# 6

# Industrial Strategy at a Crossroads

For at least three decades most of the industrializing economies of East and South Asia have delivered rates of growth that are above average for developing economies. With a few exceptions, such as the Philippines, East (including Southeast) Asian economies grew much faster than the norm, and with the exception of Nepal, the South Asian economies stayed above the rates for the rest of the developing world. The outstanding performers among these economies all hewed to a model of growth whose drivers were investment—domestic and foreign—and exports. Other factors such as political stability, fundamentally sound macropolicies, trade liberalization, and human capital no doubt contributed, but these would have been insufficient in the absence of the virtuous spiral generated by the dynamic intertwining of exports and domestic investment in technology and productive assets. Export-led growth was the rallying cry throughout East Asia; it was what kept "animal spirits" high through good times and buoyed or revived economies when the economic climate soured because of a domestic shock or an international downturn. After the East Asian crisis of 1997–98, many commentators were quick to announce the demise of the East Asian model; however, the economies of the region defied the odds and recovered—although, because of weakening investment and a slowing of export growth, only China regained the precrisis momentum.

Rapidly increasing exports complemented by high rates of investment eluded most of the South Asian economies, with only India able to crank up domestic investment to over 30 percent of GDP—and that only after 2003; hence, growth in South Asia was slower, because countries in the region relied mainly on the export of garments, textiles, and resource-based products. When India's growth reached levels comparable to those of East Asia, it was a boom in the exports of services that served as the catalyst. This aroused entrepreneurial activity in India, stimulated domestic capital spending, and began attracting investment from abroad.

No such catalytic development occurred in the other South Asian countries; instead, several have had to cope with domestic sociopolitical issues that have darkened the investment climate.

The great global recession of 2008–09 is forcing a reappraisal of development strategies in Asia and in other regions as well. At the heart of this reappraisal are conjectures regarding the future sources of growth, the course of globalization, and the roles of the United States, the European Union (EU), China, and, in the distance, India, Brazil, and the Russian Federation. For the purposes of decision making, policy makers and business managers cannot avoid making such conjectures and must develop a coherent view to inform plans and guide investments. In the remainder of this chapter, we will sketch three different scenarios and, on the basis of certain assumptions, identify the one we believe is most likely to prevail, as well as the consequences for the industrial geography of the Asian region.

## Scenario 1: Business as Usual

The most analytically convenient scenario is inevitably one with minimal changes. With minor modifications, perceived trends are extrapolated into the future.[1] This has its advantages, because extrapolation with only a small amount of tweaking is safer than the alternatives, as it involves the least amount of judgment. Under this scenario, the world economy gradually recovers during 2010–11 and resumes full-bore growth equivalent to the average for the period 2004–07, with trade growing in due course by 6–7 percent.[2] Growth of East Asian economies rebounds to 6 percent or more, with the Japanese economy expanding at close to 2 percent and China achieving high single-digit rates of GDP growth. South Asia, with India at the forefront, also begins to accelerate, with the performance of individual countries in the region influenced by political factors and the weather. As in the past, growth would be pulled by investment and trade, with domestic consumption playing a greater or lesser part depending on the stage of development, the maturity of the financial sector, the adequacy of social safety nets, and the openness of individual countries.[3] Manufacturing industry and exports of manufactures would again serve as the principal motors of the economies, complemented in China and India by infrastructure development and a deepening of business

[1] Serven and Nguyen (2010) maintain that the post 2008–09 crisis "configuration of current account deficits might not differ from the pre-crisis situation" (p. 14) because many of the determinants are unchanged.

[2] The World Trade Organization forecasts that global trade will grow by 9.5 percent in 2010.

[3] According to computable general equilibrium (CGE) model simulations, further trade liberalization would deliver gains amounting to not much more than 0.2 percent of global GDP by 2015, and these would favor the developed countries and industrializing countries such as China and Brazil, not the poorer countries (Anderson and Martin 2005; Polaski 2006; Ackerman 2006).

services.[4] Southeast Asian middle-income countries would continue to benefit from rising intra-industry trade in intermediate products, with China and Japan providing the twin axes of production networks, mainly serving retail markets in the United States and the EU. For the lagging South Asian economies to improve their game, capital spending on infrastructure and manufacturing would need to rise sharply, with more of the increased and diversifying production of industrial items being exported. In every case, the recipe for industrial development is virtually the same. Each country attempts to enlarge its shares of existing product markets, to upgrade existing product groups, and to diversify into products that leverage acquired comparative advantage. For the foreseeable future, assembled and processed commodities, which have served as the vanguard of export-led growth, would dominate manufactured exports. There is change, but it is of the incremental kind. There are no projections of disruptive technologies or new technological epochs, or of a radical reorientation of trade flows from the United States and the EU to China; there is only more of the same, perhaps with some of the low-income countries and India aggressively pushing industrialization.

This scenario—while it is surely plausible for the near term, in view of the recovery of most Asian economies—rests on the critical assumption that the demand for Asia's exports will return to the levels reached during 2001–07, with only moderate changes in the mix of products exported. The recovery of East Asia's trade that started in the second half of 2009 is a positive sign, but the buoyancy of trade in the medium run is likely to be tempered by four factors. First is the high likelihood that demand from the United States will remain low for years. Consumers in the United States sustained the East Asian export machine from the 1970s until at least 2007. Import demand from other nations certainly reinforced U.S. demand, but the centrality of the U.S. market for Asian suppliers went largely unchanged and was underscored by the speed at which trade flows began drying up after U.S. import demand plunged in 2008. With U.S. consumers eventually having to raise their savings (above 4–5 percent rates) and deleverage, and with the United States forced to narrow its current account deficit through a combination of slower growth, a depreciation of the dollar, and a variety of measures to enhance the competitiveness of its tradables (whether goods or services), its trading partners can expect weaker demand for imports and greater competition from U.S. exports. Some of the EU countries will also need to curb their demand for imports in order to erase their twin deficits. The expanding public sector debts and contingent liabilities of several Organisation for Economic Co-operation

[4]China's investment rate rose to 46 percent in 2009 as a result of increased spending on infrastructure, housing, and manufacturing capacity. This will have steepened the decline in the marginal product of capital that was already apparent (Brooks and Barnett 2006). Under the circumstances, further increasing investment to sustain growth would be counterproductive.

and Development (OECD) countries narrow the scope for reflationary policies.[5] So also does the level of external indebtedness, particularly of the United States. That the East Asian countries will continue to bankroll the United States' large current account deficits through the purchase of U.S. Treasuries is likely in the medium term[6] but questionable in the long run.

A second factor, related to the first, is the potential for growing the international trade of light consumer goods, electronics and electrical products, auto parts, and other manufactured commodities. These are standardized goods trading in relatively saturated markets. In several industries there is global excess capacity, fierce price competition, and narrow profit margins. China is now the ranking producer of steel, cement, aluminum, and glass. It is pulling ahead of the Republic of Korea in shipbuilding, and it produced more cars than the United States in 2009. As a result of continuing investment in capacity in these industries and others in the absence of an exit of smaller inefficient producers (of cement and steel, for example), capacity utilization rates in 2008 had fallen into the 75 percent range for steel, cement, and aluminum, and even lower for methanol, polycrystalline silicon, and wind power equipment. This partly explains the declining investment in manufacturing capacity in a number of Southeast Asian countries in recent years and the shift toward real estate and business services. If future growth is likely to be slower, a rebound in private investment in East Asia may not materialize and, under these conditions, it is not clear that India could enter the market for electronics and auto parts without increasing the pressure on all participants to levels that could force a major shakeout of industry across Asia, triggering a bout of protectionism. Investors are being cautious elsewhere as well. American companies are husbanding large cash assets, which they are unwilling to plough into productive assets because the outlook for manufacturing is uncertain with stock market movements providing little guidance as they are influenced much more by the ample supply of liquidity and low interest rates than by the prospects of the real sector.

A third factor, linked to the first two, is the maturing of the electronics and information and communication technologies, which underpinned the latest stage of industrialization in East Asia. Although bio- and nanotechnology and renewable energy–related technologies all have promise, none has developed in a manner conducive to a new wave of industrialization with significant consequences for GDP growth and employment. Biotech has been viewed as a promising industrial force for almost two decades; it has led to important advances in medicine and the agricultural sciences, for example. But the multiple subfields nourished by biotechnology have

[5]Concerns that monetary easing and fiscal stimuli administered during 2009–10 could lead to higher rates of inflation are adding to the worries of policy makers in some countries.

[6]Caballero, Farhi and Gourinchas (2008) and Caballero (2010) argue that the world is short of safe AAA-rated assets and that emerging economies have made little progress in generating these. Hence, countries will continue to accumulate U.S. Treasuries and finance U.S. external account imbalances.

neither individually nor collectively provided the foundations for a new base of industry with significant growth, employment, and export prospects. Nanotech, advanced materials, and energy technologies may begin to show traction, but it might be a decade or more before they become more than niche industries.[7] It is difficult to identify an industrial technology that could promise a sustained acceleration of growth rates.

The fourth factor is the cost of energy and raw materials. So long as they were low (stable or falling), they could be conveniently ignored and used to generate globe-spanning, energy-intensive production networks. In 2007–08, the increase in the prices of fossil fuels and critical metals served as a forewarning of pressure on suppliers (see figure 6.1). Prices eased when the global economy went into a tailspin, but if growth rates were to approach the levels attained in 2006–07, the supply elasticities for energy and raw materials are such that inflationary tendencies would very quickly resurface. Evidence of this possibility became apparent in 2010. Rising prices would curb demand[8] and begin undermining the viability of industries and trading systems built on cheap energy and mineral supplies. Growth would be caught between the pincers of rising costs and weakening demand.[9]

Asian economies were sustained during 2006–07 by asset bubbles generated by expansionary monetary policies and financial innovations in advanced economies that encouraged leveraging and consumption, side by side with high savings in the Middle East and East Asia that facilitated borrowing. A return to the state of affairs that precipitated the great recession of 2008–09 is scarcely desirable. Were it to happen, the global economy would experience, at the very best, another year or two of uneasy expansion that could not last.

## Scenario 2: Concentration of Economic Activities in China and India

Business as usual will be difficult to restore for more than a handful of years. A possible scenario for the Asian economies starts with a return to near normalcy in 2010–11 but then veers in a different direction.

Consider the implications of prolonged sluggish growth in the United States and the continuation of its struggle to adjust the current account deficit to accommodate

[7]It is notable that the venture capital industry in the United States, which is flush with funds, has few outstanding successes to report since the end of the dot-com boom. Over the past five years, only Facebook and Twitter have yielded the high returns that venture capitalists seek.

[8]Oil priced at over $85 per barrel could depress economic activity in the United States.

[9]In the 1980s and the 1990s, global economic expansion was buoyed by low energy prices. With extraction costs rising and "peak oil" approaching, another energy dividend is not in the offing, and greenhouse gas (GHG) concerns argue for a tax on carbon.

**Figure 6.1 Global Commodity Prices**

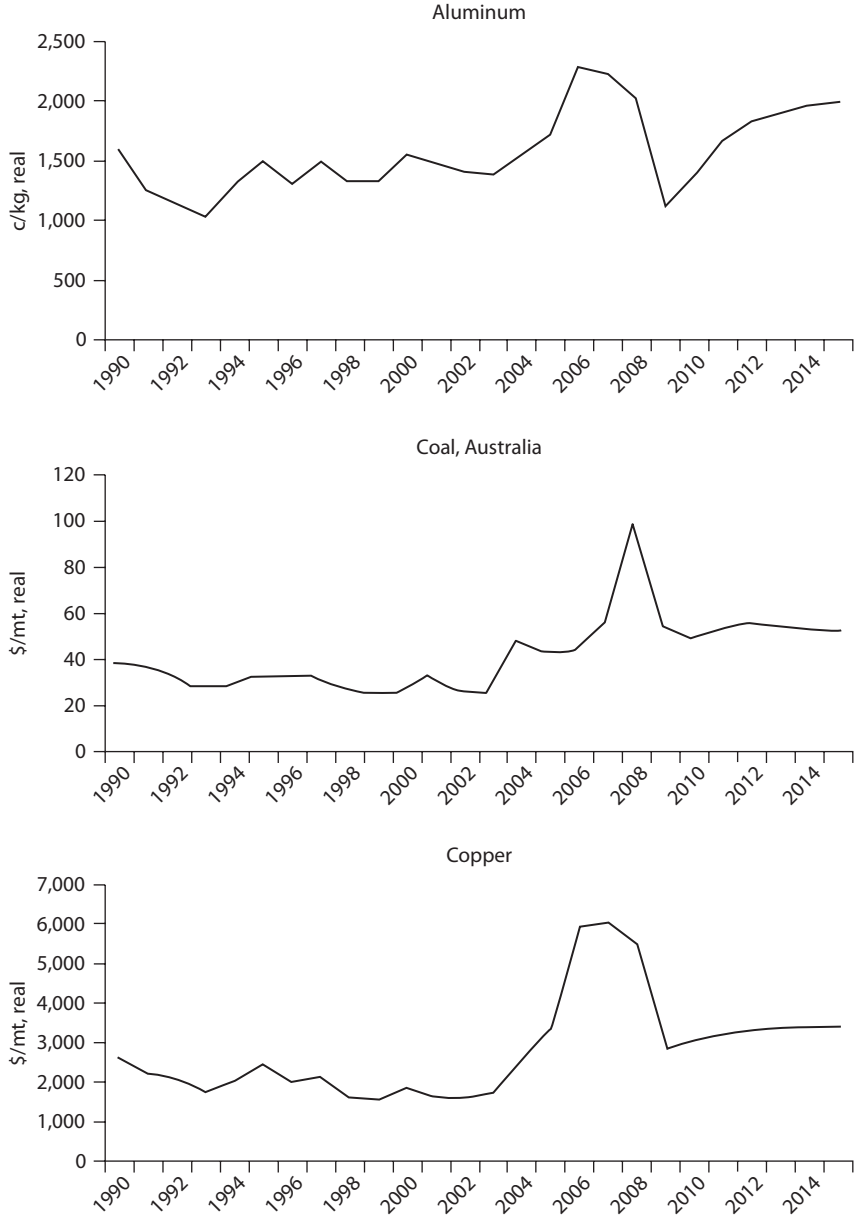


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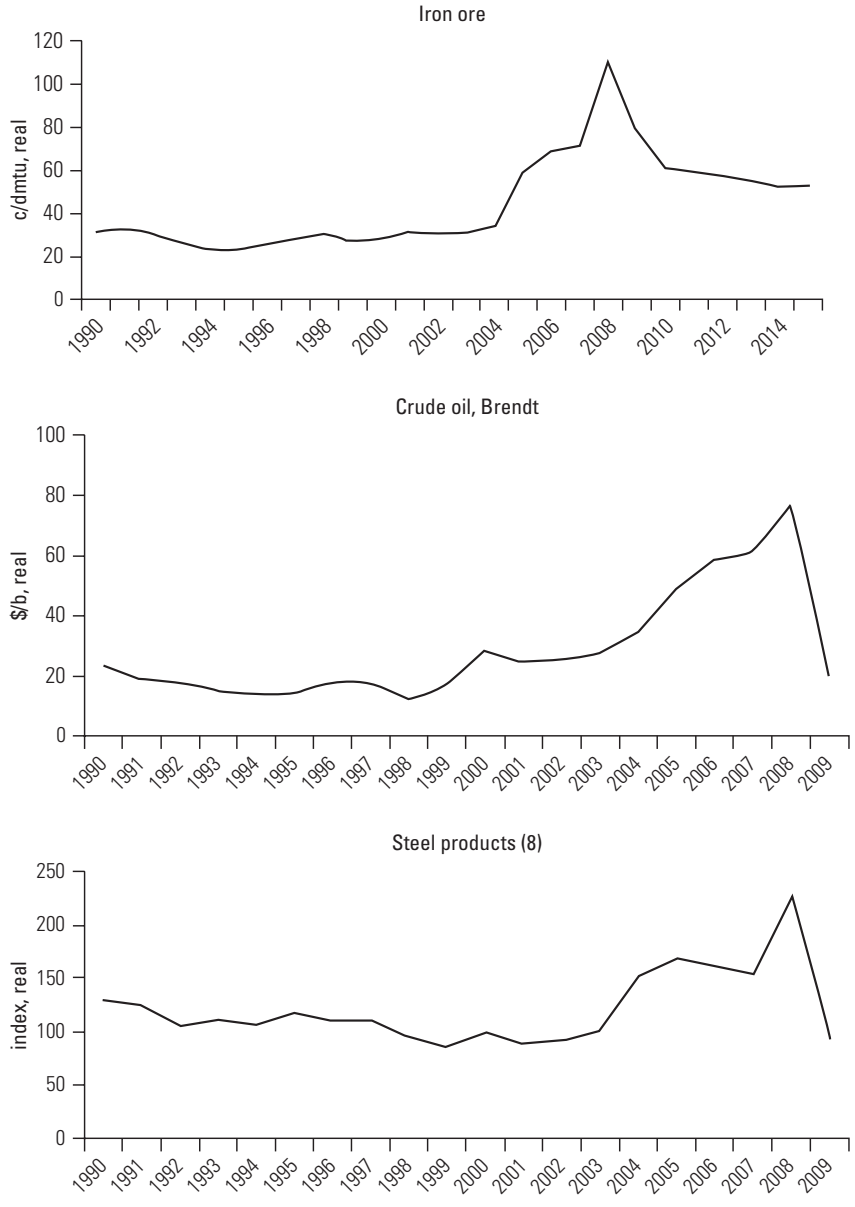
**Figure 6.1** ***(continued)***




*Source:* Global Economic Monitor Database, World Bank.
*Note:* $ = U.S. dollar: c = U.S. cent; mt = metric ton; dmtu = dry metric ton unit; b = barrel. "Steel products (8)" includes rebar (concrete reinforcing bars), merch bar (merchant bars), wire rod, section (H-shape), plate (medium), hot rolled coil/sheet, cold rolled coil/sheet, and galvanized iron sheet.

a waning foreign appetite for U.S. Treasuries. This situation could be paralleled by a depreciation of the dollar relative to other major trading currencies (the dollar has depreciated significantly against the yen but strengthened vis-à-vis the euro),[10] which would further quench the U.S. appetite for imports from Asia while, arguably, diverting resources into tradables and discouraging the overseas transfer of production, including the outsourcing of services.[11] If the United States exports more and imports less, either other countries take up the slack by growing faster and importing more—in which case world trade expands—or past U.S. deficits, which contributed so lavishly to global demand, are transferred to other countries, which then run smaller surpluses or incur larger deficits. Either way, there is likely to be some decline in export growth from Asia to the United States, particularly of manufactures. Until a realignment of trade flow occurs, the growth impulse from trade surpluses enjoyed by several Asian countries will diminish.

Alternatively, the United States could face bigger deficits as the European countries forced to eliminate large current accounts that cannot be financed by capital inflows push adjustment onto other countries. Accommodating the adjustment of Spain, Italy, Greece, and other European countries running deficits would require a reduction in the surpluses of other members of the EU, in particular Germany, and of East Asian trading partners, especially China. A fiscally conservative stance by Germany, and other European countries with surpluses would redirect most of the pressure onto China and the United States, i.e., China would export less to the EU countries and derive less growth from trade and/or the United States would experience a widening of its deficit absent significant fiscal tightening. In any event, rebalancing would be painful and could affect the direction of globalization.

A narrowing of the U.S. external deficit by moderating demand for the imports of manufactures could accelerate a number of developments signaled by recent trends in trade and industrialization across Asia. As noted above, East Asian trade has flourished in part because of manufacturing activities that, as a result of national incentive regimes, foreign direct investment (FDI), and opportunities for trade, were integrated into international production networks. These delivered final goods to U.S., EU, and Japanese markets by mobilizing the region's production capabilities in a cost-effective way. An electronic gadget might be assembled in one country, but its parts might come from three others. These might take a circuitous route through yet another country, where some of the parts are assembled into a module and additional work is done on the module itself to prepare it for the recipient assembler. By distributing demand among a host of suppliers, the vertical disintegration of the production process led to much greater intra-industry

[10]Feldstein (2010) maintains that the dollar must also depreciate against the euro and that the euro area may need to run an overall current account deficit to balance surpluses elsewhere.

[11]Liu and Trefler (2008) estimate that the insourcing of services to the United States is outweighing outsourcing.

trade, which we documented in chapter 2. By combining productive assets and specialized skills from several countries, networking allowed sharing of the benefits from trade. To the degree that the network consolidated dispersed East Asian manufacturing activities into one reasonably well-articulated system, it facilitated a mutually advantageous coexistence. This is why several empirical studies do not find much evidence of China (or India, for that matter) intensifying pressures on neighboring countries. On the contrary, countries worried about competition from firms in China (and later in India) but welcomed the upsurge of demand from China, somewhat mediated by production networks. In spite of inevitable tensions, the Asian symbiosis sustained the export-led model, although barely.

Production networking as practiced in East Asia has its costs. Vertical specialization of production among firms in different countries gives rise to numerous problems noted earlier—communication, defining specifications and designs, monitoring work practices, and meeting delivery schedules. There are problems also of customs, insurance, shipping, invoicing, and fulfillment. These transaction costs are nontrivial and can add 10 percent or more to the cost of the product (Sirkin, Hemerling, and Bhattacharya 2008). There is also the cost of shipping intermediate products back and forth. The time factor for goods that have to be shipped from distant places means that users need to hold precautionary inventories and tie up working capital. Although networks have knit suppliers together, assemblers and parts producers can have difficulty working closely on design and jointly coordinating refinements in technologically fast-moving industries. As with just-in-time production and delivery, there is no substitute for proximity in contributing to the efficient conception, design, development, and manufacture of a product. The more sophisticated the product, the more customized the individual components; and the more complex the task of integration, the greater the efficiency gains and (vertical) technological spillovers[12] from a clustering of firms jointly engaged in the product's manufacture.

This leads to efforts among East Asian economies to increase domestic value added by localizing more segments of the value chain. In countries where a focus on assembly and processing activities means that domestic value added in most export-oriented manufacturing rarely exceeds 30 percent, raising GDP growth by increasing value added is the constant focus of policy makers. The creation of local manufacturing clusters that internalize multiple production activities is one of the uppermost objectives of governments in Asia. The agglomeration of suppliers and assemblers in clusters is more likely to occur where the potential local markets are largest, because this facilitates design and testing and lessens risk. The presence of large markets confers other benefits such as access to credit and to skilled workers, and the presence of many buyers makes it easier to realize economies of scale and of scope. Clustering is also more likely in economies hosting

[12]These are more common than horizontal spillovers and strengthen the case for clustering.

major firms with expertise in integration and a focus on research and development (R&D) to bolster international competitiveness (see Yusuf 2008).

In East and South Asia today, China and India are the two major economies with good growth prospects and emerging homegrown multinational corporations (MNCs) with the ambition to innovate. Japan's economy is as large as China's, but it is unlikely to expand by more than 1–2 percent per year. Although Indonesia is a populous country, it is at an earlier stage of industrialization. Hence, if production networks are to coalesce in the urban-industrial regions of individual countries, China and India are the most likely sites.

If trade grows more slowly, energy costs remain high or even climb higher, competition in product markets intensifies, and MNCs move to rationalize their production in the Asia region—all eminently plausible outcomes that could occur together—then a decline in vertical specialization and a transfer of intermediate and component production to China and (eventually) India is definitely possible. It will be a gradual process, and the rest of Asia would certainly not be denuded of manufacturing, but value chains could become concentrated in clusters, and more of these clusters could be located in Asia's giant economies. Furthermore, a larger share of their production would be aimed at the domestic market under the assumption that trade would not provide the opportunities it once did. The evidence presented on intra-industry trade in chapter 2 points to this trend, as does increasing competition between Chinese producers and others in East Asia and OECD markets.

The losers would be the smaller economies of Asia and those with unattractive business climates. Relative to East Asian economies, especially those in the northeast, business climates in Pakistan, Bangladesh, Nepal, and Sri Lanka are far more challenging, and these countries are ranked low according to various measures of competitiveness (see tables 6.1, 6.2, and 6.3). Some are also prominent in the failed state index (table 6.4). Because of the unfavorable business climate and high risks, South Asian countries (with the exception of India) also do not receive much FDI (see figures 6.2 and 6.3). With slower-growing trade and little FDI inflow, these countries are likely to be characterized by low growth.

Middle-income countries in East Asia also face difficult challenges. Countries such as Malaysia could lose most of their component manufacturing to China and India as MNCs restructure their operations, cut excess capacity, and prune the extra costs of shipping parts from one place to another. With both China and India having integrated into the global economy, maintaining several production units for insurance purposes will be less important. Lean operations that benefit from cluster-induced spillovers could dominate decision making in a world where more of the growth comes from two major Asian economies.[13] Hence, for the

[13]The lean approach to manufacturing and retailing has been reinforced by years of intensifying competition and, most recently, by the global recession. Companies have mobilized

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**Table 6.1 Doing Business Indicators (Rank)**

| Country/economy | 2006 | 2007 | 2008 | 2009 |
|---|---|---|---|---|
| Singapore | 2 | 1 | 1 | 1 |
| Japan | 10 | 11 | 12 | 12 |
| Thailand | 20 | 18 | 15 | 13 |
| Malaysia | 21 | 25 | 24 | 20 |
| Korea, Rep. | 27 | 23 | 30 | 23 |
| Taiwan, China | 35 | 47 | 50 | 61 |
| Pakistan | 60 | 74 | 76 | 77 |
| China | 91 | 93 | 83 | 83 |
| Vietnam | 99 | 104 | 91 | 92 |
| Sri Lanka | 75 | 89 | 101 | 102 |
| Bangladesh | 65 | 88 | 107 | 110 |
| India | 116 | 134 | 120 | 122 |
| Indonesia | 115 | 135 | 123 | 129 |
| Philippines | 113 | 126 | 133 | 140 |

*Source:* World Bank 2005, 2006, 2007, 2008.

leading Southeast Asian industrializing countries to sustain their competitiveness, it is vital to secure medium-term performance in electronic and automotive products, and it is only through a rapid accumulation of domestic technological capacity that they can grasp fresh industrial and trade opportunities. Fortunately (or unfortunately), they have rich natural resources to lean on while they build up indigenous capabilities. The risk is that countries are distracted by other social and political issues and are unable to muster the consensus needed to press ahead with industrialization in difficult times with no obvious models to guide them. A loss of momentum could lead to a slow retreat of manufacturing in Southeast Asia, with countries becoming mainly resource-based commodity exporters with low and volatile growth rates.

Japan, Korea, and Taiwan, China, have developed their technological capabilities sufficiently to accommodate and benefit from this kind of scenario. Even so, Chinese

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a variety of techniques and software to reduce cycle times, warehousing, equipment downtime, energy costs, and material wastage. Producers, moreover, have redoubled their efforts to customize products for individual markets and to use the wealth of data now at their disposal to identify the preferences of customers and use marketing tools to target them more effectively (Womack and Jones 1994; Moody 2001).

**Table 6.2 Global Competitiveness Index**

| Country/economy | 1997 | 2003 | 2009–10 |
|---|---|---|---|
| Singapore | 1 | 8 | 3 |
| Japan | 14 | 13 | 8 |
| Taiwan, China | 8 | 16 | 12 |
| Korea, Rep. | 21 | 23 | 19 |
| Malaysia | 9 | 26 | 24 |
| China | 29 | 46 | 29 |
| Thailand | 18 | 31 | 36 |
| India | 45 | 37 | 49 |
| Indonesia | 15 | 60 | 54 |
| Vietnam | 49 | 50 | 75 |
| Sri Lanka | — | 57 | 79 |
| Philippines | 34 | 65 | 87 |
| Pakistan | — | 75 | 101 |
| Bangladesh | — | 91 | 106 |

*Source:* Lopez-Claros and others 2006; Porter, Schwab, and Sala-i-Martin 2007; World Economic Forum 2010.
*Note:* — = not available.

**Table 6.3 Global Competitiveness Ranking**

| Country/economy | 2004 | 2006 | 2008 | 2009 |
|---|---|---|---|---|
| Singapore | 2 | 3 | 2 | 3 |
| Japan | 21 | 16 | 22 | 17 |
| Malaysia | 16 | 22 | 19 | 18 |
| China | 22 | 18 | 17 | 20 |
| Taiwan, China | 12 | 17 | 13 | 23 |
| Thailand | 26 | 29 | 27 | 26 |
| Korea, Rep. | 31 | 32 | 31 | 27 |
| India | — | 27 | 29 | 30 |
| Indonesia | 49 | 52 | 51 | 42 |
| Philippines | 43 | 42 | 40 | 43 |

*Source:* IMD World Competitiveness Yearbook 2009.
*Note:* Ordered by rank in 2009. — = not available.

and Indian firms will begin exerting great pressure on the established firms from Japan, Korea, and Taiwan, China. Their ability to sustain their lead over competitors from China and India will depend upon the productivity of innovation systems and the agility of firms in developing and marketing new ideas.

**Table 6.4 Failed-States Index (Rank)**

| Country | 2006 | 2009 |
|---|---|---|
| Pakistan | 9 | 10 |
| Bangladesh | 19 | 19 |
| Sri Lanka | 25 | 22 |
| Philippines | 68 | 53 |
| China | 57 | 57 |
| Indonesia | 32 | 62 |
| Thailand | 79 | 79 |
| India | 93 | 87 |
| Vietnam | 70 | 94 |
| Malaysia | 98 | 115 |
| Korea, Rep. | 123 | 153 |
| Singapore | 133 | 160 |
| Japan | 135 | 164 |

*Source:* Failed States Index 2009.

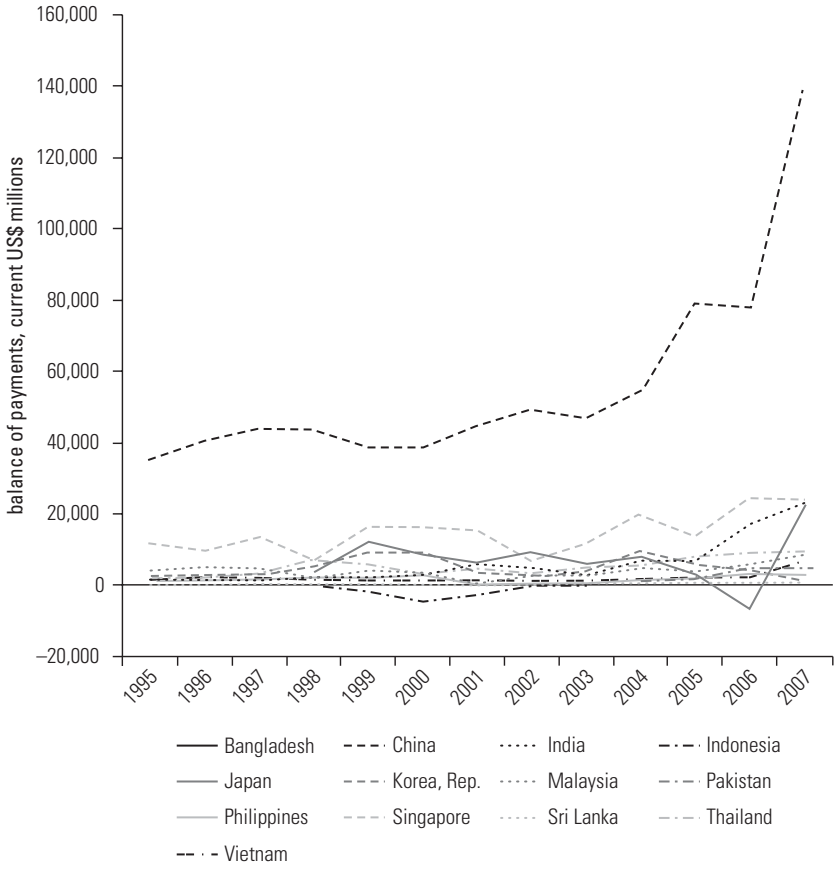
## Scenario 3: New Industrial Epoch, New Opportunities

A third scenario (and the one least likely to materialize in the near term, but whose likelihood will increase with time) revolves around the dawning of a new technological epoch that gives industrialization a major jolt, triggering another virtuous spiral. The technological epoch could arise, for example, from a global consensus that highly damaging climate change is a near certainty unless radical measures are taken to arrest GHG emissions, and, moreover, that shared rising prosperity will demand innovations to significantly conserve energy and other exhaustible materials.

This is a fairly utopian scenario.

East Asian industrialization was the outcome of a serendipitous coming together of a number of factors. One deserving primacy is the revolution in electronics and communication technologies, which opened up a broad avenue for industrial development. Key decisions leading to the modularization of the technology and to standardization facilitated a dispersal of production and of innovation, both product- and process-related. Spearheaded by FDI, the off-shoring of electronics assembly inducted several East Asian economies into MNC production networks and launched the most important phase of export-led industrialization in East Asia. Its significance can be gauged from the gulf that separates industry in South Asia from that of East Asia. South Asia—India excepted, which never managed to attract FDI in electronics—remains wedded to the manufacturing of textiles and garments, whereas most East Asian economies transitioned rapidly from textiles and resource-based goods to the processing of electronics—moving as a result into the middle-income category.

**Figure 6.2 Foreign Direct Investment, Net Inflows**

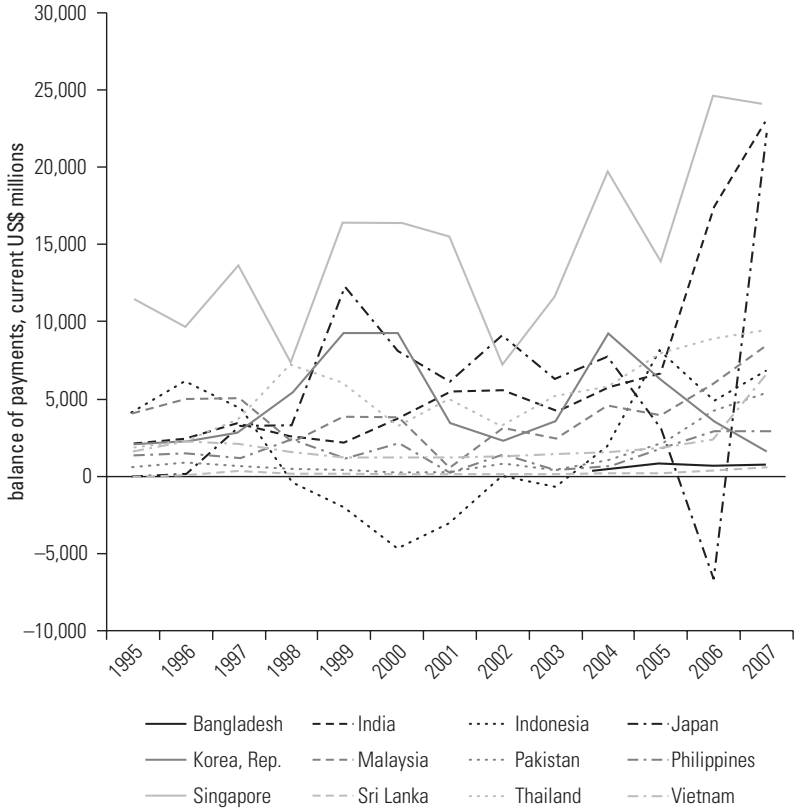



*Source:* World Development Indicators Database.

The electronics/ICT revolution is by no means a spent force.[14] However, unless innovation and demand continues spiraling (and not just from the United States), the East Asian countries graduate into the design and manufacturing of complex components and production equipment for the electronics industry, and the South Asian economies move into significant niches they vacate, electronics alone will not be the pathway to successively higher stages of industrialization. What, then, are the options on the horizon? The most likely is a cluster of activities under

[14]There is more innovation apparent in software than in hardware.

**Figure 6.3 Foreign Direct Investment, Net Inflows, Excluding China**




*Source:* World Development Indicators Database.

the rubric of "green technologies." This is still an ill-defined set of possibilities, but the avenues for technological advances and new manufacturing are becoming clearer.[15] What is not clear yet is how a focus on green technologies will affect total output, investment, production methods, employment, and industrial geography.[16]

[15]In the future, the emphasis of sustainability in the various dimensions of development will multiply the opportunities for innovation. Countries pursuing sustainability through policy, regulation, standard-setting, investment, and incentives will stimulate companies to innovate in particular ways (Prahalad and Krishnan 2008).

[16]A note of caution is warranted. High-tech sectors, in spite of being the focus of innovation and leading the field with respect to gains in productivity, often are too small to drive

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Green technologies range from energy and water conservation to nanotechnology, advanced materials, and waste disposal. The core manufacturing activities that will translate green technologies into industrial change are likely to be those producing material and equipment for generating renewable energy and transmitting it over smart grids; new materials that are lightweight, biodegradable, or recyclable and can be manufactured with the smallest release of carbon; transport equipment and power supplies that meet green criteria; building materials; and household and industrial equipment that will promote conservation and the inputs for a low-carbon urban infrastructure. As currently perceived, most of these products are research-, skill-, and capital-intensive. Few are likely to employ armies of production line workers, although value added per worker would surely rise. Perhaps the industries that best fit the profile of a breakthrough technology with dense manufacturing linkage are new automotive and transport technologies. Assuming that the global stock of automobiles—more broadly, internal combustion engines—will need to be replaced by propulsion devices with a negligible direct carbon signature, and that future additions will be mainly green technology–based vehicles, we stand on the threshold of a new industrial revolution. The three biggest sources of GHGs (if we exclude humans, rice cultivation, deforestation, and cattle) are power plants, transport equipment, and buildings. Should the vast majority of these sources need to be replaced to minimize climate change, and should "green" become the order of the day, manufacturing industry will have to take on a challenge. And once green is "it," every other activity will be affected, requiring redesign, retooling, and change in the structure of industry.

Is Asia positioned to compete for this type of manufacturing activity with all that it entails in terms of technology and human capital? Some countries are, and those that can develop research capabilities and absorb the new production technologies will be the big winners and will participate in what could turn out to be a new industrial epoch (see Felipe, Kumar, and Abdon (2010) for a ranking of countries).

## Concluding Observations

Economists and other social scientists are discovering that forecasts based on the models and empirical techniques we currently employ are subject to large margins

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GDP growth directly. The U.S. semiconductor industry at its peak in 2000 contributed just 0.6 percent of GDP. The information technology (IT) industry in India accounts for 0.7 percent of GDP. Technological spillovers raise the contribution of these sectors, but the fact remains that the bulk of GDP growth from manufacturing or services derives from traditional industries such as food processing and construction materials and mid-tech transport and engineering industries (McKinsey Global Institute 2010).

of error.[17] But there is no escape from forecasting—from making educated guesses as to what the future holds. Explaining the past can be satisfying, but if economics becomes an extension of history, its utility as a guide to decision making could be greatly reduced. The decision-making process would be substantially impoverished.

In this book we have looked back in time using data series and the literature on development to size up a process, to understand the unfolding pattern of changes in Asia affecting trade and industry, and to hypothesize about the future dimensions of one critical part of national economies: the manufacturing sector. Our understanding of the development process leads to the proposition that growth in Asian economies has thus far been inseparable from industrialization and from the expanding trade in manufactures. Furthermore, the economies that have successfully graduated into high-tech manufacturing activities have all first acquired a solid base of manufacturing capabilities in electronics and electrical engineering industries. Hence, when we look ahead, our working hypothesis is that the development and growth of low- and middle-income economies—and even high-income economies—will be a function both of industrialization and of the form it takes. A corollary of this proposition is that trade will strongly influence the pace and characteristics of industrialization. This is more applicable to the smaller economies, but even the larger ones are unlikely to thrive if the growth of trade slows—or worse, grinds to a halt.

Through a review of recent trends, we have tried to determine how manufacturing activities are evolving in Asia and to highlight the role of China and India, which are the fastest growing among the industrializing Asian economies and which have major roles in the world trading system.

Out of this analysis, reading the trends and reviewing the information on some of the significant corporate players brings us to a prognosis of a slowing of growth and trade in Asia, a greater concentration of manufacturing and associated research capabilities in China, a more gradual increase of such capabilities in India, and stagnation or decline in manufacturing in other Asian countries (Vietnam being a possible exception, because it is somewhat coextensive with the economy of Southern China). Services may partially compensate for the arrested development of manufacturing in some countries, but past experience suggests that they may prove to be less dependable vehicles for rapid and sustainable growth rooted in innovation and improving productivity. Nor do we see a continuing acceleration in the trade in services fueled (as was the case with manufacturing) by demand from the United States and, to a lesser degree, from other OECD countries. On the contrary, this demand will be

[17]Taleb (2007) has drawn attention to the now infamous and unpredictable "black swans." Others have pointed to the unexpected threats and opportunities that are hidden in "fat tails" of event distributions.

slower to materialize from the United States and some countries in the EU, which also will need to compete far harder to balance their books with the rest of the world.

If industrialization and growth languishes in the rest of Asia, China's gains—and India's—will be partially negated by weaker external demand, by the threat of trade frictions, and by an unwinding of globalization.

We think that this outcome is avoidable, although just barely. As the Doha Round of talks has shown, hammering out compromises that partially and fairly address the competing interests of nations is a difficult business.[18] Making and implementing long-term development policies in the current political circumstances of most Asian countries is also a formidable undertaking. Doctrinal differences in approaches to development, as well as varied readings of the evidence on the sources of growth, the gains from freer multilateral trade, factor flows, the contribution of urbanization, and how global warming can be arrested, make it hard to define clear objectives and to chart a course for a diverse assortment of countries.

Rather than attempt the impossible, which is to set forth a detailed roadmap for all of Asia, we offer a parsimonious set of proposals that could enable Asian countries—and others—to achieve higher rates of sustainable growth.

It appears that the world needs to enter a new technology-induced spiral that entails a large amount of spending on fixed assets, generating massive employment and the promise of substantial returns over the longer term. Neither biotechnology, advanced materials, nor nanotechnology—all of which hold promise—have yielded these. However, the new industrial green revolution could conceivably deliver the goods. With the threat of global warming providing irresistible motivation, a rapid and systematic development of technologies in the following five areas can stimulate the development of new industries:

- Low-carbon urban infrastructure and services delivery
- Low-carbon transport solutions and energy-delivery infrastructure
- Low-carbon energy infrastructure
- Water delivery, purification, management, and conservation technologies for urban and rural uses
- Lean natural resource use technologies for industry

Exploiting currently available technologies in each of these areas and exploring fresh possibilities, if aggressively pursued, would generate the growth and the

[18]A multifaceted dissection of the global trading environment following the collapse of trade in 2008 and with reference to the issues arising from the Doha Round can be found in Baldwin (2009). See also Hufbauer and Stephenson (2009).

employment that Asian countries are seeking. It would harness electronics technologies and give a focus to research on new materials and nanotechnologies.[19] Moreover, it would yield the much-needed bonus of cutting GHG emissions, containing water use, and lessening the depletion of nonrenewable resources and environmental damage. Another benefit of more compact cities designed for walking would be the improvement in public health.

A new technological epoch will require a strong push and incentives from government—both negative and positive. Public spending on infrastructure, support for research, and underwriting of some risk capital would need to be combined with a multitude of other reinforcements and sanctions, including standards for equipment and infrastructure, pricing regimes, and regulatory arrangements. A neoliberal state that trusts in the market and adopts a fundamentalist low profile is less likely to achieve results.

The successful launch of a new technological epoch would give rise to a round of cross-sectoral investment incentives that would fuel growth directly and from gains in productivity arising from innovation and improved efficiency. Middle- and high-income countries would have new industries to expand into, and technological change would rejuvenate existing industries. Ideally, this would lead to a regionwide reshuffling of industrial shares, with the technologically more advanced countries going down new industrial pathways, and the low-income countries moving up the industrial ladder and occupying the spaces vacated by middle-income countries, as well as finding new niches of their own creation.

A new technological epoch that makes possible sustainable growth and curbs global warming will absorb an enormous volume of resources. The winners will be countries that can mobilize resources and maintain high levels of investment.

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