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The Drivers of Asia's Industrial Geography

The preceding chapters examined the evolving composition of industry in Asia and how countries are competing with China and India in global markets. In this chapter, we look at some of the factors that will affect industrial change and trade flows over the medium term. We highlight the following five factors:

- The adjustment and growth of the U.S. economy
- Savings and investment in China, India, and other major Asian economies
- Technological shifts
- Industrial networking, clustering, corporate competitiveness, and the pattern of trade
- The evolution of industrial capabilities in other Asian countries

These are by no means the only relevant ones—there are other economic and geopolitical factors that will play a mediating role; however, the above five deserve primacy for reasons we will explain.

Rebalancing the United States

For close to a quarter-century, the U.S. economy has served as the principal global locomotive—and a main contributor to the success of export-led growth in Asia. The willingness of the United States to open its market to exports from East Asia and Western Europe,¹—as well as the strength of U.S. consumer demand for

¹To build the economies of its Cold War allies, the U.S. pursued trade and exchange-rate policies that, over time, downsized a number of major domestic industries such as steel and autos.

imports—stimulated industrial development² in the exporting countries, while U.S. foreign direct investment (FDI) helped finance export-oriented industrialization and cemented trading relationships. A U.S. trade deficit of approximately 1.5 percent of GDP in the 1990s, which widened to a high point of 6 percent of GDP in 2006–07, enlarged the role of the U.S. market in the global trading system. This seemingly insatiable demand for imported manufactures, along with the associated hollowing of U.S. industry,³ strongly bolstered manufacturing activities in China, India, and other Asian countries. Undoubtedly, the formation of the European Union and intraregional trade in Asia also fueled demand, but the United States was the most important mover and importer. A narrowing and gradual elimination of the U.S. current account deficit has massive implications for Asian countries that have depended upon exports to fuel their industrialization. The need to lower external debt and mobilize domestic resources to meet domestic priorities means that household savings (as a percentage of disposable income) must return to earlier U.S. trend rates of 8–10 percent, from the level under 5 percent witnessed in 2009, and government overspending must be curtailed.⁴ Foreign borrowing to maintain current expenditure for the indefinite future is not a viable option for any country, not even one whose currency is an international unit of account and a store of value.⁵

Thus, the medium- and longer-term prognosis calls for higher U.S. domestic savings to finance investment priorities, to close domestic and external financing gaps, and to diminish the indebtedness of households—and of the government. This could mean lower potential growth as more of it derives from activities that produce smaller gains in productivity and are, on balance, less innovative. The potential growth rate of the U.S. economy over the long term is expected to fall by almost 1 percent per year—from about 3 percent to close to 2 percent. There are several reasons for this. First, household deleveraging and rebuilding of assets will most probably result in weaker demand from consumers. This is unlikely to be offset by increased investment, because spending on real estate may not climb

²Technology transfer from the United States through a number of channels also facilitated industrial development.

³Some of it happened through the transfer overseas of production facilities by U.S. multinational corporations (MNCs).

⁴The revival of consumption demand in the first quarter of 2010 pushed down household savings and foreshadows at least a temporary widening of the current account deficit.

⁵The “exorbitant privilege” enjoyed by the United States because of the dollar being the premier reserve currency is discussed by Reinhart and Reinhart (2010). This has been reinforced by the flight to safety precipitated by the financial crisis, causing the dollar to strengthen against the Euro. The degree to which this privilege is retained will depend upon regulatory measures to safeguard the attractiveness of U.S. financial markets and policy actions to rebalance the U.S. economy in the medium term (see Blanchard and Cottarelli 2010 on the 10 fiscal commandments for the Organisation for Economic Co-operation and Development (OECD) countries).

back to precrisis levels (Blanchard 2009). Both could adversely affect the change in total factor productivity. This rose by 0.9 percent annually between 1995 and 2000, but by 1.4 percent annually from 2001 through 2008. Unless export-led investment in manufacturing significantly contributes to productivity, a lower rate is in the cards. Compounding these is the anticipated decline in the growth of the labor force from 12.1 percent during 1998–2008 to 8.2 percent between 2008 and 2018 (Feldstein 2010; Lee, Rabanal, and Sandri 2010). Measures to limit global warming, if they are actively pursued, are also likely to raise the capital coefficient of development. With the U.S. economy generating less demand for Asian manufactures and U.S. firms competing more aggressively in foreign markets, industrialization and growth could be slowed in the smaller countries dependent on exports, as well as in countries at an early stage of industrial development with a narrow range of low-tech, raw material-based, and processed exports—countries such as Pakistan, Bangladesh, Cambodia, and Vietnam. The larger countries, such as China and India, have the resources, domestic markets, and growth momentum, while advanced economies such as Japan and the Republic of Korea have the technological capabilities and the corporate strength to compete in export markets, realize some of the opportunities associated with global warming, and take steps that will partially neutralize the long-run costs.

Savings and Investment

In the months immediately following the financial crisis of 2008–09 and its aftermath,⁶ some believed that a savings glut⁷ was resulting in underconsumption and trade surpluses in some Asian countries. Proponents of this view have argued that East Asian countries reacted to the pain inflicted by the crisis of 1997–98 by adopting domestic expenditure reduction and export-promoting exchange-rate and financial policies in order to accumulate foreign exchange reserves. This was in order to reduce their vulnerability to speculative attacks, sudden stops of capital, and capital flight.⁸ The success of this effort at insuring against shocks is reflected in the vast foreign reserves held mainly by East Asian countries. In conjunction with the expansionary monetary and weak regulatory policies of some Western countries, along with their high public-sector indebtedness, the global

⁶For a succinct account of the causes of the financial crisis in the United States see Levine (2010). On factors contributing to increased subprime lending, see Mian, Sufi, and Trebbi (2010).

⁷Globally, the savings rate as a percentage of GDP has remained more or less static since 1995. It was 22.3 percent in the mid-1990s, declined to 20.6 percent in 2002, and rose to 22.8 percent in 2005. Mollerstrom (2010) maintains that for the U.S. current account deficits to be caused by capital inflows triggered by rising savings, U.S. investment—not just consumption—ought also to have risen by up to 4 percent.

⁸The crisis of 1997–98 also induced Asian borrowers to cut down short-term debts and to avoid mismatches in the maturity of their debt obligations.

economy is facing severe imbalances. One group of countries is consuming too much and borrowing to finance this spending, and another group may not be consuming enough. A solution advocated to promote the adjustment of Asian countries with current account surpluses—and to reduce the deficits of the United States, the United Kingdom, and some of the EU economies—is for East Asian households to increase their consumption so that domestic demand, rather than exports, becomes the engine of growth and raises the international demand for the exports of countries running deficits. A reduction in the so-called savings glut, it is argued, could (relatively) painlessly solve the adjustment issues for a handful of the most seriously affected countries and could restore growth.

A closer examination of savings in the Asian region indicates that they rose in only China, India, and Vietnam. This was mainly because of rapid growth and, in China's case, also because greater productivity and profitability of Chinese corporations⁹ significantly increased corporate savings. The high savings of Chinese households and the rising savings of Indian households are also ascribed to precautionary motives: both countries lack adequate pension and health safety nets. In both countries, the limited access to finance compels families to save for children's education, down payments for the purchase of homes, the acquisition of major durables (cars particularly), and the accumulation of dowries for daughters—or the equivalent of bride prices for young women rendered scarce by sex imbalances (Chamon and Prasad 2007; Wei and Zhang 2009). Habit persistence and inertia in the face of rising incomes might be another factor explaining the rise in savings (Horioka and Wan 2006).¹⁰ In the other Asian countries, savings remained constant or even declined, but in some cases, investment declined even more. This slowdown in investment is not entirely explicable, but it is linked to excessive, often speculative investment in the 1990s, prior to the crisis of 1997–98; to the overhang of capacity it created in the real estate sector and in manufacturing; and to the uncertain investment climate in some Southeast Asian countries. A number of industrializing East and Southeast Asian countries, which tended to run current account deficits prior to 1997–98—countries such as Thailand and Malaysia—welcomed trade surpluses and enlarged their foreign exchange holdings. Viewed as excessive by some, these reserves have nonetheless underwritten fiscal

⁹The bulk of the increased profits have accrued to only a subset of the state-owned enterprises, the largest beneficiaries being the producers of resource-based commodities, tobacco products, and suppliers of information technology (IT) services. Low dividend payout rates have contributed to the high levels of corporate saving and investment. Profitability has also been buttressed by low borrowing costs and other fiscal incentives provided to the corporate sector.

¹⁰Neither Prasad (2009) nor Horioka and Wan (2006) find that the age structure of the population explains Chinese savings. Household savings tend to follow a U-shaped rather than an inverted-U-shaped pattern, with young households and older households being the higher savers.

stimulus packages and assisted these countries in coping with the global economic contraction during 2009.

Are higher consumption propensities the recipe for faster growth in Asia and the world and the way to repair global resource imbalances? Although popular, this view needs to be treated with caution for two reasons. First, because the world could be heading toward a shortage of savings: savings in the advanced countries, in some instances already low, are projected to fall as the rising number of aging households begin to eat into their assets. This tendency will be exacerbated by higher dependency ratios (as the elderly population increases in number) and slowing growth of incomes. In several countries, expansionary fiscal policies have led to public dissaving and have generated large public-sector deficits that are likely to persist far into the future. These deficits and their servicing also need to be factored in as the adequacy of global savings is assessed.

Take, for example, the Indian case. India's national accounts for 2008 indicate that consumption as a percentage of GDP was 65 percent, while household savings were 24 percent. Meanwhile, investment was close to 39 percent of GDP, and the current account deficit was 1.4 percent of GDP. The large public sector deficits argue against increased public consumption. In theory, household consumption could grow faster—reversing recent trend rates—and this could offset a further deterioration of net exports or weakening of investment growth. In purely arithmetic terms, such rebalancing could sustain GDP growth rates of 7–8 percent per year for a few years, if foreign financing at affordable terms is available to accommodate continuing external deficits. However, given the likely shortage of savings globally, such affordability will be in question, and such widening of the current account deficit would raise the probability of foreign exchange becoming a constraint on growth.

Second, a premature focus on domestic consumption as a driver of growth in developing countries has future ramifications for industrial development. Demand from households, the majority of which are lower-middle- and middle-income households, will be weighted toward food, housing, transportation, light consumer goods, household goods, and services, whereas the faster-growing exports comprise higher-value manufactures and processed commodities. Quite likely, such a shift would significantly dampen investment in manufacturing activities that are more sophisticated, capital intensive, scale sensitive, and value adding. A reorientation of manufacturing and services to serve domestic consumers would also affect the investment in human capital: Tertiary-level professional and technical skills needed for an expanding higher-income overseas market would be less in demand, leading to slower increase in the stock of tertiary level science and technology (S&T) skills; there could possibly be more brain drain, especially of the most talented. The faster-growing segments of manufactured exports are also the ones that are more sophisticated, of higher quality, and with greater value added. By focusing on the domestic market, these countries may well forego exports that are more profitable and technology intensive; that can deepen

domestic manufacturing capabilities; that can stimulate process and product innovation; and that can be the springboard for the emergence of corporate champions, the ones spearheading technology acquisition and investment in research and development (R&D). In addition, the imports of advanced machinery and components underpinning many of the exports serve as a vital conduit for R&D and technology transfer from more advanced trading partners. If they decline, most likely there would be a parallel decline in FDI in the more high-tech manufacturing and services activities in these countries.

Among the middle-income East and Southeast Asian economies, savings have very likely peaked in China and could decline as financial deepening and reforms of the health and social security systems lessen the need for precautionary savings and as the middle class's increasing wants for positional goods raises consumption. Barring an acceleration of growth in Southeast Asia, it is uncertain as to whether a dip in dependency ratios could push savings above existing levels. Indian savings could rise further if the economy expands at Chinese rates, or they could flatten out. In the rest of South Asia, savings will go higher if incomes begin rising more steeply, which is not likely. On balance, the outlook calls for a declining ratio of savings even if governments do not aggressively push consumption propensities.

Will there be a demand for these savings, or will a sizable fraction end up financing consumption and investment in the deficit-ridden postindustrial societies? There are four reasons for maintaining that the demand for investment will be greater in the future and that Asia may need to save more and not less.

First, most of Asia is still developing. Even in countries such as China and Malaysia, which have acquired significant industrial capabilities, the industrial base is not deep. For incomes to continue rising at a rapid (single-digit) pace, these countries must engage in further rounds of industrialization. More capital-, technology-, and skill-intensive activities—industry and services—need to be introduced, which will require costly investment. Healthcare and multimedia services are as capital intensive as, if not more than, manufacturing. South Asia—including India—lags far behind, and here much of the needed industrial base and infrastructure have yet to be built. In all, these countries' capital-to-labor ratios are a fraction of those in the United States.

Second, Asia's population is still mostly rural. Half of China's population, more than two-thirds of India's, and half of Indonesia's still are classified as non-urban. This has profound implications for the development of adequate urban housing and infrastructure to accommodate the almost inevitable transfer of the majority of these people to the cities. Affordable housing of decent quality, transport, communications, water, energy, sanitation, and sanitary waste disposal, to name the most essential, will consume immense amounts of capital. Aside from new investment to accommodate the urban population of the future, there is the vast backlog of investment to raise the living standards of existing urban inhabitants,

many of whom live in slums¹¹ with the bare minimum of services—and often not even that. Asia's capital requirements for urban and infrastructure development have been frequently computed—and they are enormous—and as we indicate below, these projections might gravely understate the actual needs (see Asian Development Bank 2009).

Third, global warming will greatly increase the outlay on infrastructure of all kinds and, over time, require a replacement of production equipment, industrial boilers, coal-based power plants, and transport equipment. It will complicate the development process and enlarge investment needs. Inevitably, countries will be slow to face the new imperatives and delay will add to the costs, but eventually the bill will come due. For all Asian countries, global warming requires investments to conserve energy and water; to protect coastal and deltaic areas from rising sea levels; and to safeguard cities, in particular, from extreme weather events, be they heat waves or hurricanes. Cities and transport systems in Asia have evolved with the barest nod to design features that would mitigate carbon emissions and enhance livability. For too long, most municipalities in even the arid regions have avoided planning for the long haul and have preferred to assume that somehow the needed energy and water supplies will be forthcoming. Motorized vehicles are the preferred means of transport in even the poorest countries; it is this preference, reinforced by auto producers and affiliated industries and abetted by governments desperately seeking growth engines, that is determining the layout of cities. An extraordinarily small number of Asian cities are systematically developing comprehensive public transport systems and evincing a serious commitment to reducing greenhouse gas (GHG) emissions. It is unclear when a real change in thinking and lifestyles will occur. What is increasingly obvious is that with every passing day, decisions are being taken and investments being made that will be costly to reverse or modify in the future, when reversing mistakes may become unavoidable—barring, of course, the miraculous discovery of one or more technological fixes. Poorly designed and insulated buildings; energy inefficient appliances, equipment, and processes; urban spatial designs that further embed automobility into living and travel arrangements; and water extraction, sanitation, delivery, and industrial use practices that reduce the availability of clean water—together these are hastening the onset of warming and leading to water scarcity and storing problems for the future. The day will come when cities will need to be incrementally or hastily deconstructed and rebuilt to conform with lifestyles that consume much less fossil fuel-based energy. The longer the delay in making the switch to such a lifestyle, the greater will be the eventual burden of adjustment.

Fourth, social expenditures will add to the claims on investible resources. One is the needed investment in skills to narrow the technological gap between

¹¹About 1.2 billion urban dwellers worldwide live under slum conditions.

developing Asia and the advanced countries, as well as to build the knowledge capital that will stimulate innovation. More education, training, and research will absorb higher-level skills; in addition, upgrading education will call for large expenditures on capital-intensive facilities—not just classrooms, but also laboratories, computers, and state-of-the-art communications technology. Raising both the level and quality of education in much of Asia and bringing technological capabilities of all countries up to the level that Korea is at today will be a huge and costly undertaking.

For several of the Asian societies that can anticipate a sharp increase in the proportion of the elderly in the next two decades, facilities must be created and resources put aside to accommodate the medical and other expenses of the non-working old—making cities elder friendly, for example. If the thinking and research on elder care in Japan is an indication of what is to come, a variety of medical, robotic, and information and communication technology (ICT)-based devices could contribute to the quality of life of the elderly through heightened mobility, monitoring and care, entertainment, access to services, and routine medical assistance. A substitution of relatively scarce labor by capital is in the cards.¹² Societies where a fifth or more of the population is over 65 years of age will require a different mix of urban furniture, services, equipment, and life support systems. In a word, the elderly will enjoy decent living standards only if societies are willing to make the investments in the R&D, capital assets, and facilities necessary to cope with steeply rising dependency ratios.

The potential demand for investment is there, enough to absorb the current level of savings and more. That this demand is not manifesting itself has to do with the divide between private and social returns, distorted tax and other incentives, and risk perceptions that are diverting resources into the financial sector¹³ and real estate—distortions that are accentuated by increasing income disparities and greater imbalances in power relationships. The transport, energy, and financial industries, for example, strongly and effectively oppose measures that would constrain their prospects. Both public and private entities are reluctant to boldly plan for the future and embark on risky schemes—some inciting strong political opposition from industries and vested interests. In several cases, governments lack the foresight, planning skills, and resources to engage in investment or underwrite the risks of the private sector.

¹²An increasing number of these will be single children who would need to take care of two sets of parents. Even if these children decide to rely on external services for the care, the number of available caregivers is insufficient.

¹³More than 25 years ago James Tobin (1987) expressed skepticism as to the real economy outcomes of financial activity (and the mushrooming of transactions resulting in paper gains and losses) although he staunchly believed in the advantages of financial market efficiency.

Although higher consumption spending in East Asia would provide a welcome boost to demand in the medium term and may help deficit countries to adjust,¹⁴ those Asian households that are accumulating precautionary savings as incomes rise are doing the right thing from a purely private perspective, and they might also be contributing to the larger social good over the long term. It is now up to governments to compensate for the market's myopia and ensure, with the help of the price mechanism and other incentives and signals, that the resources are efficiently invested in the interests of long-term sustainability. It is increasingly apparent that unaided market forces subject to myriad distortions and manipulation will certainly lead to suboptimal outcomes.

Major Technological Shifts

We noted earlier that a succession of general-purpose technologies have been associated with periods of rapid growth. Most recently and spectacularly, semi-conductors and other advances in the realm of electronics, computers, the Internet, and mobile telecommunications are jointly responsible for bringing an enormous spate of innovations across diverse segments of the economy, for inducing investment, and for nudging the global growth to unprecedented heights. There is plenty of impetus left in the electronics and IC technologies, and this could be used most fruitfully in conjunction with technological innovation in low-carbon energy generation, new materials, urban transport systems, robotics, and bioinformatics. Significant advances in these areas through basic and applied research could help to sustain rapid development in Asia. The importance of these technologies is widely recognized, and five Asian economies are committing large sums to research that could have a bright commercial future. Of the five—Japan; Korea; China; Taiwan, China; and India—Asia's two most populous economies have arguably the most at stake and the most to gain for several reasons.

First, by participating in technological breakthroughs, they could reap early-mover advantages and corner a sizable share of the global market, instead of having to acquire and assimilate the technology from abroad and then compete with other countries to secure a piece of the global export trade. Second, successful innovations would be a boost to industry, with many spillovers, and the basis for productivity growth. They would launch a flotilla of firms, both small and large, among which could emerge a few world-class suppliers able to establish global brands and provide the two Asian countries with much-needed corporate heft. For China to nurture an innovative firm such as Samsung or Canon in an expanding field would represent tangible progress.

¹⁴This, of course, assumes that these deficit countries can expand their exports substantially when much of their manufacturing capacity has already relocated outside of the country.

Third, both China and India are urbanizing and industrializing economies with much ground still to cover. These countries are currently building their research infrastructure, training large numbers of researchers, and attempting to define their areas of comparative advantage in R&D. By entering relatively new fields with many scientific and technological secrets yet to be unlocked, China and India can enhance the productivity of their spending on research. The fact that they are at an earlier stage of development means that there is more scope for incorporating new technologies into manufacturing equipment and urban infrastructure. This process is also incentivized and expedited by the ongoing, large-scale investment in fixed assets in both countries. Thus, by achieving a pole position in leading-edge technologies that are still relatively immature, China and India can gain an edge on industrialized—and especially postindustrial—economies where the share of manufacturing is shrinking.

In this race to take the lead in the signature technologies of a “green economy,” China has a considerable advantage over India. The scale of its R&D effort is far greater—it is producing many more researchers every year—and Chinese companies are near the forefront in the production of photovoltaic cells (PVCs), wind turbines, and high density batteries.¹⁵ Moreover, Chinese research in nanotechnology, which is likely to affect the development of advanced materials, is yielding promising results.

R&D in green technologies represents an important facet of a broader strategy to deepen industrial capabilities and competitiveness using technology as the lever. All of the industrialized and industrializing countries are engaged in this technological arms race, and the stakes are high, because competitiveness and return on capital are increasingly a function of quality, design, and innovation. For standardized and labor-intensive products, costs of labor certainly matter a good deal; however, even in these product categories, process innovation that reduces costs and product innovation that differentiates a product and enhances its value contribute to profitability. In more valuable products, sophisticated technologies can confer a decisive advantage. As noted above, the frontrunners are Japan and Korea, if the metric used is R&D expenditure relative to GDP. They also lead others in Asia in the number of patents registered with the U.S. Patent and Trademark Office (USPTO). Taiwan, China; Singapore; and China are in third, fourth, and fifth places, respectively. The larger Southeast Asian economies and India follow, with the other South Asian countries trailing far behind. The latter have not entered the technological race thus far, which

¹⁵China invested heavily in nonfossil sources of energy during the 11th Plan and intends to redouble its efforts in this regard during the 12th Plan. Solar power for instance, is being heavily subsidized, especially for projects in remote regions (“Hedging all bets” 2010). See Adams, King, and Ma (2009) on China’s R&D effort. The Indian firm Suzlon is also one of the foremost manufacturers of wind turbines, while China’s BYD is a leader in high-density batteries.

partly explains their industrial composition and export competitiveness, and the characteristics of their narrowly circumscribed product space.

Among the industrializing countries, China is clearly setting the pace. The most striking aspect of its performance are the rates of change of key indicators. These are quite startling and overshadow those of India. In purchasing power parity (PPP)-adjusted terms, China is now the second-largest spender on R&D and has the second-largest contingent of researchers in the world after the United States. On its current trajectory, China should pull ahead of Korea and Taiwan, China, with respect to patents and papers in the near future. Moreover, because China's research spans many more subsectors, it is also likely to prove more fruitful overall than that of these two economies. Japan currently enjoys a huge lead over all other Asian economies but is having difficulty translating this into manufacturing success across a broad front and into GDP growth. Japan is likely to retain innovation-based competitiveness in autos, consumer electronics, and manufacturing equipment, and Korea has a well-honed and seemingly durable advantage in electronics, mobile telecommunications, white goods, and transport equipment. However, firms in both countries face intensifying competition from up-and-coming rivals in China—and within a decade, most likely from India as well.

As the research on innovation has convincingly established, the bulk of the downstream applied R&D, the kind that leads to commercial outcomes, is conducted by firms. A number of larger firms, especially, collaborate with scientists in universities and research institutes and monitor the research published by the scientific press. They are ready to acquire intellectual property (IP) with commercial promise from such institutions, but the innovativeness of the manufacturing industry and how it fares in the hard school of international competition depends upon how effectively firms deploy their own generated and acquired technologies. The Japanese, Korean, and Taiwanese miracles may have been sparked and sustained by the guiding hand of the state, state-directed financial bodies, and specialized research institutes established by the state, but large Japanese firms and trading houses, large Korean conglomerates, and small- and medium-sized Taiwanese firms—networked with MNCs—built the manufacturing engines of these three economies and actually delivered the miracles. Starting with modest production facilities, low-tech products, and no research or international marketing expertise (and no brand names), firms in the “miracle economies” acquired the manufacturing, research, and marketing capabilities and the much-coveted brand recognition. Whether the three countries remain competitive in the areas they now dominate or enter and colonize new industries will be decided by the competencies and the inventiveness of manufacturing firms.

So it will be in the rest of Asia. Recognizing this, the Chinese government and Chinese firms are trying hard to become global players and to establish a secure foothold in major product categories through their price competitiveness, technological upgrading, homegrown innovation, acquisition of IP from other sources, takeover of foreign firms and their brands, and determined efforts to

build their own brands.¹⁶ Indian firms are beginning to engage in a similar effort. But throughout the rest of Asia, almost four decades of industrialization, while it has led to the birth of a number of industrial conglomerates and major firms (frequently through the midwifery of governments), have not given rise to manufacturing powerhouses with global ambitions that have contributed to the industrial achievements of the leading economies.

Clustering of Industrial Activities

Manufacturing activity is primarily an urban phenomenon. In East Asia, the most dynamic and fastest-growing manufacturing industries emerged in a relatively small number of cities. In key instances, groups of firms in an industrial subsector formed integrated clusters through the use of a common labor pool, buyer-supplier relationships, collaboration to refine and develop technologies, joint marketing efforts, information gathering and training systems, and, in order to present a united front when lobbying for government support. Where cluster networking took root, it helped internalize technological spillovers and, in the most successful cases, achieve the balance between competition and cooperation that can be the basis for a virtuous growth spiral. Realizing the benefits of industrial clustering, governments (national as well as subnational) throughout East Asia have sought to grow clusters—in particular, clusters of high-tech firms. They have pursued clustering by seeding selected urban locations with science parks, incubators, and extension services; by encouraging local universities to engage in research and establish industrial linkages; by inducing venture capitalists to invest in small and medium enterprises (SMEs) in the area; and by attracting a major anchor firm, local or foreign, that could trigger the in-migration of suppliers and imitators. Governments have supported these initiatives with investment in infrastructure and urban services and through a variety of tax and financial incentives (see Yusuf, Nabeshima, and Yamashita 2008).

Some clusters materialized autonomously; others congealed as a result of initiatives by national and local governments, frequently in close coordination with industrial associations. In many instances, attempts to create the cluster effect led

¹⁶The Chinese firms making headway in this regard are Haier, Lenovo, Huawei, and ZTE. Lenovo's experience with the acquisition of IBM's PC business and that of TCL with the takeover of Thomson's TV arm suggests that the acquisition of large foreign firms with brand names can bolster the fortunes of ambitious Chinese companies—if they can muster the managerial expertise to harness and grow the reputational capital of the acquired foreign assets and to cope with the challenges posed by transnational operations. (On Lenovo's circumstances, see "Short of Soft Skills" 2009.) The acquisition of Volvo, the Swedish carmaker, by Geely, the privately owned Hangzhou-based Chinese manufacturer, will be another important test case of whether Chinese firms can turn around an ailing foreign company and effectively sustain and capitalize on its reputation.

nowhere, even when a number of firms established production facilities at an urban location. Over the span of nearly four decades, East Asia notched up enough successes to become the global hub of manufacturing, from the beginnings in Japan followed by the growth of industrial clusters in Korea; Taiwan, China; Southeast Asia; and then China. Dense urban-industrial agglomerations, some with networked clusters of firms, have been vital to the growth of productivity, for technological change, and for promoting further industrialization by opening opportunities and stimulating supplies of capital and skills.

This is the past; what of the future? One striking aspect of recent industrialization and clustering in Asia is its slowing in many countries. In Japan, industrialization has been in retreat for two decades, with many lower-tech clusters withering and a hollowing even of higher-tech clusters. There are no new industrial hotspots in Japan, although manufacturing clusters flourish in cities like Nagoya and Kyoto. New clusters of "green manufacturing" could arise in Kyushu, for example, but they are more likely to displace existing activities than to expand the industrial base. Deindustrialization in Korea is at an earlier stage; here, as in Japan, it is possible that the investment in "green" technologies, in the life sciences, and ICT could trigger an upsurge of manufacturing activities in existing locations, with emergent clusters displacing or complementing the old. However, Korea, much like Japan, is a maturing industrial country increasingly unlikely to foster new industrial clusters or reclaim the industrial ground it has lost mainly to China and Southeast Asia.

The high-tech electronics, IT, and biotech industries of Taiwan, China, are in a healthy steady state, but most of the low- and even medium-tech industries, which are sensitive to labor costs, have migrated to the mainland. The principal manufacturing clusters in Taiwan, China, remain robust; however, the odds are against new clusters springing up on the island with the cost structure, market access, and supply of skills favoring the mainland.

That future industrialization is more likely in developing Asia is no surprise. What is surprising is the virtual absence of budding industrial agglomerations in Southeast Asia, with the exception of Vietnam. Industrial growth continues in all the leading Southeast Asian economies; however, it is largely through densification in existing industrial agglomerations and in already established industrial subsectors. From the perspective of industrial clustering in these countries, what is remarkable from the earlier assessment of production patterns, exports, and value added is the limited evidence of industrial deepening through backward linkages to the manufacturing of components, intermediates, and production equipment.

In Thailand, clusters of firms producing auto parts, electronics, foodstuffs, textiles, and engineering products are mainly in the Bangkok metro area and its vicinity. In spite of the government's efforts at dispersing industry, industrial agglomerations have not begun to coalesce elsewhere in the country. The existing Malaysian centers of manufacturing in KL/Klang Valley, Penang, Malacca, and

Johor Bahru are holding onto their electrical and engineering industries, but rising costs are eating into the competitiveness of labor-intensive assembly operations. Textiles and footwear are declining. Again, new urban agglomerations of manufacturing are not springing up in other parts of the country.

Widening of activity in established industrial centers and existing lines of production is also apparent in Indonesia and the Philippines, but there is scant evidence of diversification or of deepening, or signs of nascent industrial agglomerations that could breed tomorrow's manufacturing clusters.

During the past decade, new centers of manufacturing have blossomed, and a clustering of textiles and light consumer electronics manufacturing may be ongoing in a few Vietnamese cities—principally Haiphong, Hanoi, Ho Chi Minh City, and Da Nang.¹⁷ Further west in South Asia, industrialization in Pakistan, Bangladesh, and Sri Lanka remains concentrated in a few of the main urban areas. The clusters that exist are mainly focused on textiles and garments. In Pakistan there is a well-known cluster producing surgical instruments and sports equipment, mainly soccer balls. According to trade and production statistics, production has risen in all three countries, but the mix is static and potential backward and forward linkages are not thickening the domestic value chain. The surgical instruments cluster in the Pakistani city of Sialkot, for instance, has not diversified into more sophisticated, derivative products. Nor, for that matter, have textile producers in Dhaka used R&D in new synthetic materials to serve other industries, using their expertise as a point of departure. Garment manufacturers in Sri Lanka, many in the vicinity of Colombo, have increased domestic value added through the domestic production of lace, ribbons, zippers, and buttons but have not diversified into other industries. A combination of factors, including adequate profits from existing production lines, risk aversion, the scarcity of skills, research bottlenecks, entrepreneurial shortsightedness, financing constraints, and market uncertainties, might explain why old clusters have not evolved and few new ones have emerged. But the fact remains that the manufacturing sector is stagnating in the three countries.

India is a different story, with more evidence of industrial acceleration and diversification, but by no means on the scale of China's from the 1980s through 2008. India's industrial capacity is deepening and diversifying in the Mumbai, Nasik, Pune urban region, and around Delhi and Agra, Chennai, and Kolkata. Textile clusters continue to flourish in Tirupur, as do farm machinery clusters in Punjab and Haryana. It is too early to know if the investment in the auto, petrochemicals, iron and steel, and engineering industries will create new clusters, increase domestic value added, spur innovation (in metallurgical and chemical fields, for example), and put India firmly on the path to higher-tech industrialization.

¹⁷Kuchiki (2007) notes the formation of an electronics cluster anchored by Canon in Hanoi and of a garments cluster in Haiphong.

That some Indian firms are scrambling to enlarge their global presence suggests that change is afoot. How dramatically this will affect India's industrial composition and geography will depend upon the country's supply of skills and market opportunities (domestic as well as foreign), entrepreneurial energies, and elasticity of financing.

This leaves China, where three major urban industrial agglomerations—the Pearl River Delta (PRD), Changjiang, and Bohai regions—have given rise to multiple clusters producing everything from toys, footwear, and garments to computers and autos. Industrial deepening in these three regions is continuing; in addition, industrial agglomerations are expanding in Chengdu, Chongqing, Xian, Wuhan, and Dalian, and in Henan, Jiangxi, Guangxi, and Guizhou provinces, as some industries are moving out of the crowded PRD in search of space, labor, and lower costs. Industry is also booming in Anhui, along the coast in Fujian, and is reviving in the northeastern provinces such as Liaoning and Jilin.

As a full-spectrum industrializer, with a commitment to deepening and upgrading of manufacturing capabilities and pursuit of high-tech opportunities, China is likely to enhance its capacity and competitiveness in virtually every manufacturing subsector. Given the strong gains in labor productivity throughout the manufacturing sector, there is little reason to anticipate a decline in China's competitiveness in light manufacturing. Ceglowski and Golub's (2007) computing of China's unit labor costs in manufacturing underscores its advantage over its competitors. It is an advantage deriving from productivity gains that have outpaced the increase in wages and, thus far, the appreciation of the exchange rate. A weakening of East Asian currencies and the Euro relative to the dollar in 2009–10 led to an appreciation of China's trade-weighted real effective exchange rate. China's decision to end the implicit pegging of the renminbi to the dollar and intensifying wage pressures are likely to result in further appreciation of the real effective exchange rate. This will be offset by the migration of labor and land intensive activities to lower cost inland cities and by falling transport costs. How this plays out is difficult to gauge, but it would be unwise to assume that China is ready to forsake labor intensive manufacturing with several hundred million underemployed workers in agriculture and significant productivity gains to be realized. Hence, other early-stage industrializing Asian countries will have to battle Chinese producers if they want to expand their global market share or export to China. For the South Asian economies, it is not enough to maintain a competitive advantage in garments, textiles, and light manufactures; they need to break out of these old industrial strongholds and compete in other areas with better growth prospects, which India is doing. At the other end of the spectrum, Chinese firms—some allied with MNCs—are already emerging as formidable competitors in electronics, pharmaceuticals, metallurgical products, transport equipment, and engineering equipment. Thus, they will be competing with manufacturers in Japan and Korea, many of which have set up production facilities in China.

The map of Asian manufacturing viewed from this angle shows a gradual withdrawal of manufacturing activities from the Eastern rim economies—Japan, Korea, and Taiwan, China—and a transfer of labor-intensive production to China and Southeast Asian countries, among others. Manufacturing is positioned to grow in China, with new centers joining the old, as infrastructure development and rising costs in coastal areas push some of the more footloose industries into the interior. Manufacturing capabilities will also deepen, and more Chinese firms will be operating near the technological frontiers in key industries.

The industrial prospects of Southeast Asia are uncertain. A country such as Vietnam has a future in light manufacturing and processing, because MNCs will want to maintain multiple sources of supply, and Chinese FDI is transferring some labor-intensive activities to Vietnam. Singapore will need to specialize in high-tech niche areas and depend on the competitiveness of services. For reasons we will elaborate later, Malaysia, the Philippines, Thailand, and Indonesia risk a manufacturing stasis or even a partial rollback unless they can make the leap in technological and manufacturing capabilities to compete with China, India, and the Northeast Asian countries at the higher end of the technological spectrum. Likewise, South Asian countries other than India could remain in a low-level manufacturing equilibrium barring political and policy breakthroughs—national and international—that focus the leadership on more ambitious development objectives, radically change the opportunity set, and begin to significantly ease the shortages of skills, infrastructure, and capital.

Shift in Global Production Networks

The manufacturing industry in East Asia is notable for its export orientation and the degree to which production of tradables throughout the region is integrated into international production networks. These buyer- and supplier-driven value chains have arisen out of investment and sourcing decisions of MNCs and buyers in the industrialized countries. They are the legacies of strategies, of incentives of technologies facilitating dispersed production, and of an era when energy was cheap and the United States displayed a seemingly limitless appetite for the manufactures of East Asia.

Production networks have supported and motivated a sprawling industrial archipelago extending from Singapore to Korea. In South Asia, India, Bangladesh, and Sri Lanka have a role in the manufacturing of garments, but it is a relatively minor role that has developed in the past decade. The core of the system lies in East Asia, China, and Southeast Asia. Dispersed manufacturing permits efficient specialization, redundancy in sources of supply, and great supply elasticity. Most of the risk resides with the myriad suppliers scattered over a half-dozen economies competing in a cutthroat market managed by buyers and integrators who serve as intermediaries for final buyers.

The heyday of production networking might be passing for several reasons, and its slow atrophy will affect the spatial distribution of manufacturing in Asia.

First, networking has resulted in hypercompetitive markets for standardized, modular products with codified technologies. This may have done wonders for intra-industry trade and greatly benefited consumers in the high-income importers of finished products, but with quasi-rents sharply reduced, producers of items feeding international value chains have difficulty accumulating the resources to grow out of low-end unskilled labor-intensive processing activities.¹⁸ They stay relatively low-tech; they have difficulty, given the nature of products and the chains, to diversify or upgrade skills and products. This partly explains why Malaysia has been unable to climb out of assembly and processing of electronics into other products. This is not the only reason, but it is one of them. Networks have a locking-in effect for the many production cogs that feed the ocean-spanning value chains. Networking, apparently, is not a ladder out of low- or midlevel manufacturing activities.

Second, networking, for all its virtues and presumed efficiency, is a complex, energy-intensive activity entailing significant transaction costs for all the players. These add to the cost of products and will rise with energy prices.¹⁹

Third, dispersed production makes it harder for assemblers to plan and develop products, and the risks involved have implications for inventory holding and for the flexibility of production. In most instances, a clustering of assemblers and suppliers is the most cost-effective approach. It facilitates coordination, makes possible just-in-time delivery, and reduces insurance and warehousing costs. It also simplifies design and development of products—even in the Internet era (Moody 2001; Eberhardt and others 2004).²⁰ In fact, most final producers are consolidating their production chain and prefer to deal with as few suppliers as possible, and co-location is an advantage. Moreover, buyers are also finding that purchasing from fewer reputable producers is more efficient than buying from many suppliers scattered over several countries.²¹ By focusing purchases, a number of costs are minimized, including the costs of monitoring compliance with labor,

¹⁸This may account for the continued specialization of countries such as Bangladesh, Sri Lanka, and Pakistan in garments and textiles (Almeida 2010).

¹⁹The likelihood of oil prices rising can be envisioned from some simple statistics. The per capita daily consumption of oil is 2.5 gallons in the United States. It is 1.9 gallons in Korea and 1.4 gallons in Japan. Were China to approach Korea's level by 2020, its consumption would reach 40 million barrels per day (bpd) as against approximately 8 million bpd in 2009. This would imply, for instance, a rising stock of light vehicles reaching 225 million from approximately 60 million in 2010, based on annual domestic production of 15 million cars as against 13 million in 2009 (Kopits 2010). On the rising cost of seaborne trade, see Rubin (2009).

²⁰These matter less for standardized commodities produced using mature technologies.

²¹On such trends in the apparel industry, see Gereffi and Frederick (2010).

environmental, and phytosanitary rules, along with rules having to do with security regulations in importing countries. If this practice spreads, networks will be severely pruned.

Fourth, the sunk capital in MNC production facilities in a number of Asian countries and the long-standing relationships with local suppliers and governments have provided a certain inertial stability to networks. Furthermore, many MNCs, while recognizing the advantages of concentrating production in China, have been loath to put all their eggs in one basket. To a certain extent, the purpose of diffusion of production sites was to exploit trade agreements, to circumvent trade restrictions (such as highly restrictive garment trades), and to avoid trade disputes, especially between United States and other East Asian economies. If such restrictions and concerns over trade frictions remain, there will still be some dispersion of production activities. However, the crisis of 2008–09, a slowing of U.S. demand for imports, and the increasing relative prominence of the Chinese market over the medium and longer term could reinforce other tendencies, leading to a shakeout and concentration of industrial production in Asia, as well as a greater readiness to locate facilities in China and to buy from producers in China.²² If this happens, more of the production currently scattered over East and South Asia will gravitate toward clusters in China's industrial cities, and intra-industry trade could decline. This will reduce costs all around; in addition, a concentration of suppliers and sources of supply will increase the bargaining power of suppliers and help widen profit margins.²³

This signifies a substantial reduction of standardized commodity production in the middle- and lower-middle-income Asian countries and its relocation in China and possibly India. Low-income Southeast Asian and South Asian countries might continue to hold on to their markets for garments and textiles,²⁴ but the transition to other standardized commodities (e.g., electronics) traded via global networks could be far more difficult than it would have been 20 years ago, when Southeast Asian countries were entering the markets for manufactured commodities. In fact, the prospects for these countries to further their industrialization using the leverage provided by trade have dimmed. Unless regional trading opportunities can impart the needed stimulus, it is unlikely that the domestic markets in the smaller South Asian countries will boost industrialization—something they have failed to do thus far.

²²Between the fourth quarter of 2008 and the third quarter of 2009, industrial production fell in all but these six countries: China, India, Kazakhstan, Norway, Singapore, Korea, and Vietnam (Bloomberg 2010).

²³Sturgeon and Van Biesebroeck (2010) examine the concentration of auto manufacturing in large middle-income countries such as China.

²⁴For example, there is scope for trade in textiles between India and China because of differences in areas of specialization. China's exports of finished textiles could lead to imports of intermediate yarn and cloth from India (Cerra, Rivera, and Saxena 2005).

Indian producers are, to a degree, integrated into the production network for textiles but not for other products; hence, a shrinking of these vehicles for trade would affect growth. It will also affect the scale of diversification into products imported by advanced countries via networks. Were India to become an alternative hub to China for a wide range of standardized products, then it is possible to foresee industrialization along traditional lines. Barring that, and assuming slow or moderate growth of world trade over the medium run, industrialization in India will be paced and directed more by domestic demand. India might yet surprise the world by matching China's past performance using services (not just IT services) as the principal driver of growth and exports, by relying less on FDI, and by deriving more of the industrializing impetus from domestic demand and not from network-mediated exports to the United States and the European Union. This would be a significant achievement. From the perspective of Asian industrial geography, it would lead to an even greater relative concentration of manufacturing activity in China and parts of Southeast Asia. The outcome would be an unusual state of affairs. China would become the undisputed leader in many sub-sectors of manufacturing, and other Asian countries would be more dependent on services for growth and the balancing of their trade. Instead of using a broad manufacturing base as the ladder to higher incomes, the rest of Asia would have to place their bets on a number of high-tech and capital-intensive manufacturing industries, on innovation, on productivity growth from services, and from intensively trading services. Although services is the dominant sector in most Asian countries, we know little about the potential of a services-led model to deliver high and sustainable growth rates for low- and middle-income countries.²⁵ Indian experience with the off-shoring of impersonal services holds out some hope, but the contribution of the sector to employment and the GDP is small and empirical evidence underlying its long-term potential as a driver of growth is slender indeed.

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²⁵See Grabowski (2009), which sketches an Indian model of growth that partially skips a stage of manufacturing development and moves to higher tech industry and to tradable services.

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