11.39	10.41	11.48	13.52	14.18	15.87	18.87	11.9
Western China	10.87	11.08	12.39	13.81	15.81	16.64	19.37	20.93	9.8
MPL (CNY thousand per worker)									
South China coastal	18.21	20.58	22.31	24.72	24.93	24.85	27.79	32.51	8.6
East China coastal	13.66	15.2	17.28	20.09	19.14	23.56	26.36	30.41	12.1
North China coastal	14.6	16.63	19.65	24.35	29.64	33.73	39.13	47.02	18.2
North-East China	8.2	10.35	12.15	15.42	18.25	21.08	24.5	29.41	20.0
Central China	11.08	13.12	15.44	18.95	24.4	27.34	33.14	41.93	20.9
Western China	6.72	8.26	9.71	11.57	14.64	16.89	20.63	24.59	20.4
Unit labour cost									
South China coastal	0.72	0.65	0.66	0.60	0.63	0.70	0.77	0.79	1.3
East China coastal	1.02	0.93	0.88	0.81	0.86	0.78	0.77	0.73	–4.7
North China coastal	0.76	0.66	0.61	0.52	0.51	0.49	0.46	0.43	–7.8
North-East China	1.32	1.15	1.10	0.94	0.91	0.81	0.81	0.80	–6.9
Central China	0.78	0.87	0.67	0.61	0.55	0.52	0.48	0.45	–7.6
Western China	1.62	1.34	1.28	1.19	1.08	0.99	0.94	0.85	–8.8

Note: Unit labour cost is the ratio of workers' compensation to the marginal productivity of labour.

Source: Authors' own calculations based on the survey data.

Conclusion

This chapter expounds a unique regional pattern of changes in industrial structure—the leapfrogging type of industrial evolution among the Chinese regions—and it provides an empirical test by estimating TFP by region. Although the newly emerging regions other than the coastal areas have shown faster upgrading of their industrial structure, such trends have not yet changed the potential comparative advantages they hold in labour-intensive industries. From this standpoint, combining Schumpeter's notion of creative destruction with the flying-geese paradigm, one can expect that in the course of tackling the financial crisis, central and western regions will rise to sustain the sources of China's rapid economic growth. At the same time, applying the flying-geese theory to the scenario in which industrial transfer happens not only among countries but among regions within a country with the unique characteristics of a large economy will lead us to conclude that labour-intensive manufacturing will not shift from China to other developing countries in a general way.

It is important to understand the Chinese economy from a regional point of view in that when some regions experience tremendous changes in resource endowments and tend to loose their comparative advantage in labour-intensive industries, other regions can still hold a comparative advantage in those industries. Viewing China as a homogenous economy in spite of the huge diversities among its regions, it is difficult to believe that China will not conform to the pattern of traditional industrial transfer as predicted by the flying-geese model, but will sustain labour-intensive industries and simultaneously ascend to a higher level of industrial chains. For example, a report by the Japanese Ministry of Economy, Trade and Industry is puzzled by the observation that China not only gains comparative advantage in labour-intensive industries, it holds competitiveness in technology-intensive industries such as the information technology sector via FDI (Ahearne et al. 2006). This phenomenon shows precisely the regional heterogeneity among Chinese regions and the large-economy effects of China as a whole, which allow the flying-geese pattern of industrial transfer to come into being within the country.

Industrial upgrading in all regions is a requirement for achieving the economic transformation needed to maintain high growth. For the antecedent order of industrialisation, shifting their industrial structure to a higher level of value chains—namely, from labour to technology-intensive industries—is a natural response to the increases in costs of

labour and land. For the central and western regions, carrying on some of the labour-intensive industries vacated by the eastern regions is itself an upgrade in industrial structure and an accomplishment of their own task of transforming the growth pattern as well. It can be expected that after such adjustments in the eastern and central-western regions, the scale of the east's absorption of migrant workers will stabilise, while the incremental labour force shift from agriculture will be employed more in central and western regions. As a result, the industrial structure in the central and western regions will focus more on producing those labour-intensive products that are in conformity with the underlying comparative advantage determined by the relatively abundant labour force.

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Endnotes

1. Kojima (2000) reviewed the evolution of the flying-geese theory in detail.
2. Young (1992) and Krugman (1994) questioned the East Asian miracle because they found that the rapid growth in those economies depended heavily on inputs of capital and labour other than total factor productivity.
3. Here, we take the upgrades of industrial structure to represent transformation of the economic growth pattern, but by no means are the upgrades consistent with the requirement of that transformation.