

# Leading Dragon Phenomenon: New Opportunities for Catch-up in Low-Income Countries

VANDANA CHANDRA, JUSTIN YIFU LIN, AND YAN WANG\*

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Modern economic development is accompanied by the structural transformation from an agrarian to an industrial economy. Since the 18th century, all countries that industrialized successfully have followed their comparative advantages and leveraged the latecomer advantage, including emerging market economies such as the People's Republic of China (PRC), India, and Indonesia. The current view is that Chinese dominance in manufacturing hinders poor countries from developing similar industries. We argue that rising labor cost is causing the PRC to graduate from labor-intensive to more capital-intensive and technology-intensive industries. This will result in the relocation of low-skill manufacturing jobs to other low-wage countries. This process, which we call the "leading dragon phenomenon," offers an unprecedented opportunity to low-income countries. Such economies can seize this opportunity by attracting the rising outward foreign direct investment flowing from Brazil, the PRC, India, and Indonesia into the manufacturing sectors. All low-income countries can compete for the jobs spillover from the PRC and other emerging economies, but the winner must implement credible economic development strategies that are consistent with its comparative advantage.

*Keywords:* structural transformation, Asia, Africa, People's Republic of China, flying geese

*JEL codes:* B10, O10, O14, O25

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## I. Introduction

Many developing economies have tried to catch up with industrialized countries but only a handful of countries, mostly in East Asia, have succeeded. Entering into the 21st century, Brazil, the People's Republic of China (PRC), India, Indonesia, and a number of other large developing countries achieved dynamic growth and emerged as the drivers of global growth in a new multipolar world.

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Lin (2010) and Lin and Monga (2011) show that a developing country can achieve dynamic growth and catch up by exploiting the latecomer advantage and developing industries that are aligned with its comparative advantage. In this paper, we build on this theme and use historical and comparative perspectives to show that because of similarity in the comparative advantage of low-income countries, the dynamic emerging economies, when they upgrade their industrial sectors, will create a huge space for low-income countries. In contrast to the conventional thinking that the PRC's dominance in manufacturing export dooms poor countries to economic backwardness, we argue that its growth spiral may in fact be a boon. As the PRC upgrades its labor-intensive industries and cedes market shares, millions of labor-intensive jobs will be relocated to low-wage countries and can accelerate their industrialization. This process, which we call the "leading dragon phenomenon," offers an unprecedented opportunity to low-income countries. To the skeptics, we point to current trends in South–South foreign direct investment (FDI) flows as drivers of industrialization in low-income countries. If other emerging market countries such as Brazil, India, and Indonesia follow the PRC's growth trajectory, they will create even more labor-intensive jobs in low-income countries.

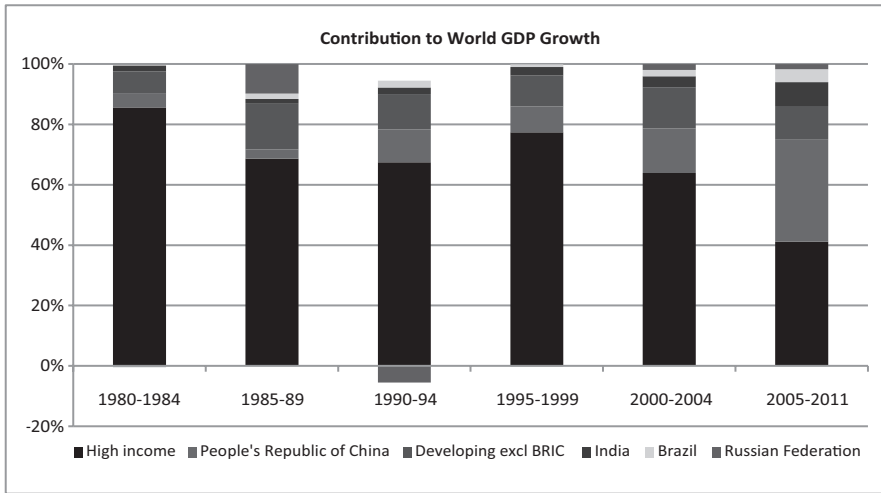
Section II motivates the analysis by reviewing the evidence on structural transformation and its role in industrialization in the world. Section III examines the experiences of the Industrial Revolution, the post-World War (WW) II period, and the more recent East Asian successes in catching up. Section IV first discusses the failures to catch-up in various countries that followed protectionist strategies. It then analyzes the PRC's meteoric rise in the context of its "comparative advantage following" strategy. Section V investigates the impact of the PRC's rising labor costs on its employment structure and the industrial upgrading and job relocation currently being facilitated through outward foreign direct investment (OFDI). Section VI concludes.

## **II. Structural Transformation and Catch-up**

### **A. Catch-up in a Multipolar World**

Sustained and rapid income growth is a modern phenomenon that appeared only after the Industrial Revolution in the 18th century. Before that time, for a long period, almost all countries in the world had agrarian economies and were poor relative to today. The income gap among countries was very small. The richest country's per capita income was only about five times greater than the poorest country's per capita income (Maddison 2010). The Industrial Revolution led to accelerated growth in the Western European countries, the United States (US), and other western offshoots, but most other countries failed to do so. As a consequence, there has been great divergence in income levels between developed and developing countries and between developing countries with dynamic growth and those trapped

Figure 1. Emergence of Multipolar World in the 21st Century



DCs ex-BRICs = developing countries excluding Brazil, the PRC, India, and Russian Federation; HICs = highly industrialized countries; PRC = People's Republic of China.

Source: World Bank. 2012. *World Development Indicators 2012*. Washington, DC.

in low-income or middle-income status (Lin 2011). By the end of the 20th century, the gap had significantly widened, with per capita income of industrialized high-income countries at more than 50 times that of low-income economies (Maddison 2010). Among the set of developing countries, only a handful were successful in transforming their aspirations for catching up into reality. Among them were Japan and the East Asian tigers (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China).

The growth poles in the past were all high-income countries such as Germany, Japan, the United Kingdom (UK), and the US. In the 1980s and 1990s, among the top five contributors to global growth, all but the PRC were G7 industrial countries. By 2009, all except the US were emerging economies. The replacement of G7 by G20 as the primary global forum since the eruption of the global crisis in 2008 underscores the emergence of a multipolar world. The sheer size of the large emerging economies combined with their dynamic and sustained growth has elevated Brazil, the PRC, India, and the Russian Federation (known as BRICs) to become the largest contributors to economic growth in the world (Figure 1). During 2006–2010, almost 45% of global GDP growth was generated in the BRICs. The era of a multipolar world seems to have been firmly established.

## B. Structural Transformation and Catch-up

The path to prosperity in the developed countries was marked by a process of structural transformation as reflected in employment and value-added of

primary, secondary, and tertiary industries. Long-term economic trends from the pre-industrial stage of development in a large number of developed countries confirm that at the end of each episode of catch-up, the fast grower's economy had a structure closer to that of a developed country as opposed to a low-income one (Syrquin 1988, p. 206; Chenery 1979, xvi; Abramowitz 1983, 85; Lin 2009, 2010, 2011, and 2012b).

Simon Kuznets sought to understand and document long-run transformation through a series of stylized facts, though he was reluctant to offer a theory of development. His empirical studies identified four features of modern economic growth.<sup>1</sup> According to the first Kuznets fact, structural transformation occurs when the share of the nonagricultural sectors in an economy increases. A reconstruction of national accounts from a variety of sources for western countries shows that such a transformation raised overall productivity and increased the returns to workers and capital. From 1800–1849 to 1951–1960, for example, agriculture as a share of gross domestic product (GDP) declined from 30% to only 5% in the UK and from 20% to 4% in the US. The share of industry inclusive of manufacturing meanwhile increased from 23% to 56% in the UK and from 33% to 43% in the US (Kuznets 1966). Second, this sectoral shift is mirrored in the structure of employment. Third, the population is redistributed from rural to urban areas. And fourth, the capital–labor ratio in the nonagricultural sectors of the economy rises.

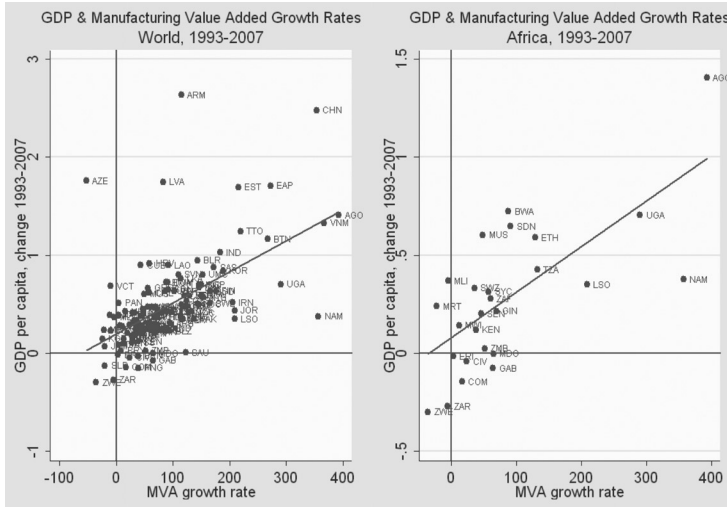
History points to the critical role of industrialization as an engine of sustained growth in the long term. Since productivity growth is associated with technological change and industrial upgrading, it can be said that continuous structural change in technologies and industries is the main feature of modern economic growth (Kuznets 1966, Maddison 2010). In Western Europe, the annual per capita income growth before the 18th century was about 0.05%, accelerated to about 1% in the 18th and 19th centuries, and reached 2% in the 20th century. The required time for doubling per capita income thus fell from 1,400 years before the 18th century to 70 years in the 18th and 19th century and further to 35 years in the 20th century (Maddison 2010).

History also demonstrates that in the first stage of catch-up, manufacturing was instrumental in the transfer of new technologies to nonmanufacturing sectors of the economy. Manufacturing has contributed to the modernization of the agricultural and mining sectors, which provide raw materials through backward linkages, and spawning services through forward linkages. In addition, manufacturing can serve as an indirect source of demand and thus spur catch-up. Because there is a tight nexus with the services sector, technological progress and growth in manufacturing lead to a larger demand for services, propelling overall economic growth.

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<sup>1</sup>Kuznets (1966, 1971).

Figure 2. **Manufacturing and Income Growth, 1993–2007—Industrialization as Growth Engine**



Source: World Bank. 2011. *World Development Indicators 2011*. Washington, DC.

Except for a few oil-exporting countries, no country has achieved high-income status without dynamic industrial upgrading. In general, a change in GDP per capita is strongly and positively correlated with growth in value-added in the manufacturing sector (Figure 2). If countries rich in natural resources or land countries have achieved a middle-income status without a large manufacturing sector, they rarely succeeded in sustaining growth. More importantly, growth in the resources sector does not create much employment.

### III. Industrialization, The Flying Geese Pattern, and Catch-up in a Historical Perspective

History shows that following comparative advantage to tap the latecomer advantage is the best way for developing countries to start and sustain a dynamic growth path for diversification and industrialization (Lin 2009, Lin and Monga 2011). The spread of industrialization in Western Europe in the 19th century, rapid catch-up in the post WWII period, and the East Asian miracle starting in the 1980s are all reminiscent of the flying geese pattern. In this section, we provide evidence on this assertion.

In the 1930s, economists researching “catch-up growth models” argued that catch-up was not random. Kuznets and Akamatsu explored the conditions under which the Industrial Revolution occurred in the UK and how it spread only to those countries that had sufficient accumulation of capital and skilled labor, among other

conditions (Kuznets 1930). The focus on structural transformation and industrial upgrading (Rostow 1960) and cross-country catch-up (Gerschenkron 1962) can be found in Akamatsu's work (1935, 1961, and 1962) on Japan, a country that started from a much lower level of income than the Western European countries. In a seminal paper in the 1930s, Akamatsu documented what he called the "wild-geese flying pattern" in economic development and noted that "wild geese fly in orderly ranks forming an inverse V, just as airplanes fly in formation" (Akamatsu 1962, p. 11).

The flying geese pattern describes the sequential order of the catch-up process of industrialization of latecomer economies. It focuses on three dimensions or stages: (i) the intra-industry dimension; (ii) the inter-industry dimension; and (iii) the international division of labor dimension. The third element in particular involves the process of relocation of industries across countries, from advanced to developing countries, during the latter's process of convergence.<sup>2</sup> A prominent feature of this stage is that exports of consumer goods start declining and capital goods begin to be exported. In this stage, a group of economies advance together through emulation and learning-by-doing. The focus of this paper is on the second and third dimensions of the flying geese model as illustrated in Figure 3 from a note prepared by the National Graduate Institute for Policy Studies in Tokyo for the GRIPS Development Forum in 2002.

A weakness in Akamatsu's model is that it only describes the flying geese pattern without linking it to a country's endowment structure and comparative advantage. He did not recognize that the market mechanism is a necessary condition for a country to follow its comparative advantage successfully. However, he noted that the accumulation of capital, technological adaptability of people, and government's protection policy to promote the consumer goods industries matter for the flying geese pattern (Akamatsu 1962, p. 3).

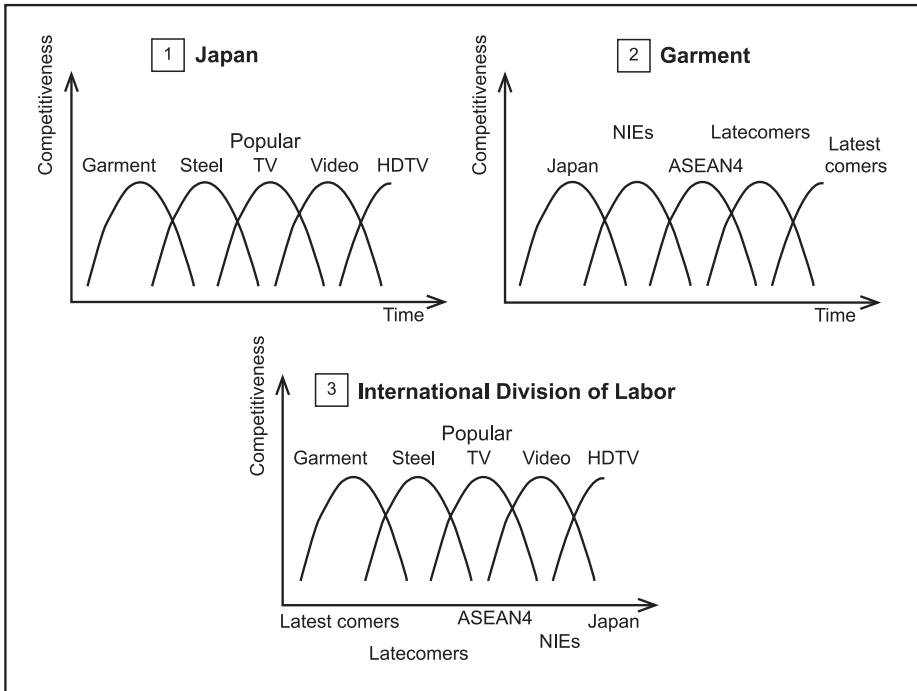
There is a fundamental difference between the traditional Structuralist views and the New Structural Economics (NSE) (Lin 2010). NSE contends that the flying geese model can be used by latecomers to catch up only if they follow the comparative advantage of their own countries. This is called the comparative advantage following, or CAF, approach. In other words, with the CAF strategy, latecomers can follow the lead goose, whose income levels and endowment structure are not too different, and can tap into their comparative advantage and reduce their risk and cost of innovation.<sup>3</sup> As long as industrialization is CAF, there is no need for government

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<sup>2</sup>There is an extensive literature on the flying geese pattern, including Kiyoshi Kojima's seminal work (2000) and Ozawa 2004, who have contributed to the dissemination of the model outside Japan, and applied it in country-level analysis. Being a strategic think piece, a full literature review is beyond the scope of this paper.

<sup>3</sup>There is an extensive literature on the spatial patterns of production and vertical disintegration of supply chains (Helleiner 1973, Jones and Kierzkowski 2004, and Kimura 2010). This is consistent with the NSE framework. A country has certain natural and factor endowments which determine the comparative advantage of the country. In any stage of its development, the country would naturally attract those products, parts and components, and processes that utilize the factors that are abundant and less expensive in this country (e.g., labor-intensive parts of a supply chain,

Figure 3. **International Dimensions—Asian Wild-Geese Flying Pattern**



Source: GRIPS (On-line). Available: <http://www.grips.ac.jp/module/prsp/FGeese.htm>

to adopt protectionist policies as firms are able to withstand market competition. Rather, the government’s role is limited to facilitating firms’ entry into new industries where the country has latent comparative advantage by overcoming externalities and coordination issues inherent in the industrial upgrading and diversification process.<sup>4</sup>

**A. The Spread of the Industrial Revolution: Leaders and Latecomers**

The Industrial Revolution started in the UK in the 1700s, but for about 50 years, it did not spread to other countries because the British government forbade

such as assembly lines). As the country’s factor endowment upgrades, the components or processes attracted to this country would upgrade to more capital- or technological-intensive parts of the supply chain (such as manufacturing of electronic components). Evidence is provided in Section IV as Taiwanese investors upgrade their investment in the PRC to manufacturing (not assembly) electronic parts and components and to services (see Figure 10 in section IV).

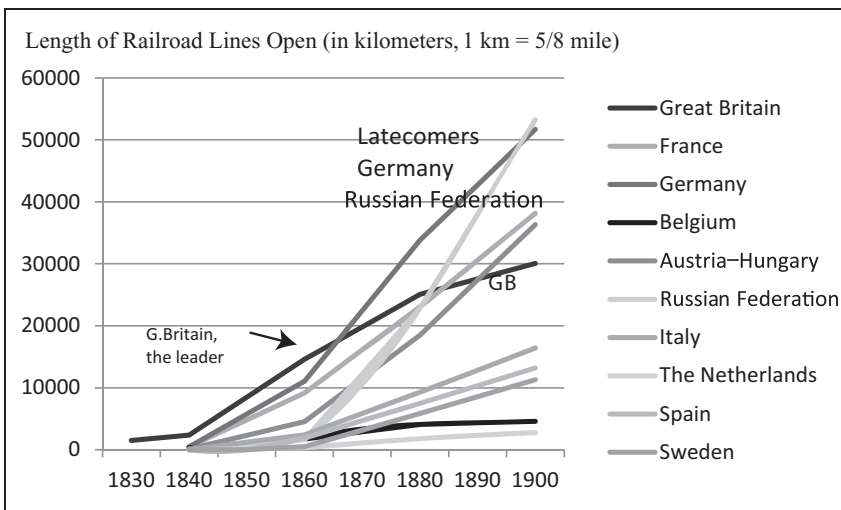
<sup>4</sup>An industry is an economy’s latent comparative advantage if, based on the factor costs of production which are determined by the economy’s endowment structure, the economy could be competitive in this industry. However, due to high transaction costs (which are determined by infrastructure), logistics, and other business conditions, the economy may not yet be competitive in the global market in this industry.

the export of machinery, manufacturing techniques, and skilled workers. Eventually, in the 19th century, it gradually spread to other countries in Western Europe. The earliest center of industrial production in continental Europe was Belgium where production of coal, iron, textile, glass, and armaments flourished. By 1830, French firms had employed many skilled British workers to help establish the textile industry, and railroad lines began to appear across Western Europe. Germany was a latecomer in developing industry mainly because no centralized government existed there.

The first steam locomotive was invented in the UK in 1804, but other European countries did not start building railroads until the 1830s. Germany, for example, produced its first locomotive in 1835, but railway construction lagged due to the lack of an integrated central government. After the 1840s, German coal and iron production skyrocketed and by the 1850s, construction began on a rail network. After its political unification in 1871, Germany exceeded the UK in terms of the length of new railroads, and there was a rapid catch-up process in the production of pig iron and other industries (Figure 4).

Relative to the UK, industrialization was delayed in the US because the country at that time lacked the basic factor endowments—labor and capital—to invest in business. When it finally picked up in the 1820s, its growth was explosive. Laborers and capital came from Europe where political revolutions sent immigrants to the US. The first locomotive emerged in 1826, and the first railroad in 1827. The length of the railroad surpassed that of the UK in 1850, reaching 9,021 miles.

Figure 4. **Spread of the Industrial Revolution—Latecomers Catching Up, 1800–1914**



Source: Statistical Appendices, "Fontana Economic History of Europe," Vol. 4, from *Modern History Sourcebook* (On-line). Available: <http://www.fordham.edu/halsall/mod/indrevtabs1.asp>



and expanded rapidly to the west in 1890 to reach 129,774 miles, longer than the length of railroads in the entire continental Europe (Depew 1895, p. 111). Rapid industrialization and structural transformation then followed. In 1800, farmers comprised 85% of the US population, but the proportion declined to 50% in 1860.

Gerschenkron (1962) observed that rapid industrialization could start from vastly different levels of “economic backwardness.” In fact, “the more backward a country’s economy, the greater was the part played by special institutional factors (government agencies, banks) designed to increase the supply of capital to the nascent industries” (Gerschenkron 1962, p. 354).

Like Akamatsu, a weakness of Gerschenkron’s theory is that he did not stress that for the latecomer to be competitive, it must identify industries consistent with its comparative advantage or which are CAF. Industrialization can start from a low level of economic development, but if the level of development is too low, industries that are too advanced will be comparative advantage defying (CAD) and may require heavy subsidies and protection from the state. With government support, it is possible to set up advanced industries—however, as long as they are CAD, they will be neither viable nor competitive.

## **B. Japan’s Catch-up in the Meiji Period: Learning by Importing then Exporting**

Starting with an income level that was only one-third of that in the West during the 1850s, Japan achieved rapid catch-up in 50 years to become the first industrial country in Asia in 1904. After opening up trade in 1854, its government encouraged learning from western technology and institutions by sending high-level missions including about half of the ministers to the US and Europe for nearly 2 years (Shimposha 2000, p. 48). After signing the Ansei Treaty in 1858, Japan lost control of its tariff policy but the government provided facilitation by building Japan’s modern infrastructure and encouraging learning-by-doing. Telegraph services between Tokyo and Yokohama began in 1870. The first Japanese railroad connecting Yokohama and Shinbashi was built in 1872, and by 1900, Japan had 3,875 miles of railroad (Ito 1992). The government also actively introduced foreign technology by importing modern machines and hiring thousands of foreign experts to instruct Japanese workers and managers in the late 1800s (Ozawa 2004).

Throughout the Meiji period (1868–1912) Japan’s top exports were raw silk yarn, tea, and marine products, which were consistent with Japan’s comparative advantage. As Japan’s cotton industry grew, its imports fell steadily, and in 1890, it began to export large quantities of cotton, yarn, and cloth to neighboring Asian countries (intra-sector upgrading as in Akamatsu 1962). On the institutional side, a banking system was organized and a central bank was established in 1882 (Ito 1992, p. 21).

Table 1. Catch-Up in the Prewar and Postwar Era (Per capita GDP, by 1990 international GK dollars)

	Europe Targeted the UK, Gaps Were Small		Japan Targeted Germany during the Meiji Restoration			Japan Targeted the US after WWII			
	1870	% of the UK	1890	1900	% of Germany	1950	1960	% of the US	
France	1,876	59	2,376	2,876		5,186	7,398		
Germany	1,839	58	2,428	2,985	100	3,881	7,705		
UK	3,190	100	4,009	4,492		6,939	8,645		
US	2,445	77	3,392	4,091		9,561	11,328	100%	
Japan	737		1,012	1,180	40%	1,921	3,986	35%	
	Asian NIEs (4 dragons) incl. the Republic of Korea Targeted Japan in the 1960s–1980s			China Targeted East Asian NIEs incl. the Republic of Korea			Latecomers Started to Target PRC after 2000		
	1960	1970	% of Japan	1980	1990	% of the Republic of Korea	2000	2008	% of PRC
UK	8,645	10,767		12,931	16,430		20,353	23,742	
US	11,328	15,030		18,577	23,201		28,467	31,178	
Japan	3,986	9,714	100	13,428	18,789		20,738	22,816	
Rep. of Korea	1,226	2,167	25	4,114	8,704	100	14,375	19,614	
PRC	662	778		1,061	1,871	23	3,421	6,725	100
India	753	868		938	1,309		1,892	2,975	44
Viet Nam	799	735		757	1,025		1,809	2,970	44

GK = Geary-Khamis, PRC = People's Republic of China, UK = United Kingdom, US = United States.

Note: Highlighted countries are the targeted countries.

Sources: Angus Maddison Database, authors' calculations.

Historical experiences of the Industrial Revolution offer several insights. First, countries that are on the technological frontier can play the role of the “lead geese” as Britain did.<sup>5</sup> Latecomers have the economic advantage of “backwardness,” and under certain conditions, they can catch up quickly and even overtake the lead geese. Second, capital accumulation was necessary but not sufficient for success. Political stability, openness to trade, and labor mobility were also important for the country to acquire new technology and develop new industries. In addition, governments were required to play a facilitating role, as in the case of Germany, Japan, and the US. Without the existence of a centralized state in Germany since 1871, there would have been no railroad or Industrial Revolution.

More importantly, selecting the right target country is critical for catching up. Some European countries could catch up with Britain relatively quickly because their stages of development were not too far from the leader (Table 1). According to

<sup>5</sup>Britain rather than the United Kingdom is used following the convention of the literature on the Industrial Revolution.

the estimate of Maddison (2010), per capita incomes of France, Germany, and the US were about 60%–75% of Britain in 1870.<sup>6</sup> During the Meiji restoration, Japan targeted the industries of Prussia (later, Germany) and its per capita income was about 40% of the latter. Thus, it was realistic for Japan to target Germany rather than Britain or the US which were too far ahead in terms of relative stages of development. Even though many nation states tried to catch up, Japan succeeded and became the first industrialized nation from the East because it chose the right country to target.

### C. Post-WWII Era: The US Showing the Way to Japan and Others

The economies of Western Europe and Japan have enjoyed unprecedented growth and technological upgrading in the decades since WWII in the so-called “golden age of capitalism” (1950–1974). During this period, nearly all developing countries pursued *dirigiste* capitalism but, except for Japan, the Republic of Korea and other East Asian tigers, they did not succeed. Why? The NSE contends that the crux of Japan’s and East Asia’s success was that their development followed closely their comparative advantage (or was CAF) and their governments played the facilitator’s role (Lin 2010, Lin and Monga 2011).

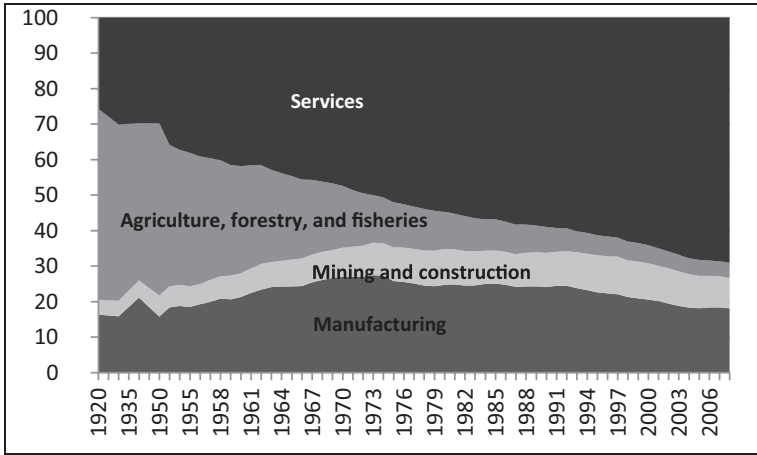
Just before WWII, textiles and other light industrial goods accounted for 60%–75% of all Japanese exports and Japan’s textile industry was at its peak (Ito 1992, p. 24). In the 1960s, when its per capita GDP was about 40% of the US and it had established a strong industrial base, Japan targeted US industries (Table 1). Japan’s historical labor statistics record that a rising share of labor in Japan’s manufacturing sector coincided with a declining share of labor in the manufacturing sectors of the US. In the 1960s–1970s, Japan supported its heavy manufacturing sectors, including machinery and automobiles. In the 1980s–1990s, just as the US was upgrading its industrial base, Japan expanded its shares in the home appliance, electronics, and computer markets (Figures 5–6).

Figure 6 shows the employment shares in the US during 1958–2005 for five subsectors selected from 99 manufacturing industries, ranked from most labor intensive to most capital intensive. Overall, as the capital–labor ratio increases over time, industrial and employment structures change dramatically. Specifically, the share of labor employed in the most labor-intensive sectors such as fabrics declined monotonically. In sectors such as computer manufacturing, the share of labor employed first increased and then declined, showing a hump or inverse V-shape. In industries such as aircraft and automobile manufacturing, which are capital-intensive but subject to labor-saving scale economies, the share of labor showed a

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<sup>6</sup>Britain’s per capita income in 1830 was 3,190 in 1990 international Geary-Khamis dollars. Those of most countries in Western Europe were in the range of 1,500–2500 IGK dollars.

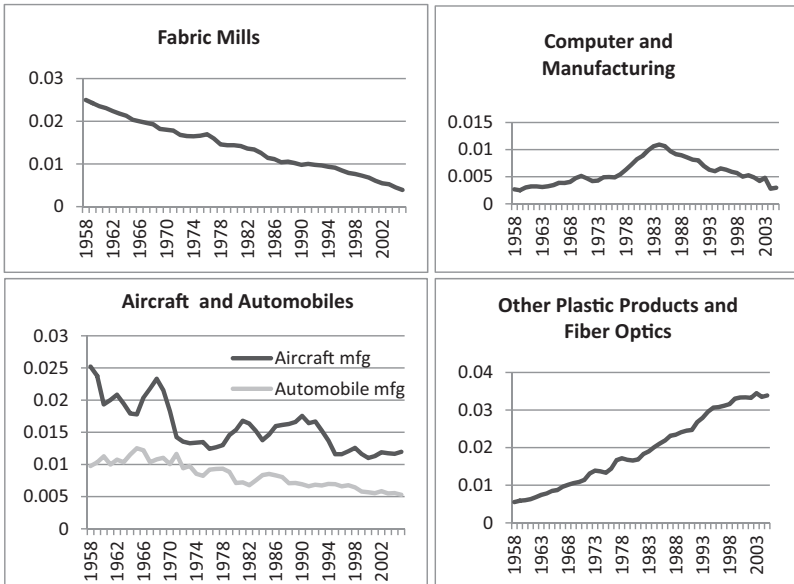
Figure 5. **Structural Transformation in Japan—Manufacturing Increase Followed by Slow Decline as Services Expanded (%)**



Note: Figures refer to shares of employment by sector.

Source: Authors based on Historical Statistics of Japan (On-line). Available: <http://www.stat.go.jp/english/data/chouki/index.htm>

Figure 6. **The US as Leader of Transformation—Shares in Total Employment in Selected Subsectors, 1958–2005**



Note: The subsectors, selected from the 99 industrial sectors, are ranked by their capital–labor ratio. These are the: (i) labor-intensive sector (industry 313210, broadwoven fabric mills), (ii) mid-level capital/labor intensity (industry 334111, electronic computer manufacturing), (iii) high capital intensity (industry 336411, aircraft & industry 336111, automobile), and (iv) high technical intensity (industry 326199, other plastic products manufacturing including fiber lens, windshield, and optics). The 1997 6-digit NAICS codes (473 industries) were used.

Source: Ju, Lin, and Wang (2011). Based on NBER-CES manufacturing industry data for 1958–2005.

slow and declining trend. In the most technology-intensive sectors such as plastics including fiber optics and lens, the share of employment shows a monotonic increase indicating that the US still maintains a comparative advantage in these industries. In general, the manufacturing sectors started to shed labor in the 1970s, while the services sector created more jobs throughout the period. This process accelerated in the 1990s.

Why is the employment structure in the US changing so rapidly? First, the simultaneous improvements in education, financial, and legal institutions as well as in hard infrastructure has allowed firms to constantly innovate and create new industries and exhaust the set of production possibilities (Harrison and Rodriguez-Clare 2010). Second, this process has been accelerated by globalization. Because the US maintained an open trade regime and a liberal investment policy, industrial transformation that started in the 1970s–1980s exceeded that of other countries (McMillian et al. 2011). Third, the behavior of multinational corporations has played an important role. Using firm-level data related to outward FDI from the Ministry of International Trade and Industry (MITI) of Japan and the US, Lipsey and his co-authors (Lipsey, Ramstetter, and Blomstrom 2000) found that:

- (i) “A Japanese parent’s employment, given the level of its production, tends to be higher, the greater the production abroad by the firm’s foreign affiliates.” This is similar to that of Swedish firms but contrasts with that of US firms.
- (ii) US firms appear to reduce employment at home by allocating labor-intensive parts of their production to affiliates in developing countries. “Among US firms, production in developing countries is associated with lower parent employment at home, given the level of parent output.” This could be interpreted as US multinationals being “footloose,” allocating the more labor-intensive parts of their output to developing countries and keeping the more capital-intensive or skill-intensive parts in the parent facilities.

Why was economic growth in Japan not sustained after the 1970s? From the mid-1950s to 1973, Japan for a variety of reasons, was able to sustain rapid growth for nearly 20 years. In 1973, Japan’s rapid growth started declining for three reasons: oil crises, the decline in investment, and the slowdown in technological progress. “Japan finally caught up with the US and the Western European countries technologically in the mid-1970s . . . (and) since it was harder to develop a country’s own new technology compared to merely obtaining a license, Japan’s growth rate then had to fall” (Ito 1992, p. 72). In other words, Japan’s advantage of backwardness had been exhausted. The Japanese economy was then constrained mainly by the speed of indigenous innovations on the global technology frontier. Japan had to relocate some of its production base to the Republic of Korea; Taipei, China; and

other NIEs due to rising domestic labor costs leading to the loss of its comparative advantage in the labor-intensive sectors.

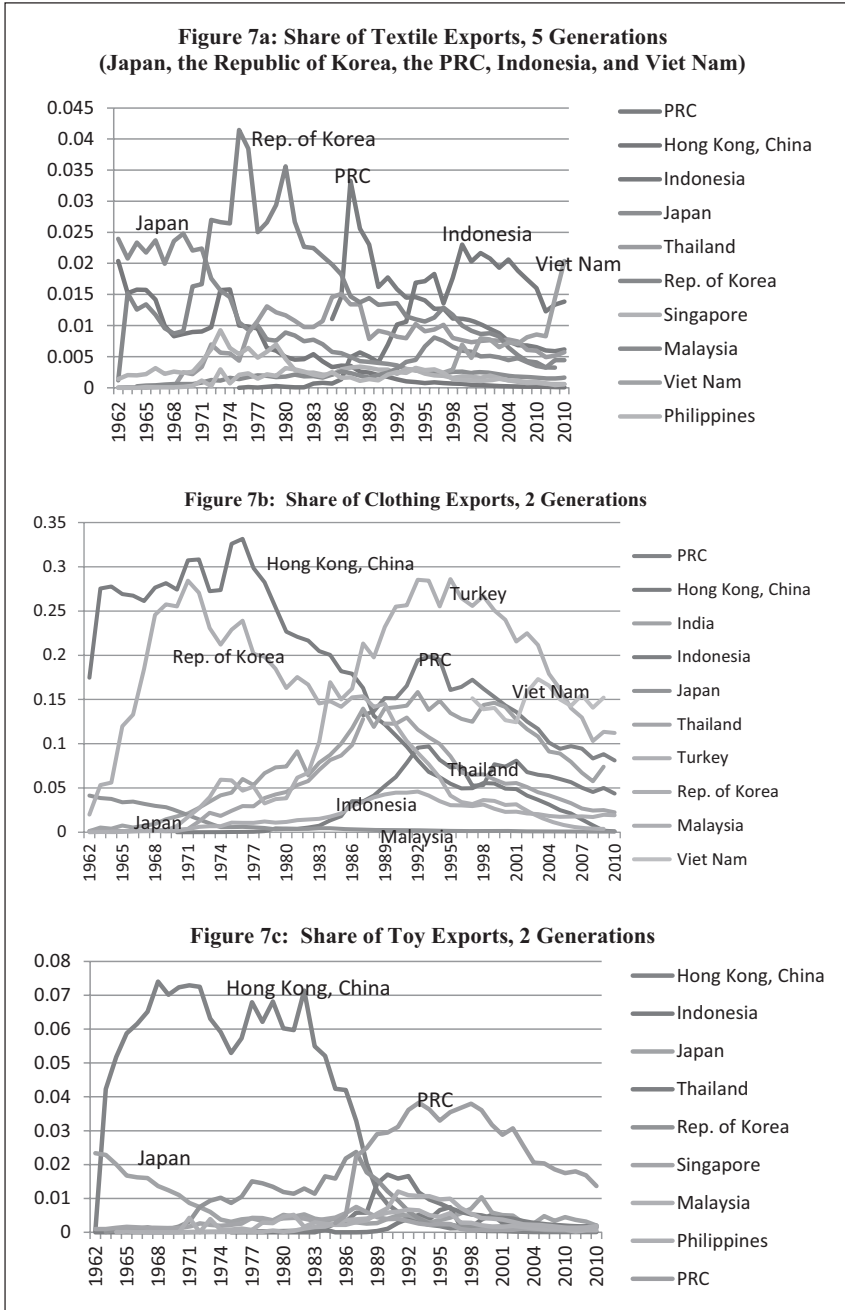
#### **D. The Flying Geese Pattern in East Asia**

It has been well documented that several generations of lead geese played significant roles in the rapid development of the East Asian economies. From 1965 to 1990, Japan emerged as the world's biggest exporter of manufactured goods, increasing its share of the world market from about 8% to almost 12%. Japan's success was followed by a second generation of economies in the 1970s (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China), a third generation in the 1980s (Indonesia, Malaysia, the Philippines, and Thailand, or ASEAN4), and a fourth generation in the 1990s (the PRC and Viet Nam) (Gill and Kharas 2007, p. 81).

What is less well studied, however, is how this flying geese pattern evolved at the subsector level, how the "jumping" of an industry from one country to another took place, and how the Republic of Korea ceded its dominance in labor-intensive subsectors to the third generation of geese—ASEAN4, the PRC, and Viet Nam. Using UN Comtrade data, we show graphically that:

- (i) There is an inverse U-shape in some subsectors where the lead goose loses comparative advantage to its followers (as in Akamatsu 1962). Since Akamatsu's transformation cycle could last for over 100 years, the inverse U-shape emerges only when simple measures such as shares of exports in the sector are used to illustrate the pattern. Each specific sector may have several generations of countries playing the role of lead goose sequentially in different periods as each country's endowment structure changes. This is reminiscent of Akamatsu's theory on the international dimensions of the flying geese model (Figure 3).
- (ii) In textiles, an upstream but labor-intensive industry, five generations emerged sequentially. Japan ceded to the Republic of Korea in the 1980s, after which the PRC emerged in the 1990s, though its textile exports are now losing steam as labor costs are rising and employment shares declining. ASEAN4, particularly Indonesia and Viet Nam, and countries which can expand market share rapidly would have a better chance to benefit by following the PRC (Figure 7a).
- (iii) In the 1970s, Japan lost its leading position in the apparel and clothing sector to the Republic of Korea, whose clothing exports show a clear hump shape as it ceded its leading position to the PRC in 1989. The PRC emerged later than ASEAN4, but its low wages and efficient industrial clusters in many provinces enabled it to gain dominance. After many years in the dominant position, the

Figure 7. Share of Sector Exports in Total Merchandise Exports—Several Generations of Flying Geese



Note: Figures based on SITC rev 1, 3–4 digits.  
Source: UN Comtrade data via WITS.

PRC is now losing its comparative advantage due to rising wages and will gradually cede its market shares to ASEAN4, Viet Nam, and countries that can seize the opportunity to rapidly expand exports (Figure 7b).

- (iv) In toys, the PRC has recently been losing market share in the European Union and US markets. Shares of toys in total exports have been declining (Figures 7c). This is consistent with what other studies have observed, though shares vacated by the PRC have not yet been taken up by African countries (Maswana 2011). There are large opportunities for other low-income countries to benefit from the PRC's graduation from these labor-intensive industries.

### **E. The Republic of Korea—An Example of Successful Industrial Upgrading<sup>7</sup>**

The industrial upgrading of the Republic of Korea since 1962 is often described as a good example of flying geese catch-up.<sup>8</sup> The share of manufactures in GDP rose from merely 9% in 1953 to 30.1% in 1988, while that of the agriculture and mining sector shrunk to single digits in the 1990s.

During this phase of industrial upgrading guided by export-oriented industrialization, the benefits of economic backwardness were exploited with sequential structural transformation from labor-intensive industries (i.e., wood manufactures and clothing) to capital-intensive industries (i.e., machinery and transport equipment). Until the early 1980s, labor-intensive products, primarily wood manufactures and clothing, had a combined share of about 60% and accounted for the majority of total exports. Since 1983, capital-intensive machinery and transport equipment products have accounted for the majority of exports. After the mid-1990s, their share exceeded half of total exports.

We argue that the Republic of Korea's success was due in part to its adherence to its comparative advantage which evolved over time with changes in its factor endowments, suggesting flying geese catch-up patterns.<sup>9</sup> For example, Figure 8a shows the intra-industrial and inter-industrial dimension of "Flying Geese Catch-up" patterns. The Republic of Korea successfully moved up the value chain from exports of clothing to exports of textiles and to production of synthetic fibers (Lim 2011). In the electronics industry, a comparative advantage recorded by the net trade index

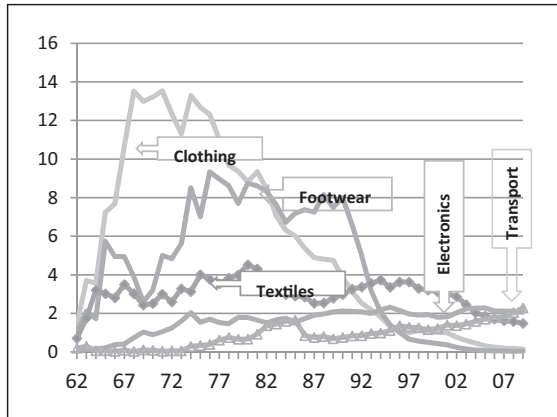
<sup>7</sup>The authors thank Kwang Park for this section on the Korean experience.

<sup>8</sup>The Republic of Korea's industrial upgrading process between the 1960s and the 1980s can be roughly divided into three phases: (i) the "takeoff" phase (1962–1973), (ii) the Heavy and Chemical Industry (HCI) drive phase (1973–1979), and (iii) the liberalization phase (1980–later) (World Bank 1987). For details of Korea's industry policies, see World Bank (1987), Krueger (1997), Suh (2007), and Lim (2011).

<sup>9</sup>Some critics have argued that the Republic of Korea adopted a Comparative Advantage Defying (CAD) strategy, and there is a heated debate. For the debate on whether the HCI drive in the 1970s is CAF or CAD, see Lin and Chang (2009). We consider Republic of Korea's policies as being consistent with the New Structural Economics and Growth Identification and Facilitation (GIF) framework where government plays a strong role based on market signals to identify the latent comparative advantages.



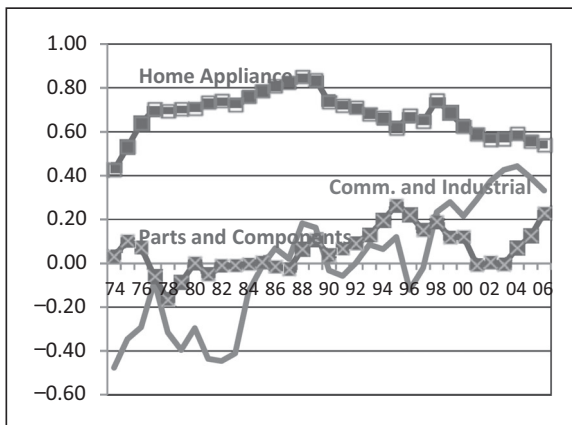
Figure 8a. Revealed Comparative Advantage (RCA) of the Republic of Korea's Industries



RCA = share of an industry in the economy's exports/its share in global exports.  
 Note: Based on SITC rev 1, 2 digits.  
 Source: UN Comtrade data via WITS, authors' calculations.

reveals industrial upgrading from simple goods to more sophisticated goods (Lin and Chang 2009). Starting with the assembly of radios from imported components, the Republic of Korea obtained a comparative advantage in the home appliance industry (World Bank 1987). The country started to gain comparative advantage in electronic parts and components (i.e., transistors and semiconductors) in the mid-1980s, and later on in information, communication, and industrial electronics in the 1990s (Figure 8b).

Figure 8b. Trade Specialization Index (TSI) of the Republic of Korea's Electronics



Note: TSI = (export - import)/(export + import) for each industry.  
 Source: Korea Electronic Association.

In terms of the inter-industrial dimension, the Republic of Korea maintained a high revealed comparative advantage (RCA) in clothing exports until the end of the 1960s, followed by footwear until the 1980s. In the 1990s, it rapidly developed a high RCA in electronics exports, which was more recently replaced by transport equipment exports.

The Republic of Korea's flying geese catch-up also had an international dimension involving the relocation of an industry from one country to another. For example, it gained a sharp increase in RCA in footwear in the mid-1960s partly as a result of manufacturing alliances and technology cooperation between local and Japanese firms prompted by increasing wages in Japan which had been weakening the latter's competitiveness in the sector. A steep decrease in its RCA in the mid-1990s indicates that higher wages in the Republic of Korea had led to a relocation of factories to the PRC, Indonesia, and Viet Nam (The Committee for the 60-year History of the Korean Economy 2010). Since the end of the 1980s when a liberal policy was adopted, outward foreign investment from the Republic of Korea's labor-intensive industries has increased with its main destination being Asian countries.<sup>10</sup>

#### **IV. Successes and Failures: CAD versus CAF**

##### **A. Import Substitution in the 1950s–1970s**

In the post-WWII period, most developing countries were keenly aware of the role that industrialization played in accelerating structural transformation and catch-up in Europe, Japan, and the US. Keen to emulate them, developing countries adopted the prevailing Structuralist paradigm, which advocated an import-substitution-led (IS-led) industrialization strategy to develop advanced industries similar to those in the industrial countries. Examples include heavy industries such as iron and steel, chemicals, machinery, and transport equipment in countries as diverse as Brazil, Egypt, Ghana, India, and the Republic of Korea.

In spite of a large variety of protectionist measures including high tariffs, even the most well-intended policy interventions failed in sustaining CAD industries. In many countries, most tariffs on manufactures led to effective rates of protection (ERP) well in excess of 100%. In a sample of 10 countries chosen for a special study, Krueger (1983) found that all except the Ivory Coast and the Republic of Korea pursued IS-led strategies in the 1960s and 1970s. The average ERP on manufactured products varied from 356% in Pakistan to 384% in Uruguay.

Governments following CAD were not indifferent to the type of industries they were protecting. In other words, they also "picked winners." Brazil is notable for starting out with high ERPs in the late 1950s but gradually shifting to a strategy

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<sup>10</sup>See Section IV on FDI.

where protection for CAF industries was reduced but protection for CAD industries remained high. Examples are: (i) the plastics industry, where the ERP declined from 489% to 332%; (ii) textiles, where ERP declined from 298% to 232%; and (iii) clothing, where ERP changed from 481% to 321% (Fishlow 1983, p. 58a). In Pakistan, during 1970–1971, the ERPs on most consumer and intermediate goods were between 100%–200%, except for motor vehicles which had an ERP of 595% (Guisinger 1978).

The Indian government had an elaborate brand of IS. At the start of the second 5-year plan (1957–1962), policymakers in India envisioned a country that was not dependent on imports of either consumer or producer goods. This was achieved by using IS to make machines as well as to make consumer products—i.e., imposing import licensing requirements and tariffs on capital and consumer goods. As late as 1991, the Indian economy was one of the most heavily protected economies globally with ERPs averaging 125%, where the highest was 355% (Krueger 2002).

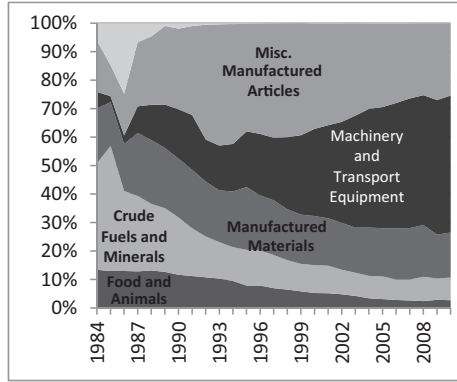
In contrast to Japan and East Asia which followed their comparative advantage, well-intended governments across Africa, Latin America, and South Asia adopted IS and protection in the 1960s and 1970s to achieve dynamic growth in industries that were CAD. They assigned a high priority to the development of capital-intensive heavy industries when in fact capital was scarce. To compensate for the absence of private firms in capital-intensive sectors, governments leveraged large state-owned enterprises to produce capital-intensive products. Examples of such strategies include Indonesia's launch of a shipbuilding industry in the 1960s when its GDP per capita was only 10% of its main competitor, the Netherlands, and the attempt of Zaire (now the Democratic Republic of Congo) to build an automobile industry in the 1970s when the country's GDP per capita was only 5% of the US, then the industry leader (Lin 2011).

The Republic of Korea and Japan, on the other hand, had selected target countries that were appropriate to their income levels during their catch-up phase. As reflected in Table 1, Japan targeted Germany whose income was 2.5 times Japan's in the Meiji period, while the Republic of Korea targeted Japan whose income was 4 times that of the Republic of Korea's in the 1970s. Countries flourish because they have followed their comparative advantages. They fail to catch up if they do not.

## **B. The PRC as a Follower: Learning and Industrial Upgrading**

The PRC's success over the past 3 decades is the result of a two-pillar strategy: (i) adopting a dual-track approach to reforms, giving transitory protection to CAD capital-intensive sectors, and liberalizing entry to CAF labor-intensive sectors, thereby achieving stability and dynamic transformation simultaneously; and (ii) as a latecomer, choosing an economic development strategy that tapped into the potential advantage of backwardness along the lines of the flying geese pattern.

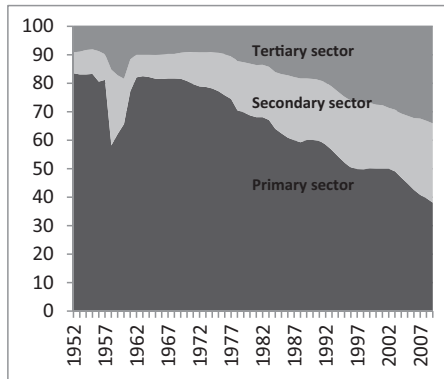
Figure 9a. **PRC's Rapid Transformation in Export Structure Following Comparative Advantage**



Source: UN Comtrade; Lin and Wang (2008), updated by the authors.

Industrial development in the PRC after reforms in 1979 has basically followed the country's comparative advantage or is CAF. The PRC was an exporter of primary products. In 1984, nearly 50% of the PRC's exports were crude oil and agricultural products (Figure 9a). The first industrial upgrade from resources to labor-intensive products happened in 1986, when exports of textiles and clothing exceeded crude oil. The second upgrade happened in 1995, when Chinese exports of machinery and electronics exceeded textiles and clothing. This indicated that the PRC has started the transition from exporting traditional labor-intensive exports to nontraditional labor-intensive processes (assembly lines). The third upgrade happened after 2001 following the PRC's accession to the World Trade Organization, locking in liberalization of trade in goods and services and making PRC laws and

Figure 9b. . . . **But Slow Transformation of the Employment Structure**



Source: UN Comtrade; Lin and Wang (2008), updated by the authors.

regulations conform to international standards. Regulatory reforms led to rapidly rising FDI inflows, bringing in new technologies and processes. As a result, the level of product sophistication increased.<sup>11</sup>

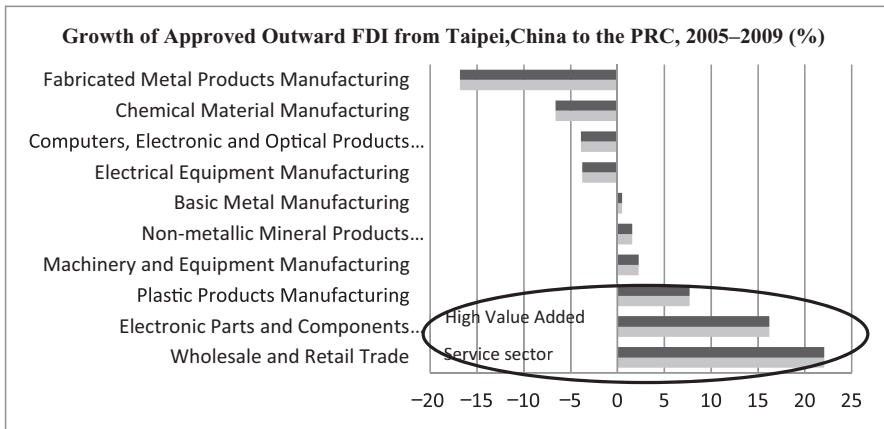
The evolution of the PRC's export structure in the last three decades reflects significant structural transformation in the flying geese style that has enabled the country to graduate from being an exporter of labor-intensive products such as apparel, textiles, and leather to producing more sophisticated items such as home appliances, office machines, and electric machinery (Figure 9).<sup>12</sup> Unlike the case of the Republic of Korea, FDI played a critical role in the PRC's industrial upgrading. The following points about this can be made:

- (i) Inward FDI helps industrial upgrading. Many studies have pointed out that foreign investors are quick to identify a country's comparative advantage and serve as the most dynamic forces in industrial development and upgrading (Harrison and Rodríguez-Clare 2010; Aghion et al. 2011). In our view, foreign investors serve as identifiers of growth sectors, providing advanced technology and helping reduce first-mover risks and transaction costs when firms attempt to enter a new product or market. The PRC's capital-labor ratio in the manufacturing sector increased from 0.4 in 1985 to nearly 4.0 in 2007. Foreign-invested enterprises accounted for about 20% of tax revenue, 55% of imports and exports, and over 80% of high-tech exports (MOFCOM 2011).
- (ii) In the last 5 years (2005–2009), FDI inflows have been shifting towards higher value-added products, parts and components, and subsectors including services, as shown by Figure 10. Investors from Taipei, China have provided much-needed technology and managerial skills that firms need in electronics and information technology. These firms are moving the manufacturing of electronic parts and components to the PRC. Wholesale and retailing have shown the fastest growth rate in recent years, as the PRC moved toward promoting domestic consumption.
- (iii) The process of three-stage upgrading shows the importance of learning-by-exporting from lower-end manufacturing goods to higher-value-added goods and subsequently to services. Initial learning activities occurred within sectors,

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<sup>11</sup>There is, however, a myth on the level of export sophistication which was discussed at length in Koopman, Wang, and Wei (2008) and Lin and Wang (2008). In fact, over 50% of exports in terms of value-added were foreign value-added—i.e., goods and services produced by foreign-invested enterprises (FIEs). Among high-technology goods, over 80% were exported by foreign-invested firms.

<sup>12</sup>In the context of vertical disintegration of supply chains, the flying geese pattern still exists as multinationals move the labor-intensive part of their production (often the assembly line) to the PRC and other low-wage countries, keeping the critical components and parts at home. This does not change the fundamental premise of our paper. As wages and salaries increase in the PRC, the labor intensive assembly lines will shift to other lower-income countries, and the PRC will upgrade to higher value added components and parts, as well as higher tech products, as shown in Figure 10.

Figure 10. **Changing Structure of FDI Flows to the PRC—From Manufacturing to Services**

Source: MOEA, Taipei,China; Rosen and Wang (2011), p. 35. Note that the manufacturing (rather than assembly) of electronic parts and components is not labor intensive; they belong to higher value added class.

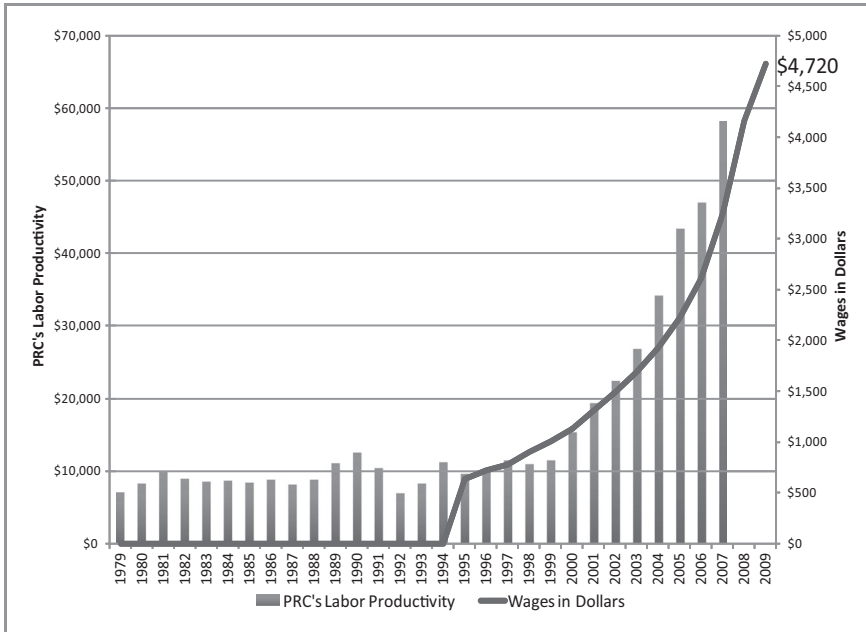
then gradually spilled over horizontally to new sectors, and eventually diversified through outward FDI to other countries (Lin and Wang 2008).

### C. Sub-Saharan Africa—Trailing Far Behind

There are several signs of a slow deindustrialization in Africa in the last decades, when the PRC and India were emerging as large industrial countries and African countries were undertaking structural reforms and liberalizing and integrating with global markets. An overview of Africa's industrial performance during 1990–2010 indicates that 40 out of 45 countries had manufacturing value-added (MVA) per capita of less than \$200 and almost half experienced negative growth in MVA per capita (UNIDO 2011, p. 46).

The report by UNIDO (2011) also shows how the share of labor in the manufacturing sector has declined, suggesting that employment in light manufacturing industries (e.g., textiles, apparel, and leather products), which are labor intensive, declined after 1990. A large part of the employment losses had been due to a decline in the share of textiles, from about 7% in 2000 to 5% in 2009 (UNIDO 2011, p. 27). The fact that Africa is increasingly dependent on other regions for light manufactures is significant for three reasons. First, the trade deficit indicates that African economies have a sizeable domestic market for light manufactures. Second, light manufacturing sectors are a stepping-stone towards more technologically sophisticated manufacturing industries (UNIDO 2011). Third, given the size of global demand for light manufactures, there is significant potential for African exports of light manufactures which can facilitate structural transformation into more advanced sectors.

Figure 11. Labor Productivity and Average Wage Rates in the PRC's Manufacturing (\$)



Sources: UNIDO; National Bureau of Statistics of China. 2010. *China Statistical Yearbook*. Beijing.

## V. The Emergence of Leading Dragons

### A. The Phenomenon of Relocating Manufacturing Jobs is Not New

The PRC is at a stage where the western countries and Japan had been during the 1970s and where other Asian economies (Hong Kong, China; the Republic of Korea; Singapore; and Taipei, China) found themselves in during the 1980s. As labor-intensive industries matured, wages increased, and firms moved into more technologically sophisticated industries in accordance with the upgrading of the underlying endowment structure. In the western countries and the Asian tigers, as the capital intensity of production in manufacturing increased, there was an overall contraction in manufacturing jobs and a reallocation of resources towards the services sectors. For example the share of manufacturing employment in the US reduced from 17% in the 1980s to 9% in 2004, in Japan from 18% to 12% during the same period. When labor-intensive industries in the high-wage countries shut down, their jobs relocated to other lower-wage economies such as the East Asian tigers.

The PRC's labor cost is rising rapidly, while the structure of its industries, exports, and employment is changing. Many Chinese economists argue that the

country has already absorbed its surplus labor and approached the Lewisian turning point (Cai et al. 2009a, Huang and Jiang 2010). Recent data indicates that wages in the PRC's manufacturing sector grew rapidly, rising from just over \$150 per month in 2005 to around \$350 per month in 2010 (Figure 11).<sup>13</sup> More precisely, the wage gap between the PRC and other high middle-income countries is closing, a trend that will likely continue with certainty over the coming decade.

The PRC's 12th Five-Year Plan projects that during the period 2011–2015, the economy will grow at 7% per year on average. It also proposes that real wages will grow as fast as GDP. Both growth rates are likely to be achieved which implies that real monthly wages will double from around \$350 per month to \$700 per month over the next decade. When combined with continued currency appreciation, the PRC's real wages could approach \$1,000 per month within a decade or about the level of some of the higher middle-income countries (e.g., Turkey and Brazil) and \$2,000 per month by 2030 or the level of the Republic of Korea and Taipei, China today.

## B. Significant Changes in Employment Patterns and Location

Spillovers from the leading dragon phenomenon spurred by rising Chinese wages are already helping to relocate its labor-intensive jobs to other lower-wage countries.<sup>14</sup> This is happening in several ways.

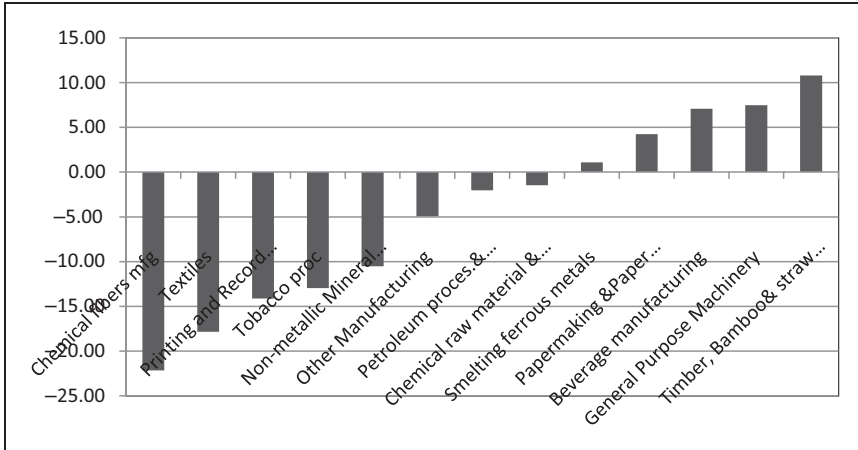
- (i) The most evident is the ongoing transformation in the PRC's manufacturing sector. Following the flying geese pattern of development, the country is transitioning from labor-intensive industries towards more advanced ones, with machinery becoming increasingly dominant in manufactured exports.<sup>14</sup> New evidence shows that urban manufacturing industries had restructured during 2002–2009. As a result, the largest decline in manufacturing employment is currently unfolding in textile, chemical fiber, printing and record media, tobacco processing, and nonmetallic mineral product industries (Figure 12).
- (ii) The PRC's restructuring could accelerate. First, with rapid urbanization, expansion of tertiary education, and greater labor market flexibility, young workers may be unwilling to stay locked in low-skill manufacturing jobs and may begin to seek upward mobility. Although it will remain a “labor surplus” economy until 2014, the growing demand for service sector employees will gradually stretch the Chinese job market (McMillan 2011). Second, with gross domestic

<sup>13</sup>From *Oxford Analytica*, on 28 March 2011. During 2010–2011, the PRC's minimum wage for 30 municipalities rose by 25% or more.

<sup>14</sup>There is a possibility of relocating labor-intensive manufacturing from coastal regions to inland regions, but the wage rate difference between the two regions is only 30%, and transportation and transaction costs are higher in inland regions. Multinationals will be the first to relocate to other low-income countries, and Chinese enterprises will follow. Labor-intensive manufacturing will move to other low-income countries sooner or later, depending on external and internal factors.



Figure 12. **Sunset Manufacturing Sectors in the PRC—Change in Employment in 2002–2009 (%)**



Note: This chart shows only those subsectors where employment is declining or rising more slowly than the average for the urban manufacturing sector in the PRC.

Source: Banister and Cook 2011 and NBS, China Labor Statistical Yearbook 2010 (for 2009 data).

savings as high as 45% for over 25 years and gross capital formation of over 50%, capital availability has increased substantially, with the channels for exporting this capital largely open. The government encourages enterprises in labor-intensive sectors to go global by providing guidance and incentives including, but not limited to, setting up 19 industrial zones outside the PRC.

- (iii) Evidently, rising wages in labor-intensive industries have already triggered relocation of low wage jobs overseas. Many lower-wage countries in the PRC's neighborhood such as Cambodia, Lao People's Democratic Republic, and Viet Nam, and even Bangladesh are emerging as the new growth nodes for garment, footwear, and other labor-intensive industries. The number of jobs each country can attract depends on the incentives package it offers to investors.
- (iv) Perhaps the most critical channel is outward FDI flows from the PRC and other emerging market economies to manufacturing sectors in lower-wage countries, as explained in the next section.

### C. Significant Potential for Relocation of Jobs to Low-Wage Countries

Due to the sheer size of the PRC's labor market, the number of jobs that the ongoing industrialization will create for low-income countries is potentially huge. As employment statistics for manufacturing is extremely sparse and tentative, we cannot provide any estimates of potential job relocation. However, rough calculations

Table 2. **Employment in Manufacturing, Potential Dragons, 2009–2010**

	<b>Brazil</b>	<b>PRC</b>	<b>India</b>	<b>Indonesia</b>	<b>Total</b>
Employment in Manufacturing (million)	<b>13.1</b>	<b>85</b>	<b>8.7</b>	<b>12.5</b>	<b>119.3</b>
Population (million)	192	1,324	1,140	277	2,934
Outward FDI (\$ billion 2010)	11.5	68	14.6	2.7	96.8

Source: ILO, Penn World Tables, UNCTAD (2011).

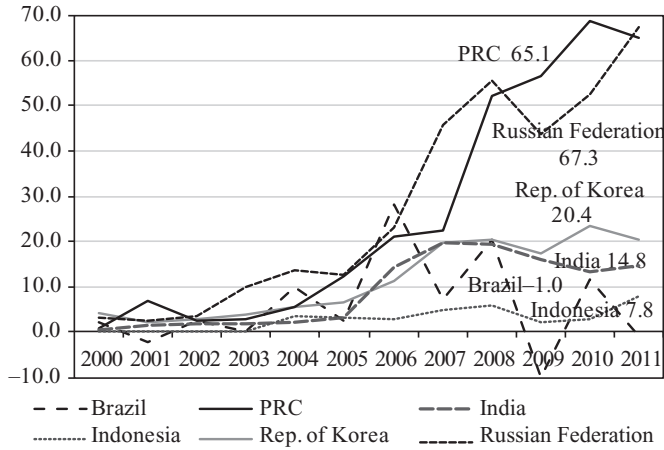
are informative and sufficient. Currently, the PRC employs about 85 million workers nationwide in its manufacturing sector. Rising wages will force the PRC to upgrade to higher value-added and more capital-intensive and technology-intensive sectors and to relocate jobs in the existing sectors to countries that have a lower wage rate. India currently employs about 9 million workers and Brazil employs about 13 million (Table 2). These emerging market countries employ about 120 million workers whose jobs could be relocated to other developing countries in the coming decades.

It seems reasonable to suggest that the leading dragon phenomenon alone can create sufficient labor-intensive manufacturing jobs for developing sub-Saharan African countries to bring them to par with most industrial countries. Even if the PRC's manufacturing sector sheds 10% of its total employment in the next few years, a pool of 8.5 million jobs will be ready to relocate overseas. The number could almost double employment in manufacturing in African countries in a few years, jumpstarting its process of industrialization.

#### **D. Accelerating the Leading Dragon Phenomenon in Sub-Saharan Africa—The Role of FDI**

Asian and African countries are not alone in competing for the millions of jobs relocating from the PRC. In particular, in sub-Saharan Africa, the scarcity of local entrepreneurial skills and investment capital are invariably the top two constraints for a competitive manufacturing sector. Evidently, availability of outward FDI can enable them to overcome these constraints and take advantage of the leading dragon phenomenon to finally participate in the global production of labor-intensive products. Outward FDI from developing and transition economies reached \$442 billion in 2011 (UNCTAD 2012). At the helm were the Russian Federation in 2011 and the PRC in 2010, while Brazil, India, Indonesia, and the Republic of Korea (collectively, BRIICK) followed as the other key sources of FDI (Figure 13). Roughly 60% of outward FDI from developing countries went into other developing countries, mostly in the form of greenfield investments that can typically open the door for South–South relocation of various industries from the PRC and other emerging economies.

A large share of the PRC's outward FDI is flowing to Africa, growing from a few hundred million dollars in 2002 to a cumulative amount of \$13 billion by the end of 2010, accounting for 4% of the total stock of outward FDI (MOFCOM

Figure 13. **Outward FDI from BRIICK Countries, 2000–2011 (\$ billions)**

Note: Indonesia was added to the BRIICK countries to meet the interest of readers.

Source: UNCTAD, data accessed 27 August 2012.

2011). About 22% of outward FDI from the PRC is presently concentrated in the manufacturing sectors, second only to mining which accounts for 29%. In 2010, Chinese firms also increased the number of jobs created overseas by 10% and capital investment by 2.5%. The PRC ranked eighth in the world according to job creation overseas (FDI Intelligence 2011). Two recent papers found that the PRC's outward FDI has played a significant role in the growth of African countries (Weisbrod and Whalley 2011, Mlachila and Takebe 2011). India currently invests over 40% of its outward FDI in manufacturing. In addition to a booming economy, India's liberalization reforms during the 1990s also facilitated the global spread of Indian firms (Athukorala 2009, p. 146). A recent World Bank survey shows that over 64% of Chinese firms operating in Ethiopia engage in manufacturing, creating 15,910 jobs (World Bank 2012, p. 12).

## VI. Summary and Implications

The emergence of large middle-income countries such as Brazil, the PRC, and India as new growth poles in the world and their dynamic growth and ascent up the industrial ladder offer an unprecedented opportunity to all lower-income developing economies, especially in sub-Saharan Africa, to accelerate industrialization and catch-up. This paper tried to explain why.

In addition, this paper argues that:

- (i) Economic development is a process of continuous industrial and technological upgrading, and modern economic development is accompanied by structural

transformation. Nearly all countries that industrialized successfully adopted CAF strategies to tap the latecomer advantage in a flying geese pattern. Successful industrialization in Japan before 1900, the “passing of the torch” from the US to Japan after WWII, rapid catch-up of East Asian NIEs, the ASEAN4, and latecomers such as the PRC and Viet Nam have all followed the flying geese pattern, albeit to varying degrees.

- (ii) This paper provides evidence that not only are industries jumping across borders, but those jumping industries are also upgrading. In the late 1970s and 1980s, the lead geese for the PRC were the East Asian tigers. As the Republic of Korea and Taipei, China are upgrading, industries that have relocated to the PRC are now also ascending to higher-end products. In a fraction of the time it took Japan and the East Asian tigers, the PRC has been able to replace simple labor-intensive products with more sophisticated ones. This is enabled by a government that fosters CAF industries.
- (iii) Dynamic growth, high savings, and substantial investments in education have triggered a rapid upgrading of the PRC’s factor endowments for more technologically advanced industries. This has pushed up wages at an amazing rate since 2002, causing labor-intensive industries to contract. The PRC has an estimated 85–100 million workers in manufacturing, with most of them in labor-intensive industries or labor-intensive segments of supply chains. As these industries shed labor, they will create a huge opportunity for lower-wage countries to start labor-intensive manufacturing production. This process, which we call the leading dragon phenomenon, will offer millions of labor-intensive job opportunities to developing countries. If Brazil, India, Indonesia, and other large middle-income countries maintain their current pace of growth, a similar pattern and employment space will arise.
- (iv) Labor cost is only one of many factors for the flying geese and leading dragon phenomenon, governments in both leading and following countries have critical roles to play, as indicated in the Growth Identification and Facilitation Framework (Lin 2011 and 2012b). Low-income countries must compete to gain access to capital, technology, and capacity development opportunities. If they have the right policy framework, the industrial upgrading in large emerging market economies, especially in the PRC, would provide them a golden opportunity for dynamic manufacturing-sector-led growth in the years to come.

In an increasingly globalized world, opportunities for economic transformation abound. The emergence of a multi-polar world is a blessing even for the most backward economies because it provides them a chance to enter a new age of rapid industrialization and structural transformation. Clearly, the opportunities

that lie ahead for labor-abundant economies in Asia and Africa, which are currently exporting mostly minerals, are enormous—provided that they quickly formulate and implement credible economic development strategies consistent with their comparative advantage. However, the actual benefit for countries and regions depends very much on the right policy environment, institutions, and implementation capacities. Countries must still compete to gain access to capital, technology, and capacity development opportunities.

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