

5 Innovation–Development Detour in South Korea

5.1 INTRODUCTION

Following the country's dramatic political, economic, and socio-cultural transformation since the end of Japanese colonial rule in 1945, South Korea has emerged as an exceptional latecomer country and established itself as a fully fledged democratic market economy. However, this process has not been without friction, as the country also experienced decades of political authoritarianism and government-led economic development (Amsden, 1989; Johnson, 1982; Wade, 1990). Korea's achievement is often encapsulated by the term "catching-up," which derives from Abramovitz's (1986) seminal article "Catching-up, Forging Ahead, and Falling Behind."

Catching up can be defined as closing the gap between a country's current state and a predetermined benchmark. Korea is a paradigmatic example of a catch-up country: Korea joined the Organisation for Economic Co-operation and Development (OECD) in 1996 and achieved an income level equivalent to other high-income countries. Despite this remarkable catch-up, Korea experienced a major crisis in 1997 and nearly avoided another crisis in 2008 and 2009. Whereas the 1997 crisis was linked to excessive indebtedness and overinvestment by big businesses, the crisis of the late 2000s began in the United States and led to capital flight from Korea back to Wall Street. This, in turn, caused the Korean currency to depreciate substantially. It is interesting to note that Korea recovered remarkably quickly from both crises, prompting the investigation in this chapter into the sources of this resiliency. This chapter expands on my earlier work on the sources of South Korean growth beyond the MIT range since the mid-1980s. Motivated by these questions, this chapter seeks to

reconceptualize the Korean model of catch-up development, aiming to suggest a consistent answer to both earlier and new questions.

Given Korea's miraculous catch-up, it is unsurprising that scholars and commentators hold diverse views on this achievement. Therefore, this chapter begins by evaluating existing views and myths regarding the Korean economy's miraculous growth and resiliency, such as the influence of initial conditions, while also reviewing debates on the role of markets versus the government, inclusive versus exclusive institutions, and import substitution versus export promotion. Based on an evaluation of various myths and misunderstandings regarding the Korean model, this chapter elaborates on and redefines the Korean model while focusing on elements that have seldom been mentioned in the literature.

The first element is the role of domestically owned big businesses and their capability building for export orientation; the second element is smart specialization into short-CTT and thus low entry barrier sectors during the upper middle-income stage. On this basis, this chapter redefines the Korean experience as an exemplary case of a country that took a detour from short-CTT to long-CTT sectors and from dominant big businesses to SME emergence. These two elements constitute a detour because advanced economies tend to be dominant in long-CTT and thus high barrier-to-entry sectors with sources of growth that are dispersed among both SMEs and big businesses.

This chapter explores the Korean experience to demonstrate that multiple catching-up pathways are possible for latecomers, and that latecomers do not necessarily follow the trajectories of incumbent advanced economies in a linear manner. Indeed, for latecomer economies, taking different or multiple paths is necessary for overcoming the entry barriers to high value-added and end goods sectors and other challenges at the middle-income stage. Additionally, I demonstrate that most successful economic catch-ups involve strategically navigating global–local interfaces to promote the emergence of big domestic businesses. Moreover, we show that no successful

catch-up has occurred without generating a certain number of big businesses, which are needed not only to overcome the latecomers' disadvantages regarding entry barriers at the middle-income stage but also to ensure a certain degree of resiliency against crises. This observation differs from the existing development literature, which asserts that no country has successfully achieved a high-income economy without growing its manufacturing sector.¹

To summarize, this chapter emphasizes that the promotion of domestically owned yet export-oriented big businesses – not foreign-controlled subsidiaries of multinational corporations (MNCs) – is an important feature of the Korean model. MNCs survey the globe, seeking cheaper labor and larger markets. Therefore, they cannot be relied upon to generate sustained growth in specific localities or countries, although they can serve as useful channels for knowledge transfer and learning at an early stage of development.

Section 5.2 provides a very brief summary of the history of Korea. Section 5.3 reviews existing views on the Korean model. Section 5.4 discusses the emergence and growth of big businesses and their export capability building. Section 5.5 discusses the issue of sectoral specialization by latecomers during the middle-income stage and Korea's strategy of entering short-CTT-based sectors. The main arguments in Sections 5.4 and 5.5, namely the roles of big businesses and their sectoral specialization, will be used to formulate my definition of the Korean model in Section 5.6. A brief summary follows in Section 5.7.

5.2 A VERY BRIEF HISTORY OF KOREA

Although Korea is often considered a latecomer or emerging country, the country has a long history stretching back nearly 5,000 years, according to records. Koreans as an ethnic group are distinct from the Chinese, and the Korean language is classified as an Altaic language.

¹ Indeed, this argument is primarily made by scholars who emphasize structural transformation, such as Szirmai and Verspagen (2015).

The borders of the ancient kingdoms of Korea at times reached Manchuria. Although the Korean language was distinct linguistically from Chinese, Korean lacked its own characters, and therefore, Korean texts were written using Chinese characters. Chinese characters, however, are logograms, making it cumbersome to memorize thousands of characters. Therefore, in the early fifteenth century, King Sejong and his scholars invented a phonetic alphabet called Hangul, which consists of five basic vowels and fourteen consonants. Koreans also invented printing. The *Jikji*, which is the world's oldest extant printed book, was first printed in 1377, which is seventy-eight years before Gutenberg's Bible in the West. In 2001, this copy was included in UNESCO's Memory of the World Register as the world's oldest metalloid type.

The last dynastic kingdom of Korea was the Chosun Dynasty, led by the Yi family. The dynasty began in the fourteenth century and lasted for five centuries; it is one of the three longest dynasties in the world. Although Chosun kings made many cultural achievements, such as inventing Hangul, they ruled over a feudal kingdom. Moreover, because the dominant philosophy of the dynasty was Confucianism, kings kept Korean society isolated from the West and modern civilization until the end of the nineteenth century. Consequently, the Chosun dynasty missed the opportunity to modernize and was annexed by neighboring Japan, a modern, constitution-based nation-state that had embraced modern civilization before Korea.

In 1945, following thirty-five years of colonial rule, Korea was liberated. After defeating Japan in the Pacific War, the United States and Soviet armies landed on the southern and northern halves of the peninsula, respectively. The US Army Military Government (USAMG) ruled South Korea for three years until the formal establishment of the Republic of Korea in 1948. The USAMG also initiated several reforms, including land reforms that returned farmland to peasants. However, the implementation of the land reform was disrupted by a civil war that broke out in 1950 with the communist regime in the North attacking the South. A cease-fire was declared

in 1953, and despite subsequent US aid, the South Korean economy remained weak throughout the 1950s as the country recovered from the war. Nevertheless, a democratic political system with free and direct elections for the presidency took root in South Korea. South Korea's first president was Syngman Rhee, a civilian and former independence fighter against the Japanese empire. However, due to a poor economy and the unpopularity of Rhee, massive demonstrations led by students and civilians broke out, leading to Rhee's resignation in 1960. The subsequent transitional government, however, was weak and did not last for more than a year. The government ended when army general Park Chung-hee carried out a coup in 1961.

Park aggressively pushed an industrialization plan and achieved economic takeoff before being assassinated in 1979 by a former collaborator who had participated in the 1961 coup. Although Park established a harsh authoritarian regime in Korea, during his time in power Korean per capita income doubled. In 1960, Korean per capita income was below that of Thailand and Malaysia and a mere 10% of US per capita income; by 1980, Korean per capita income had exceeded Thailand and Malaysia and had reached 20% of US per capita income (see Figure 2.2). Following Park's death, ex-military general Chun Doo-hwan became president through the electoral system under his control. Korea in the 1980s maintained a system of not direct but indirect elections for the president, and became a quasi-democracy in that sense. Chun pursued an economic policy of increased economic opening with less government intervention. Owing to the successes of big businesses and chaebols (family-owned conglomerates), the Korean economy became stronger, with its per capita income reaching 30% of that of the United States by the late 1980s (Figure 2.2).

This economic prosperity also led to a reduction in inequality (Wong & Lee, 2018), which was associated with the rise of a well-educated, hard-working, and better-paid middle class. However, the newly rising middle class viewed rule by an ex-military president unfavorably, and the demand for democracy continued to increase

(Eichengreen et al., 2015, p. 27). Finally, in 1987, mass demonstrations broke out, resulting in the return of free and direct elections. However, another ex-military general, Roh Tae-woo, who was a classmate of Chun Doo-hwan at the Korean Military Academy, won the 1987 presidential election. Consequently, it took Korea another five years to elect a civilian government. In 1993, pro-democracy activist Kim Young-sam was elected president as part of a political coalition formed by merging his party with the party led by ex-military politicians.

President Kim Young-sam implemented further financial liberalization to meet the conditions for joining the OECD. In the mid-1990s, Korea achieved the status of a high-income country, with its per capita income surpassing 40% of US per capita income (Figure 2.2). As a result, Korea was permitted entry to the OECD. However, firms abused this liberalized environment to borrow excessively from foreign capital markets at rates that were below domestic rates; this became one cause of the 1997 Asian financial crisis. To escape the crisis, Korea accepted an IMF bailout agreement, which imposed various institutional reforms on Korea that included radical opening, financialization, and globalization in line with the Anglo-American economic systems of shareholder capitalism. As the party responsible for the 1997 crisis, the liberal–conservative coalition government lost the 1997 election to the progressives, and newly elected President Kim Dae-jung moved Korea in a slightly more progressive direction. President Kim Dae-jung was followed by President Roh Moo-hyun, who died from suicide in 2009.

Interestingly, this left-oriented government continued to support a liberal market economy approach and even initiated negotiations over free trade agreements with the United States and others. Subsequently, under two conservative administrations lasting from 2009 to 2017, a series of free trade agreements were reached, first with the United States and then with China, the European Union, and India. In 2017, President Park Geun-hye, the daughter of former president Park Chung-hee, was impeached due to her abuse of presidential power. In the subsequent election, Moon Jae-in was elected

president in a landslide victory made possible by leftist and progressive political groups. However, Moon failed to manage the economy, in particular, rising house prices, effectively, and thus his party lost the 2022 presidential election to Yoon Suk-yeol, the former head of the prosecutor’s office, who had been appointed to the position by Moon himself.

Although the past several decades of Korean history have been turbulent, the economy has continued to enjoy consistent growth. Indeed, the country recovered quickly from several crises, including the 1979–1980 crisis following the assassination of President Park and the 1997–1998 Asian financial crisis, both of which caused negative growth rates. Korea also recovered from the 2008–2009 global financial crisis. During the late-1980s to mid-1990s, the Korean economy grew beyond the upper middle-income stage, or the so-called “middle-income trap stage,” to join the OECD. Again, throughout the two crises from 1997–1998 and 2008–2009, manufacturing exports by big businesses recovered mainly due to the depreciation of currency values, and Korea’s per capita income reached 70% of the US level by the end of the 2010s and converged with or exceeded that of Japan (Figure 2.2).

5.3 THE MYTH OF THE “KOREAN MODEL”

There are diverse views on Korea’s success. In what follows, I review these opinions critically and provide my own view, arguing that such steady and resilient growth was possible due to the emergence and growth of domestically owned yet export-oriented conglomerates and their smart specialization in short-cycle technology-based sectors, such as IT, which are low barrier-to-entry sectors during the middle-income stage.

5.3.1 *Favorable Initial Conditions versus “Taking Care of the Basics First”*

In the context of South Korea’s economic takeoff, some scholars assert that Korea enjoyed favorable initial conditions, such as a high level of human capital and physical infrastructure that was built during the

colonial period. However, the Japanese colonial government did not educate Korean people beyond primary school, and even at primary schools, enrollment rates were rather low at approximately 47%. Moreover, most infrastructure was destroyed during the Korean War which broke out immediately after liberation. In fact, post-war conditions in South Korea were quite similar to many African countries, in that South Korea underwent several decades of colonial rule, several years of civil war, and a period of hunger and food shortage in the 1950s, during which Korea relied on US food aid. South Korea also suffered from an acute lack of natural resources, as all minerals were located in North Korea. Beginning in the early 1960s, Park Chung-hee launched a series of five-year economic plans. Even at this time, Korea's situation was still similar to other developing countries in that it faced continual external imbalances and persistent trade deficits until the late 1980s (Lee & Mathews, 2010; Lee, 2016, Chapter 1). Given these initial conditions, one of Korea's first tasks was solving the food shortage and enhancing the level of human capital.

5.3.1.1 Solving the Food Shortage via an Agricultural Revolution

Following the Korean War, Korea suffered a food shortage that lasted, in part, up until the 1970s. Food shortages stemmed from low agricultural productivity, which itself was due to a lack of technology, capital, and fertilizer, as well as peasants working small plots of farmland. Food shortages in South Korea were exacerbated by the influx of approximately 2.5 million refugees from North Korea (Hsiao, 1981). Following land reform in 1948 and 1950, Korean farmers became smallholder farmers, but food shortages persisted. In the 1950s, Korea experienced a 2–20% shortage of the rice and grain needed to feed the population. In particular, production satisfied only 70% of demand in 1952 and 1953 due to the Korean War.

Furthermore, the social unrest that accompanied liberation in 1945 and the Korean War in 1950 caused the production of Korean staple grains, such as rice and barley, to stagnate from 1940 to 1960.

To solve the food shortage problem, the US government started an aid program known as the Public Law 480 program in 1954, and the United States provided food grains to Korea beginning in 1956. Public Law 480 provided both foodstuffs and agricultural inputs, such as fertilizer, to increase domestic agricultural productivity (Friedmann & McMichael, 1987). Owing to the fast growth of input (fertilizer) and the increase in the area of farmland via large-scale reclamation projects by the new Park government, rice production increased rapidly in the 1960s. The overall growth in rice production in the 1960s was 29.3%, and daily rice consumption per capita increased from 289 g in 1963 to 373.7 g in 1970.

However, despite increases in agricultural output in the 1960s, Korea continued to depend on food aid from the United States because food demand increased rapidly due to population growth and income growth from industrialization. In fact, US food aid increased steadily from 669,000 metric tons in 1965 to 3.6 million tons in 1972, which constituted one-fourth of South Korean grain consumption (Hsiao, 1981). However, in 1970, the Title II Program under Public Law 480, which provided direct donations of food aid, ended (Hsiao, 1981). This placed a great burden on Korea's balance of payments. In 1971, Korean exports were just \$1 billion, but imports were \$2.4 billion. Rice and grain imports were \$200 million. Thus, the Korean government tried to achieve self-sufficiency in rice.

President Park, who came to power in 1961, was keen to develop a new rice variety to overcome the food shortage problem and save foreign currency. After several failures, Korean scientists developed a new rice variety known as "IR667" in 1966 with the help of the International Rice Research Institute. The new variety was a hybrid of Japonica-type rice and high-yield Indica-type rice. In 1969, after the Korean Rural Development Administration made some improvements to the seeds, IR667 demonstrated an extremely high yield of about 630 kg per 10 are during tests,² which was 80% higher than the

² An "are" is 0.01 hectare [ha].

average yield of a Korean farm. The Korean government started supporting IR667 intensively, and IR667 was supplied nationwide. With the introduction of IR667 and its varieties, rice production reached 6 million metric tons, and in 1977, Korea became self-sufficient in rice, although it had to import other grains. In 1977, the national average yield per 10 are was 494 kg, which was greater than the previous world record set by Japan (447 kg/10 are) and 41% greater than the national average before IR667 (Moon, 2010).

Such increases in agricultural productivity were supported by increased investments in rural areas. The government quadrupled its expenditures on large-scale infrastructure projects, such as dams, reservoirs, and irrigation works (Boyer & Ahn, 1991). From 1970 to 1979, irrigation systems across 531,000 hectares, which constituted 23.8% of arable land, were improved. Farming mechanization was also pursued under the first Five-Year Plan for Agricultural Mechanization (1972–1976). During the 1970s, the number of mechanical cultivators increased from 11,884 to 289,779, and the number of tractors increased from 61 to 2,664 (Korean Economy Compilation Committee, 2010). Because of these investments, the annual growth rate of agricultural fixed capital increased from 1.69% in the 1960s to 11.86% in the 1970s (Hwang & Yoo, 2014). The growth in fixed capital offset the decrease in agricultural labor and farmland caused by urbanization and labor migration in the 1970s. Finally, in 1977, Korea achieved self-sufficiency in rice, although it had to import other grains.

Not only investments in rural infrastructure but also new pricing policies were introduced to give farmers greater production incentives. In the 1950s, the government controlled the grain market and set prices low to deal with inflation and poverty. The government purchase price for grain was very low, sometimes even below the cost of production. This disincentivized farmers from improving productivity. Beginning in 1961, the military government changed the low-price policy, and in 1968, it increased the government purchase price for grain.

Beginning in 1969, the Korean government instituted a dual price policy for grain, by which the government purchased grain at a high price from farmers and sold it to consumers at a low price. The program sought to subsidize the household expenses of both urban workers and rural farmers. Under this system, the government purchased grain from farmers at 130% of the production cost of marginal paddy land and sold the grain to consumers at 70% of the government purchase price (Ministry of Agriculture, Forestry and Fisheries of Korea, 1978). The policy was introduced because of political concerns about farmers who, in the late 1960s, were becoming increasingly dissatisfied with their economic situation, especially compared to their urban counterparts. This program provided farmers with incentives to increase productivity and introduce new rice varieties, such as IR667. The proportion of rice purchases made by the government was less than 10% of total rice purchases before 1970, but this figure surpassed 10% in 1971 and rose to 23.4% from 1977 to 1979, during which time the IR667 varieties were at their peak. However, this put a substantial financial burden on the Korean government. The government cost of purchasing and releasing grains reached KRW 209 billion, which was 4.1% of government expenditures in 1979. The program was abolished in 2005 due to international pressure from the WTO.

5.3.1.2 Building Initial Human Capital: The 1960s and 1970s

In 1944, one year before Korea was liberated from Japanese colonial rule, total enrollment in primary education among Korean children was only 47%. Following liberation in 1945, primary education enrollment increased rapidly, from 45% in 1945 to 82% in 1949 (Ryu, 2002). The number of elementary school students doubled during this period because, from 1945 to 1948, the provisional government under the USAMG attempted to educate every child aged six and older who wished to attend school (Kim, 1999). Furthermore, the Korean government made primary school education compulsory in June 1950. The Korean government also

implemented the Compulsory Education Achievement Plan from 1954 to 1959 (McGinn et al., 1980). Total enrollment in primary education reached 91.65% in 1959.

The new government under President Park carried out the Five-Year Plan for the Expansion of Facilities of Compulsory Education from 1962 to 1966 and then again from 1967 to 1961. These plans were carried out alongside the Five-Year Economic Development Plan. As a result, 811 schools and 53,726 classrooms were built from 1962 to 1971 (Korean Economy Compilation Committee, 2010), and by the late 1960s, Korea had achieved universal primary education.

Enrollment in secondary education also increased significantly in the 1960s. As primary education became universal in the 1960s, more children completed elementary school and desired to attend secondary school (Ryu, 2002). Thus, secondary education enrollment increased further (Korean Economy Compilation Committee, 2010). In contrast, enrollment in tertiary education remained low at 6–8% throughout the 1960s.

Catch-up efforts during this period relied mostly on imported, turnkey technology, and there was a critical shortage of technical personnel who were able to operate imported equipment after receiving either on-site training or instructional manuals (Lee, 2013b). Thus, the government emphasized raising the level of human capital, and substantial improvements were made by the mid-1970s. In 1975, primary school enrollment was 106.86%, and secondary and tertiary enrollment rates were 56.35% and 6.9%, respectively.

5.3.2 *Free Markets versus State-led Industrial Policies*

When discussing Korean takeoff, some scholars have argued that the Korean miracle was possible because the government followed the principles of free markets and openness (Balassa, 1988). This emphasis on the role of markets is often represented by the so-called Washington Consensus (Williamson, 1990), which focused on macro-economic stabilization, trade, and financial liberalization. However,

a study by the Economic Commission for Latin America and the Caribbean on reform in Latin America found that macroeconomic stability is not a sufficient condition for ensuring long-term growth and that growth is more closely linked to the dynamics of the production structure. Furthermore, well-functioning institutions and infrastructure are essential, but these generally do not play a direct role in bringing about changes in the momentum of growth (Ocampo, 2005). A World Bank assessment of the reform decade of the 1990s conceded that growth entails more than the efficient use of resources and that growth-oriented actions meant to stimulate, for example, technological catch-up or risk-taking for faster accumulation, may be needed (World Bank, 2005).

Openness and trade liberation have generally been regarded as key policy ingredients for developing countries. Many countries have simply resorted to devaluation or standard trade liberalization, which led to export booms caused by the resulting price effects and to temporary stabilization of external balances. However, there are numerous cases of macro-oriented reform bringing immediate, yet unsustainable, recovery that eventually results in another round of crises.³ Countries tend to experience some economic growth after trade liberalization and devaluation; however, this tends to be short-lived or occur in a stop-and-go cycle. This is because countries following the principles of the Washington Consensus failed to enhance the capabilities of the private sector (Lee & Mathews, 2010).

The belief that allowing market forces to operate freely despite the inherited backwardness in the capabilities of the private sector, especially manufacturing, is not consistent with the rise of capitalism in continental Europe after England's industrialization. Russian historian Gerschenkron analyzed the industrialization

³ For example, the three reform cycles in Indonesia (1983–1991, 1994–1997, and post-1998) show that rapid success with macro-reform, if not supported by micro-economic changes, tends to fade fairly soon, triggering a subsequent balance-of-payment crisis. A similar pattern is unfolding in Nepal with respect to the 1990s reforms (Lee, 2006).

of Germany and Russia and introduced the notion of “latecomers’ disadvantages,” asserting that in a backward country, state intervention may be necessary to compensate for its deficiencies (Gerschenkron, 1962). Specifically, he proposed the need for the formation of large banks to provide access to the capital needed for industrialization. The situation confronted by the developing world after World War II was worse than that faced by Germany or Russia because they lagged much farther behind the leading economies. Amsden (1989) was the first to attribute the successful economic catch-up in Korea to the industrial policies of the government, specifically in the form of “getting prices wrong and creating rents for targeted sectors.”

Industrial policy in Korea has more or less followed the example of Japan, which has been well documented in the influential work of Johnson (1982), who attributed the Japanese miracle to the role of Japan’s super ministry, the Ministry of International Trade and Investment. One of the first definitions of industrial policy was presented by Johnson (1982), who defined it as policies that aim to improve the structure of a domestic industry to enhance a country’s international competitiveness. Thus, this book defines industrial policy as building the capabilities of private firms to sustain long-term economic growth rather than as picking winners or providing protection for some firms or sectors (Lee, 2013a).

In 1960s Korea, the Park regime established various institutions, including the Economic Planning Board, which formulated economic plans; the Ministry of Trade and Industry, which supported industrial policy and exports; and the Ministry of Finance, which funded economic plans (Lee, 2013b). These government agencies were important for identifying and promoting key industries and technologies, as explained below. In what follows, we present two cases of industrial policy to suggest that the Korean miracle was not simply a result of free markets or openness. The first case is the use of financial control to stimulate manufacturing, and the second is the protection of domestic markets by tariffs.

5.3.2.1 *Financial Control and the Industrial Policy of Credit Allocation*

In Korea, the extreme scarcity of capital resulting from weak domestic savings in the 1960s and 1970s forced firms to depend heavily on credit to raise funds beyond retained earnings. In the absence of effective capital markets, the state used its control over the banking system to channel domestic and foreign savings to selected industries and firms (Lee, 2016, Chapter 2). After taking power in 1961, Park nationalized the commercial banks, and the banks remained under state ownership until 1980, when they were privatized. In Korea, the government exercised near complete control over the private sectors through their control of credit.

For effective state activism and industrial policy, the ability of the state to control finances was critical. The critical difference between the state's financial control through credit allocation and other control instruments, such as tariffs, import quotas, tax incentives, and entry or trade licenses, is often overlooked. First, financial control implies more discretionary control. Through credit allocation, the state can not only control the financial abilities of firms but also demand firms' compliance on other matters. Second, it is important to note that the Korean state's financial control was not based on its political authority, which was the case for other instruments that were supported by legislation or regulations. Rather, the Korean state's financial control was based on its economic power, which was enabled by its ownership of banks. Third, most other controls, except licensing, were aimed at specific industries or sectors and, thus, affected firms only indirectly. In contrast, financial control was directly aimed at individual firms.

In this regard, a simple but fundamental fact should be noted: The state's financial leverage allowed it to control firms because firms had a strong motivation to improve their performances and because firms believed credit supply to be critical. In Korea, firms' motivation for success was derived from private ownership and the expectation that firms would benefit from their own good performance. Thus,

even if big businesses were under so-called “soft budget constraints” due to their special connections with state agencies, this did not necessarily lead to weak motivational efficiency as it did in socialist countries. Rather, it led to exactly the opposite behavior, that is, excessive risk-taking.⁴

Korea experienced a large saving gap in the 1960s, with domestic savings at 9% of GDP and gross investment at 15% of GDP. Therefore, Korea had to borrow foreign capital to fill the gap. That is why exports were crucially important, and earning US dollars via exports was the critical binding constraint on growth for an economy at the low- and middle-income stages. Despite its low income and resulting low domestic saving, Korea maintained a high investment rate; and one of the reasons for this high investment was low interest rates, which were maintained by the government. Therefore, Korea existed in a state of financial repression. Or, to borrow the language of Hellman et al. (1997), Korea was maintaining a set of “financial restraints” in the sense that real interest rates were at least positive. Despite these suppressed interest rates, the domestic savings-to-GDP ratio in Korea continued to increase, owing to the growth of income associated with strong investment over the decades. The domestic savings rates increased from 9% in the early 1960s to approximately 30% in the mid-1980s (Cho, 1997).

In the Korean experience, the banking sector had always been intended to “serve” the real sectors by providing a stable supply of so-called “growth money” at affordable rates, and the manufacturing and production sectors had always been given priority. Of course, such practice was possible because Korea established several development banks, such as Korea Development Bank, the Export–Import Bank, and the Industrial Bank (for SMEs), and also because most of the commercial banks were under government ownership or control until they were privatized in the mid-1980s. With very minute margins

⁴ Park (1990) mentioned risk taking in the form of excessive and duplicative investment in the heavy industry drive in Korea in the late 1970s.

between lending and deposit interest rates, the profitability of the banking sector was extremely low, which boosted the profitability of the manufacturing sector. Consequently, private investment flowed into manufacturing rather than into financial businesses.

Allocating credit to manufacturing was combined with controlling entry into specific sectors, primarily the sectors targeted for promotion. This was done on the premise that five profitable firms in a single sector are better than ten unprofitable firms. This practice of limiting the number of firms in a given sector to approximately three or fewer caused return rates to be higher than interest rates, which was advantageous for boosting private investment in manufacturing. This, in turn, generated high rates of return with longer time horizons. In this way, manufacturing firms were able to earn "rents" associated with entry control enforced by the government. Industrial policy was oriented around determining the optimal number of firms in each sector in consideration of the market size, somewhat guaranteeing admitted firms a minimum level of profits (rents) that could serve as a source of investment funds for the future. Causing the rate of return to be higher than interest rates in certain industrial sectors is another possible goal of industrial policy, especially in the context of high interest rates.

The practice of entry control has typically been an industrial policy tool in Japan. In Korea, the tradition of implementing entry controls in many sectors has been regarded as an industrial policy that was copied from Japanese practices (Johnson, 1982). Entry control has two purposes. The first is to differentiate between the "good" and "bad" producers, and the second is to ensure stable profits for the selected producers so that they will be more inclined to invest in fixed capital for business expansion.

5.3.2.2 *Enhancing Export Performance via Protective Tariffs*

One of the most conventional industrial policy tools is infant industry protection via tariffs. However, empirical studies report conflicting results on the effectiveness of tariffs. According to Beason and

Weinstein (1996), tariff protection, preferential tax rates, and subsidies did not affect the rate of capital accumulation or total factor productivity (TFP) in Japan from 1955 to 1980. Moreover, Lee (1996) found that tariffs had either no effect, or a negative effect, on TFP. Nevertheless, several studies verify the positive contributions of industrial policy, in particular, tariffs. For instance, my own work with a colleague, Shin and Lee (2012), studied the same period and sectoral data as Lee (1996), and found that tariff protection leads to the growth of export share and comparative advantages. This makes sense because the goal of such industrial policy during the early development stage (the 1960s and the 1970s) was not TFP enhancement but rather output and market share growth. Aghion et al. (2015) also found that subsidies widely distributed among Chinese firms had a positive impact on both TFP and new product innovation in highly competitive sectors. Both of these recent studies identify competition and discipline as common preconditions for effective industrial policy.

An example of success with tariffs would be the case of Hyundai Motors, which was established in 1970. Hyundai's first car brand was the Pony, which captured 44% market share in Korea in 1976. However, at this time, Hyundai Motors was protected by a tariff on imported cars, including Japanese cars, that reached 82%. While the price of the Pony in Korea was approximately \$4,500, it was exported to the US market at the price of \$1,850. In other words, without such dumping, Hyundai cars were unable to compete with other cars, and Hyundai Motors' continued investment was possible due to the additional profits generated by its oligopoly in the domestic market enabled by tariffs. At this time in the 1980s, Japanese and German cars of a similar automotive class were sold for \$2,300 in US markets. In other words, domestic profits compensated for losses in foreign markets, and these guaranteed profits helped Hyundai survive and invest in fixed capital and R&D for expansion.

Thus, it can be argued that if Korea had opened up from the beginning without tariffs, the Korean economy would not have been

as successful in promoting domestic firms and sustaining their catch-up in market share. An underlying assumption of trade liberalization is that local firms are sufficiently competitive to potentially compete against foreign companies and imported goods. This assumption is not true in many cases. Indeed, naive trade liberalization can lead to foreign companies establishing monopolies or destroying the local industrial base.

A more advisable opening strategy, as discussed by Shin and Lee (2012), is "asymmetric opening," according to which latecomer economies liberalize the import of capital goods for the production of final and consumer goods while protecting their consumer goods industries by levying high tariffs on imported goods. In fact, Korea implemented an asymmetric tariff policy for its consumer and capital goods, imposing extremely high tariffs on consumer goods (e.g., around 70% for household electrical appliances in the 1970s), which were promoted as export industries, and considerably lower tariffs on capital goods, such as machinery, which Korea had to import for domestic manufacturing, primarily consumer goods manufacturing.

Of course, one can point out that the protection of local firms by tariffs and entry controls will lead to an oligopolistic domestic market. However, a study by me and a colleague, Jung and Lee (2010), demonstrates that monopoly rents can be used to fund investments because firms are exposed to the discipline of world export markets and because their privileged protection from the government is not unconditional but linked to export performance. In other words, the combination of rent-generating protection in the domestic market and discipline by world markets was an important aspect of Korea's industrial policy during the catch-up stage, which began in the mid-1980s and lasted throughout the 1990s. Jung and Lee (2010) also confirm that such financed R&D investment led to enhanced innovation capabilities among Korean firms, which enabled them to catch up to the productivity of Japanese firms from 1985 to 2005.

5.3.3 *Institutions versus Capabilities*

Following the decline of the Washington Consensus, the literature on economic development began to focus on the role of institutions as a more fundamental determinant of economic growth compared to economic openness and liberalization (Acemoglu et al., 2001, 2002; Rodrik et al., 2004). These scholars assert that although the policy prescription of liberalization was correct, the policies were not effective due to bad underlying institutions, such as political inclusiveness, corruption, the rule of law, and the protection of private property and intellectual property rights. In other words, although the seed was sound, the soil was bad. Along these lines, Acemoglu and Robinson (2012) distinguish between inclusive institutions and extractive institutions.

Interestingly, this literature (Acemoglu et al., 2001, 2002) contrasts South and North Korea, claiming that the former prospered due to democratic institutions and free markets, whereas the latter failed due to extractive institutions. However, Glaeser et al. (2004) found that the human capital variable is more robust than the institution variable for explaining economic growth, and they presented the examples of South and North Korea to argue that institutions are not the sources of growth. Rather, they asserted that it is actually economic growth that gives rise to institutions such as democracy, as in the case of former authoritarian states like South Korea. In Korea, economic growth gave birth to a middle class, which continually demanded democracy, resulting in political democracy (Eichengreen et al., 2015, p. 27). Indeed, economic growth tends to have the effect of reducing the political costs of overthrowing authoritarianism (Chen & Feng, 1996).

While the case of South Korea can serve as an example for arguing against the institution-centric view of economic growth, it can also serve as a powerful case to advocate for the importance of economic policies. The two Koreas have pursued quite different growth strategies. However, if we confine ourselves to comparing the two

Koreas, it is difficult to disentangle the impact of policies from those of institutions because institutions, such as the protection of private property rights, also differ markedly between the two Koreas. The importance of policies is more visible if we look at the case of China (Qian, 2003). It is obvious that China's miraculous growth can be attributed to sudden changes in its economic policies geared toward nurturing an open, market-oriented economy. Post-1990 India is another case where major changes in the country's policy line were responsible for economic takeoff (Tendulkar & Bhavani, 2005).

While the institution supremacy view tends to ignore policies in favor of institutions, this book takes the view that both factors matter, albeit differently and at different stages of economic development. By using the number of granted US patents and the amount of R&D expenditure as an index for innovation, my own work with a colleague, Lee and Kim (2009), shows that innovation capability is more important for economic growth in countries that have advanced beyond the middle-income stage, whereas political institutions are binding constraints on economic growth in lower-middle and low-income countries. This implies that an emphasis on tertiary education and R&D expenditures can explain the “reversal of fortune” between East Asian economies and Latin American countries over the last four decades.

In fact, one factor behind South Korea and Taiwan being able to overcome the MIT and become advanced economies was high R&D investment during the mid-1980s (Lee, 2013c). South Korea's and Taiwan's R&D investment-to-GDP ratios surpassed the 1% threshold by the late 1980s, and private R&D investment surpassed public R&D investments; this was not the case in most Latin American countries (Lee & Kim, 2009). The experience of Korea and Taiwan suggests that the fundamental solution to overcoming the MIT is the capability to innovate, which enables countries to produce higher value-added products through technological innovation (Lee, 2013c).

5.3.4 *Openness, Import Substitution, and Export Orientation*

Other scholars writing on the economic success of Korea and East Asia tend to contrast export orientation in Asia with import substitution in Latin America. This comparison is consistent with the broader observation that contrasts Asia's openness with Latin America's relatively closed economic policies. Openness – that is, global economic integration – has long been considered an important element of policy prescription, particularly in the context of the Washington Consensus (Dollar, 1992). Global economic integration has been represented by one or a combination of several of the following three variables: trade openness (trade to GDP ratio), export diversification, and FDI. However, the actual growth effects of these variables are still under debate.

For instance, whereas some studies have found a positive correlation between economic growth and trade openness, others have found that trade openness is not robust as a factor for economic growth. Similar controversies exist over the FDI variable, as scholars are divided between pro-FDI and FDI-skeptical groups. Export diversification is another variable that is subject to debate because some scholars find this concept significant for economic growth, whereas others find export specialization to have significant effects on growth. In place of these three variables, my own work with a colleague, Ramanayake and Lee (2015), introduces export growth and sustainment as alternative variables to represent economic integration and openness. Considering exports as an important factor for economic growth is not new. In particular, economic growth in many emerging countries has taken the form of export-led growth (Krueger, 1978; Cline, 1982; Balassa, 1985).

The variable of export growth, rather than the variables of openness to trade and export-to-GDP ratio, is most consistent with the actual experience of the Korean economy. The argument that export growth (sustaining exports) is one of the strongest binding factors on economic growth in the Global South is consistent with the reasoning

that developing countries must earn hard currency by exporting to pay for the imported capital goods that are required investments for sustaining economic growth. In other words, export growth promotes economic growth by generating the foreign exchange necessary for importing machinery and intermediate goods, which are needed for investment. The limits of import substitution as a growth strategy are that it has no method for generating dollars to pay for the capital or intermediate goods needed to run factories that produce consumer goods in substitution for imported consumer goods, given that the consumer goods industries in developing countries still rely on imports of capital goods to run such operations.

It is somewhat less known that Korea pursued exports of consumer goods, from textile goods during its early stage of development to consumer electronics in its later stage, while simultaneously seeking to replace imported capital and intermediate goods in export-oriented sectors with domestic production, which is a clear policy of import substitution. Such export orientation, in combination with import substitution, was desperately needed in Korea because the common mode of exporting manufactured goods tended to be accompanied by imports of expensive intermediate goods from Japan and Germany, as well as trade deficits. In fact, the Korean economy suffered from chronic trade deficits, with imports several times larger than exports in the 1960s, and these deficits persisted until the late 1980s. While the trade surplus of the late 1980s was due to the so-called “three lows” of low oil prices, low interest rates, and a low currency value (that is, a strong Japanese yen), a trade surplus emerged as Korean industry moved to high value-added goods and formerly imported capital goods were replaced by domestically produced goods.

This tendency of import substitution can also be verified by looking at the share of FVA in gross exports of Korea. FVA is one measure of a country’s participation in the global value chain. As noted by Lee et al. (2018), Korea demonstrates the so-called “in-out-in again” pattern of global value chain participation. In other words,

FVA increased during the 1960s and in the 1970s, during which time Korea initiated its export-led growth strategy and began integrating into the global economy. However, FVA began to decline in the mid-1980s and throughout the 1990s as Korea replaced imported capital goods with domestically produced goods, such as car engines. However, in the 2000s, FVA again rose as Korea pursued globalization by initiating overseas investment and establishing factories abroad in Southeast Asia and China, where labor is less expensive. Some Korean firms began producing lower-cost intermediate goods abroad for export back to Korea for final assembly.

A notable case of early import substitution is the development of Time-Division Exchange (TDX), a public–private R&D consortium in the early 1980s that produced digital telephone switches (Lee et al., 2012). On the one hand, TDX and its production of telephone switches was an example of localizing imported products. On the other hand, however, it was also one of the first attempts by a Korean firm to domesticate important capital goods in the IT industry. In the 1970s and 1980s, Korea faced a telephone service bottleneck. Until the late 1970s, Korea had neither a domestic telecommunications equipment manufacturing industry nor an R&D program (Lee et al., 2012). As a result, most equipment and related technologies were imported, and Korean technicians merely installed foreign switching systems into the nation's telephone networks. To avoid purchasing imported telephone switches at monopoly prices from foreign companies, Korea decided to build its own manufacturing capability and initiated an R&D program to develop its own digital phone switching systems (Lee et al., 2012). In this project, which targeted specific products for import substitution, the Korean team faced less uncertainty and risk because the targeted technologies, namely telephone switches, were mature products that were less resistant to technology transfers and thus were appropriate targets for imitative R&D via a private and public collaboration (Lee, 2013b).

In collaboration with a national network of switching system manufacturers and distributors, the Korean consortium TDX and

the Korean Electronics and Telecommunications Research Institute developed a proprietary digital switching system called the TDX series from 1981 to 1983. This indigenous product took over markets previously dominated by imports and MNCs (Lee et al., 2012). Over the following decades, Korea accumulated experience, leading to the growth of indigenous capabilities in wireless telecommunications in the 1990s. Around the turn of the millennium, a similar takeover occurred, with Samsung and LG taking over the mobile phone market from Motorola (Lee & Lim, 2001).

These cases are indicative of how Korean firms, with the support of the government and its affiliated research institutes, were able to successfully overtake markets previously dominated by MNCs and joint ventures to become exporters. The cultivation of new industries necessitates state-led efforts by a variety of agencies that offered support in the form of acquiring technology, securing financing (including credit rationing), adopting nurturing strategies (including tax concessions and R&D subsidies), controlling excessive competition to allow companies time to develop their products and markets, and opening up markets to the full force of international competition in a phased manner (Lee, 2013b). However, this state action should be phased out at later stages because, by this time, the costs of local production and the risks of entering new markets will have been reduced due to the dynamic learning effects that result from the cumulative output (Lee & Mathews, 2010).

5.3.5 *In Search of a Korean Model beyond the Myths*

In this section, I have discussed the diverse views on Korea's economic achievement over the last several decades. First, I suggested that such achievements happened not owing to any favorable initial conditions but rather in spite of the constraining conditions that resulted from several decades of colonial rule and several years of civil war, as well as the lack of exportable natural resources and a base for manufacturing. Second, despite these disadvantageous conditions, economic takeoff was achieved through purposeful planning

and industrial policy by the government, not the magic of “letting markets do their job.” Third, it is not the case that political democracy or inclusive institutions supported economic growth. Instead, capability building for economic growth developed under political authoritarianism, and the resulting economic growth at later stages brought about political democracy. Fourth, economic growth was sustained not only owing to exports but also import substitution of formerly imported capital goods, which was enabled via enhanced local capabilities in innovation.

The final question, then, is what constitutes the essential aspects of the Korean model of development. In the following two sections, the Korean model will be redefined in terms of, first, promoting locally owned big businesses and their technological capabilities at the lower middle-income stage and, second, smart specialization into low barrier-to-entry sectors based on short-cycle technologies during the upper middle-income stages.

5.4 KOREA’S FIRST DETOUR: BIG BUSINESSES FIRST, SMEs LATER

5.4.1 *From Technology Imports via Licensing to In-house R&D*

In the 1960s and 1970s, the technological capabilities of domestic Korean firms were very poor, and most exports in the manufacturing sector were produced through assembly-type production or the processing of imported parts and raw materials in labor-intensive sectors. The level of technology investment was extremely low: R&D expenditures in 1965 were only 0.26% of gross national product (GNP) and never exceeded 0.5% of GDP during the 1960s and 1970s. Nevertheless, domestic firms strove to overcome their technological deficiencies by investing in learning about foreign technologies from advanced countries, which consisted mainly of importation of assembling technology and packaged technologies to be applied at turnkey factories (Lee, 2013b). Further efforts concentrated

mainly on learning operational technologies, namely how to operate imported capital goods and facilities.

The importation of foreign technology in the form of licensing began to increase in the mid-1970s; this period has been referred to as one of “imitative innovation” (Kim, 1997b).⁵ The so-called “strategic” industries, such as iron and steel, nonferrous metals, general machinery, automobiles, shipbuilding, petrochemicals, and electronic equipment, were actively promoted via tax incentives and preferential credits, and firms in these priority industries were also allowed to import foreign technologies by utilizing foreign currency allocated by the government. The Korean government felt that this switch to capital-intensive sectors was necessary for several reasons, such as the argument that labor-intensive exports alone cannot generate sufficient dollars and trade surpluses because these labor-intensive sectors must import a considerable amount of capital goods.

In these capital-intensive sectors, the government evaluated and selected target firms based on the specific criteria of (1) the economic benefits provided to the nation, (2) the technical and financial feasibility of projects, (3) the prospects for profitability, and (4) the quality of management (Korea Development Bank, 1979). Firms demonstrating better performance were given preferential access to dollars to pay for foreign technology, whether directly through an approval system or indirectly through financial commitments made by government-controlled banks. The first entrants into these industries were either state-owned enterprises, such as POSCO, or chaebol affiliates, which had a record of successfully launching new businesses in related and unrelated fields.⁶

By 1978, the top forty-six chaebol groups’ share of total output in the heavy industries reached 60%. Moreover, chaebol affiliates,

⁵ This sub-section is based on Lee (2013b) and Lee and Kim (2010).

⁶ Many SOEs were subsequently privatized once they became more competitive by international standards. Examples are SK-Telecom (top telephone service firm), POSCO (global steel firm), Korean Air (global air-carrier), and Doosan Heavy Industry (turbine producer).

along with state-owned firms that had been newly privatized (e.g., POSCO and KT), were at the center of R&D efforts in the 1980s and 1990s (Sakong, 1993, p. 249). Because R&D for new industries requires heavy and risky investments, it is likely that larger firms and chaebol affiliates required more than just government support to sustain their foreign technology acquisitions and in-house R&D. To recover the costs of prototyping, tooling, and development, firms had to produce a large volume of product, which is more feasible for larger firms, including chaebol affiliates (Amsden, 2001, pp. 194–201). Thus, firms in the government-targeted heavy industries, many of which were chaebol affiliates, had grown in size and had increased their capital intensity, innovative capabilities, and labor productivity. Some of these firms were selected again in subsequent rounds of competition and granted permission to enter new target industries. They were permitted to import foreign technology and conduct R&D efforts. Through this repeated process of selective and targeted promotion that began in the mid-1970s, big businesses emerged and grew, forming chaebols, and they gained a share of the market in capital-intensive industries (Lee, 2013b).

Many foreign technology licensing contracts in Korea, especially those made during the early stages of development, involved know-how (a form of tacit knowledge); in this way, these contracts differed from the licensing of patent rights (a form of codified or explicit knowledge) for advanced technologies. My own work with a colleague, Chung and Lee (2015), used a unique data set of 3,141 foreign technology acquisition contracts that were filed between 1970 and 1993, classifying them into three categories: know-how-only, know-how-and-patent-rights, and patent-rights-only acquisitions. Know-how-only acquisition typically consists of technical services and training that are bundled with relevant documents, whereas know-how-and-patent-rights transfers consist of technical services, training, and documents that are protected by the patent system. Patent-rights-only acquisitions consist of patent right licensing.

Our research (Chung & Lee, 2015) also shows that know-how licensing contracts dominated in the early years, whereas contracts that involved patents came to dominate later. Contracts involving know-how included not only printed information and blueprints but also technical services and training. Foreign engineers often came to Korea to ensure that the initial operation of a new facility went according to plan. Selected Korean engineers were sometimes sent abroad for overseas training, which demonstrates the importance of human capital investment. This, for example, was the case with leading firms in Korea, such as Hyundai Motors (Kim, 1998) and POSCO (Song, 2002). In contrast, technologies that were bundled with patent rights were more expensive and had a higher value than technologies that were only bundled with know-how (Korea Development Bank, 1991). Thus, patented technologies may have been adopted as a means of completing the assimilation and improving processes that were initiated via investment and know-how acquisition.

Understanding these three types of licensing contracts is quite helpful for revealing the origin of the absorptive capacity (AC) of Korean industry. AC is defined as the ability of a firm to identify, value, assimilate, and exploit knowledge from the environment, and scholars have emphasized the importance of AC in enabling Korean firms to learn and assimilate external knowledge.⁷ However, it is important to consider the origin of AC and how it can be established in a firm. These questions are particularly relevant in the context of latecomer countries where firms are often hesitant to conduct their own R&D and, therefore, continue to rely on imported technology by specializing in assembly-type production.

Firms in Korea generally obtained various forms of know-how, such as operational skills and basic production technologies, while conducting their own relevant capital investment (Enos & Park,

⁷ In two influential articles by Cohen and Levinthal (1989, 1990), AC was first proposed, and such authors as Keller (1996), Evenson and Westphal (1995), and Pack (1992), have discussed it in the Korean context.

1988; Kim, 1997b). These firms built their basic technology proficiency while building production facilities and testing operations. This allowed Korean engineers to quickly assume responsibility for their daily operations. Then, at later stages and only after they had successfully assimilated basic operational skills and basic production technologies through know-how acquisition did they advance to the acquisition of technologies that involve patent rights. Technologies that were inclusive of patent rights emerged after Korean firms improved their capacity to decipher the codified content of patents. Firms with a better capability to decipher such information gradually reduced their reliance on foreign engineers.

Subsequently, formal in-house R&D activities began after firms accumulated a certain level of experience assimilating foreign technology and conducting know-how-only acquisitions. In-house R&D became more important than foreign technology acquisition as the technological capabilities of Korean firms progressed because (1) foreign firms became increasingly reluctant to provide core technology to their potential competitors in Korea, (2) labor-cost-based competitiveness gradually disappeared, and (3) government support for private R&D increased (OECD, 1996, pp. 91–92).

Our research (Chung & Lee, 2015) has verified that those firms that acquired foreign technology through know-how licensing developed their AC and subsequently conducted in-house R&D. More specifically, we found a substituting relationship between acquisitions that involved know-how-only and patent-only licensing, because firms that licensed foreign patents may have been discouraged from conducting their own R&D to develop such technologies. In the second step of our analysis, we found that in-house R&D activities were primarily responsible for firms' capacity to generate innovations measured by either patent applications or productivity jumps, and we also identified a positive link between the acquisition of know-how or know-how and patents and the generation of patents. However, we found no such linkage between patent-only licensing and firms' generation of their own patents.

From the mid-1980s, Korean firms, realizing the limitation of licensing and embodied technology transfer, started to establish their own in-house R&D centers (OECD, 1996). In order to encourage R&D activities by private firms, the government relaxed the criteria for establishing private sector R&D institutes, resulting in the formation of many institutes (Lee, 2013b). For instance, in 1985, the required number of research personnel for an R&D lab was reduced from ten to five. When the system for registering private research institutes was first introduced in 1981, the scheme provided tax waivers for private research institutes, military service exemptions for research personnel, and tariff exemptions for research equipment (OECD, 1996). Large domestic firms eventually began to recognize the importance of in-house R&D, and the number of research institutions increased from 65 in 1980 to 183 by 1985 (Lee, 2013b). Consequently, R&D expenditures as a share of GNP continued to increase, reaching 1% in the mid-1980s (see Table 4 in Lee, 2013b).

5.4.2 The Role of Big Businesses and Business Groups

The preceding discussion suggested that a certain number of firms were preferentially selected to import foreign technologies via licensing, and these firms later came to conduct their own in-house R&D, which was also supported by the government via direct subsidies, tax exemptions, and joint R&D projects. Through this cumulative term process of “initial selection, growth, and re-selection,” which is a performance-based, longer-term process that cannot be depicted simply by a phrase, like picking the winners, chaebols have established themselves in key industrial sectors in Korea.⁸ Given that the clear orientation toward capability building for innovation led to the emergence of conglomerates, their rise can be understood in terms of the

⁸ Of course, the origins of the chaebols go back further, even to the colonial period. Early on, chaebols emerged from the rent-seeking and business opportunities created by US foreign aid allocation in the 1950s (Amsden, 1989, pp. 38–40). In the absence of proprietary technology for use in related industries and in the presence of potentially high profit rates in “pre-modernized” startup industries, their initial pattern of diversification tended to be opportunistic and unrelated to technology.

Schumpeterian or Chandlerian tradition. Both economists emphasized the role of big businesses in R&D for innovation, given their scale and resources.⁹ Chandler specifically emphasized the important role of big businesses in the United States and Germany during the nineteenth and early twentieth centuries. Large businesses increased their production to unprecedented levels to fully utilize their large volume of investments and related economies of scale. In this sense, the growth path of South Korea has replicated the conventional path of capitalist development.

The emergence of big businesses, particularly in the form of business groups (BGs), can also be understood in terms of transaction cost economics and, more specifically, the concept of market failure, especially in capital markets. Capital market failure is a particularly serious disadvantage for many latecomer economies that face serious capital scarcity. When South Korea started industrialization in the early 1960s, its growth potential was seriously constrained by the extremely low amount of savings available for investment. Given the limited size of the financial resources available, a reasonable solution was to concentrate in the hands of several large firms. In other words, the government sought to promote a few large firms first to expedite economic growth.

The emergence of big businesses has played an important role in enabling Korea to sustain economic growth beyond the middle-income stage. My own work with colleagues (Lee et al., 2013) conducted a study of economies around the world to show that generating and maintaining a higher number of big businesses than would be expected from the size of its economy is a prerequisite for achieving growth beyond the middle-income stage, with the examples of South Korea and Taiwan. In contrast, a study by Beck et al. (2005) that was sponsored by the World Bank failed to identify a robust causality between SME growth and economic growth and found only a simple positive correlation.

⁹ Their works include Schumpeter (1934, 1942) as well as Chandler (1959, 1977, 1990).

As Figure 5.1 demonstrates, the ratio of the top four and top thirty business groups' combined sales to GDP in South Korea increased sharply during the catching-up period. These ratios increased from 40% and 60%, respectively, in 1987 to close to 60% and 80% by the late 1990s. The number of Korean firms among the Fortune Global 500 increased from eight in 1994 to twelve in 1997, a period during which Korea advanced beyond the middle-income stage. Subsequently, this number reached fifteen in 2007.¹⁰ In contrast, the number of Thai, Turkish, and Malaysian firms in the Fortune Global 500 fluctuated between one and zero for each country during the same period, which reflects their trapped situation during this period.

It is true that an increase in big businesses can lead to a concentration of economic power and can thus have negative effects on economic growth, which is also confirmed by our own analysis (Lee et al., 2013). In South Korea, the relative presence of Global Fortune 500 firms in the overall economy, proxied by the ratio of the sum of these firms' sales to GDP, increased from 31.6% in 1994 to 54.7% in 1997 and 59.2% in 2007. These ratios are indicative of an increasing concentration of economic power, although the ratios for South Korea are similar to those of Japan and Taiwan but lower than those of France and the United Kingdom. Then, what would be the net effect of having one more Fortune firm, balancing its positive contribution to growth against its negative effects associated with increasing economic concentration (namely, increasing the combined share of all of the Fortune firms in the economy)? The answer is that it is still positive, with the negative effect of increasing concentration being more than offset by the growth generation effect of the additional Fortune firm. Further, it has been shown by our analysis that an economy with more big businesses tends to display a more stable growth pattern.

Further, the presence of competitive big businesses was a key factor in Korea's quick recovery from the Asian financial crisis in 1997 and the 2008–2009 global financial crisis. These crises tended

¹⁰ The source is Table 1 of Lee et al. (2013).

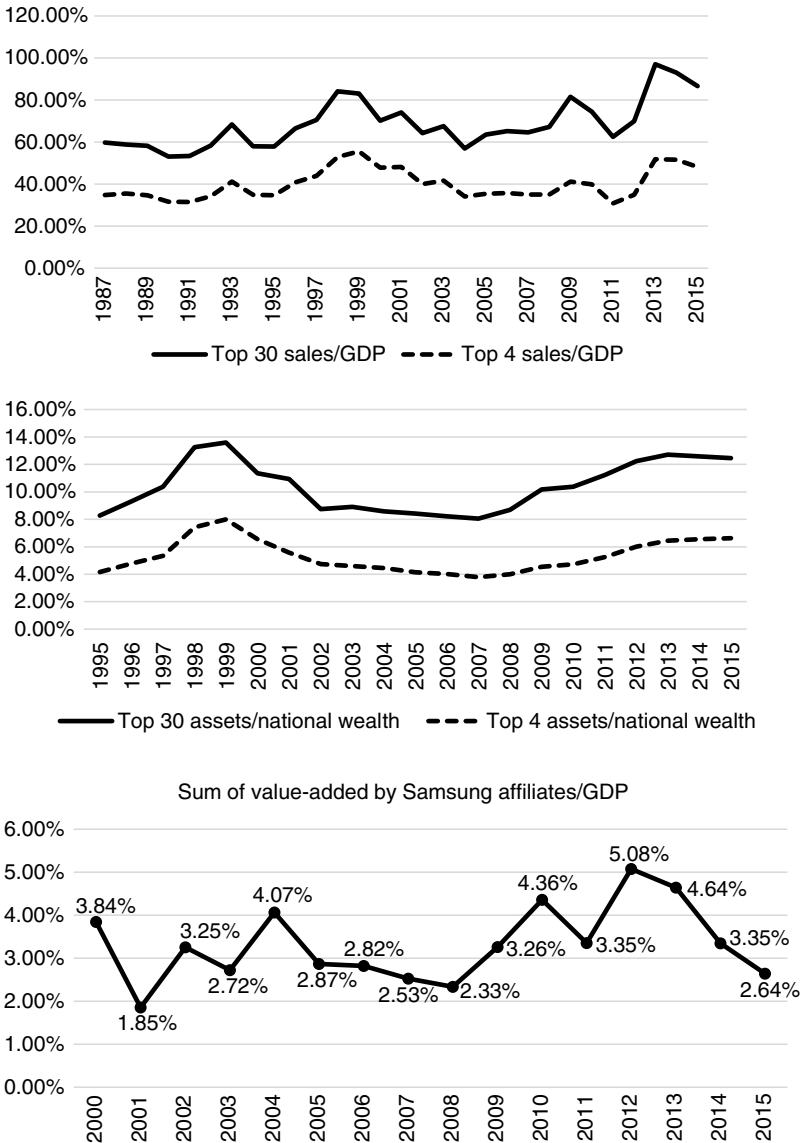


FIGURE 5.1 Trend of economic concentration in South Korea
 Notes: National wealth: the sum of tangible fixed assets, intangible fixed assets, inventories, land assets, lumber assets, underground assets, and durable consumer goods.
 Source: Drawn using the data from Kis Value, Fair Trade Commission (egroup.go.kr); KOSTAT (kostat.go.kr)

to cause a sharp depreciation of the Korean currency, which significantly boosted chaebol exports and thus aided the recovery of the economy. Although the 1997 financial crisis caused a negative 5% growth rate in 1998, Korea recovered quickly and continued to catch up after 1998. Korea's per capita GDP as a percentage of US per capita GDP was about 40% in the mid-1990s before the 1997 crisis, and it reached nearly 60% by the early 2010s after the global financial crisis of 2008–2009 (see Figure 2.2). Such swift catching up during these periods of crisis is comparable to the early record of catch-up during the fifteen years from the early 1980s, when Korean per capita GDP was 20% of the US level, to the mid-1990s, when it reached 40% of US levels. Finally, Korea's per capita GDP reached 70.2% of the US level in 2020, putting Korea on par with Japan, the United Kingdom, and France (see Figure 2.2).

Figure 5.1 shows that the ratios of the top four and top thirty business groups' sales to GDP increased sharply during the periods of the two crises, which indicates that the sales of these big businesses tended to recover more quickly than those of smaller companies. This is in sharp contrast to some other emerging economies, which lacked a strong manufacturing base and thus suffered longer and more frequent financial and currency crises. These countries, therefore, became caught in a MIT situation. In contrast, for mineral export countries with inelastic demand, depreciation simply meant unfavorable terms of trade without the effect of increasing demand, which translated to lower earnings in dollars.¹¹

Some scholars blamed the chaebols' "excessive investments" during the early to mid-1990s as one cause of the 1997 crisis. However, my own research has found that although these investments can be regarded as overinvestment in short-term calculations, they were shown to be responsible for the growth and profitability of the post-crisis period of the 2000s.¹² In other words, these overinvestments

¹¹ This point is elaborated on in Ramanayake and Lee (2018).

¹² See Lee et al. (2010), who confirmed the positive correlation between investment during the pre-crisis period and post-crisis turnaround in performance.

were not simply waste. Some were useful for advancing know-how and building capabilities for longer-term rebounds. That is, owing to the presence of locally based big businesses with strong export competitiveness, the Korean economy was able to recover quickly from crises and maintain its pace of catch-up.

5.4.3 Large Business Groups as an Entry Device and Umbrella for SMEs

The necessity for big businesses at the middle-income stage to progress to a high-income stage can also be understood in terms of their role as vehicles for circumventing entry barriers to high-end and value-added sectors by identifying niches and mobilizing resources and competencies. If latecomer firms try to enter higher-value or more profitable sectors, they must overcome high entry barriers and beat fiercely competitive incumbents. Therefore, they tend to incur substantial losses during the initial entry settlement period. Being a BG is significantly helpful in this situation because initial losses can be “socialized” among brother and sister affiliates belonging to the same BG. In this sense, BGs are an alternative to industrial policy.

A group-level initiative to launch a new business by establishing a new firm and covering its losses during the initial period is a well-known strategy in Korea. A famous example is Samsung’s memory chip business. This business is now Samsung’s largest generator of profits, but it involved considerable losses over seven years during the initial period. This kind of collective catch-up strategy is especially effective when the technology involved demonstrates a substantial learning-by-doing effect proportional to the accumulation of production experience. Finance literature also reports that the so-called “socialism” in internal capital markets of BGs ensures that investment flows into loss-making or under-performing affiliates or a division inside a group or conglomerate (Shin & Park, 1999). Existing studies tend to interpret this activity as an inefficient behavior. An alternative interpretation of this finding is that it is an effective, group-level market entry strategy that makes sense in a dynamic context.

Having big businesses that are locally based is important for reaching a high-income status because big businesses tend to execute high-end and value-added activities, such as R&D and marketing, at home while locating low-end or value-added activities in the form of FDI abroad. That is, attracting FDI is not sufficient for achieving a high-income economy. Instead, an economy must be able to generate large, locally owned corporations. Of course, FDI is an important source of knowledge and know-how about foreign technologies; however, the ultimate agents of latecomer development should be locally controlled firms. While South Korea was also open to FDI, it imposed regulations preventing the share of foreign equity from exceeding 50%; this regulation remained in place until 1986.

Samsung also relied on foreign companies, mostly Japanese companies, for learning at an early stage. In the early 1970s, Samsung Electronics established two companies that would produce electronic parts: Samsung–Sanyo in December 1969, which later merged with Samsung Electronics, and Samsung–NEC in January 1970, which was owned 50% by SEC and 40% by NEC (Japan). Samsung knew that partnering with foreign firms was critically important. However, in all of the affiliates it formed with foreign partners, Samsung held at least half ownership and gradually bought out foreign equity shares, granting Samsung full control over management (Lee & He, 2009). This is consistent with the observation that in latecomer countries, firms that received FDI, especially firms controlled by foreigners, cannot be relied upon for long-term technological development, although they can serve as initial learning venues.

For growth driven by big businesses, it is important to recognize the possibility of big businesses being entrenched in their market position and dependent on government support. In fact, this issue is related to the ongoing debate over whether competitive markets or monopolistic markets stimulate additional R&D and, in turn, innovation. The view favoring competitive markets points out that without market discipline, big businesses are more

inclined to be complacent given their existing success, whereas the view favoring monopolistic markets points out that only big businesses have the resources sufficient for R&D and risk-taking. The Korean experience offers insight into how to solve this dilemma. As is well known, the Korean market is much smaller than the Japanese market, and thus many sectors of the Korean economy are oligopolies. Despite this, Korean firms were mostly free from monopolistic entrenchment because they were oriented toward world markets and because privileges granted by the government were tied to export performance. In this regard, Korean industry differed from the Malaysian auto industry, which was not oriented toward world markets but rather operated in a closed, monopolistic domestic market, as discussed in Chapter 3.

My own empirical analyses that draw on firm data from the 1980s and 1990s (e.g., Jung & Lee, 2010) tend to confirm the productivity-enhancing effect of big businesses measured by the top firm dominance of sectors (a market structure variable), implying that catch-up is more likely to occur in industries with a more monopolistic market structure. Second, these studies also verify the productivity-enhancing effect of the combination of an oligopolistic market structure with world market discipline, which is measured by export orientation. Indeed, in the early phases of the Korean economy, tariffs and other protections led to export and output expansion through fixed investment; in the country's later period, R&D investment and export growth stimulated productivity growth. During both periods, the disciplinary impact of export orientation was important in the sense that such discipline pushed firms to make correct use of the rents derived from tariffs and an oligopolistic market structure for more capital or R&D investment. Another source of rent during the later period was tax exemptions for R&D investment. Clearly, government activism in South Korea has evolved from trade policy to technology policy involving diverse forms of public–private R&D.

Moreover, it is important to note that big businesses tend to generate a large number of SMEs as suppliers, and therefore, these

SMEs may also enjoy stable and less volatile growth despite not necessarily enjoying high profit rates (Kwak, 2010). Table 5.1 shows the number of suppliers each big business has across several sectors. For instance, Samsung Electronics had as many as 7,102 SME affiliate suppliers as of early 2011, whereas Hyundai and Kia Motors, together, had 6,106 SME affiliate suppliers. An estimate indicates that these supplier SMEs account for about 40% of all firms in each sector.¹³ In other words, in typical manufacturing sectors, the survival of less than half of firms depends on that of big businesses, which serve as an “umbrella” for SMEs. Further, some independent SMEs have also been founded by former employees of large chaebols. Notable examples are the digital platforms Naver and Kakao, which are now among the top ten firms on the Korean stock market (see Table 5.2). Further, when considering the knowledge spillover between chaebols and non-chaebol firms (Lee et al., 2016), it is misleading to treat the relationship between big businesses and SMEs as a zero-sum game whereby the weakening of chaebols will lead to the prospering of SMEs, as some studies on the Korean economy have suggested.¹⁴

Given that many big businesses tend to support and generate SMEs – both directly and indirectly – one cannot say that the strong presence of big businesses will inevitably lead to the ever-increasing dominance of big businesses. In fact, the increase in economic concentration caused by the rise of big businesses has recently been

¹³ For instance, according to Jung (2018), there were 513 firms (37.3%) distributed over the five tiers of a hierarchy, which were suppliers to Hyundai Motors and Kia Motors. In contrast, the remaining 862 firms (62.8%) were independent firms.

¹⁴ Aghion et al.'s (2021) analysis of Korean industries found that sectors dominated by chaebols during the pre-crisis (1997) period showed an increase in productivity after post-crisis reforms. They interpret these results to mean that the post-crisis reform and collapse of some former chaebols opened up the economy, removed entry barriers, and thus helped non-chaebol firms prosper. However, if one believes in the mutual supplier relationship and knowledge spillover between chaebols and non-chaebols, the coefficient may be a reflection of such positive spillover from chaebols to non-chaebol firms. Actually, their own study found less exit of firms over the crisis period in sectors with strong chaebol dominance, which may be indicative of the role of chaebols as an umbrella for SME suppliers.

Table 5.1 Number of supplier companies of each chaebol company: Chaebols' affiliate suppliers and non-affiliate suppliers by size

Company Types	Electronics				Automobiles				Shipbuilding			
	Samsung Electronics	LG Electronics	SK Hynix	Hyundai Motors	Hyundai Motors	Kia Motors	GM Korea	Hyundai Heavy Industries	Samsung Heavy Industries	Daewoo Shipbuilding & Marine Engineering		
Chaebol	22	21	3	20	20	16	0	4	0	4		
Affiliates												
Large	306	127	52	202	202	78	108	210	80	31		
Medium	1,661	969	186	1,024	1,024	315	520	1,235	552	185		
Small	5,441	3,248	417	3,943	3,943	824	1,937	4,831	2,020	493		
Total	7,530	4,365	658	5,191	5,191	1,233	2,565	6,280	2,652	713		

Source: Adaptation of Table 4 from Hong and Chang (2015)

Table 5.2 *List of top ten firms in Korea by market values*

	1974	1980	1990
1	KEPCO (electricity)	Samsung Electronics	KEPCO (electricity)
2	Hanil Synthetic Fiber Ind	Taihan (Cable)	POSCO (steel)
3	Taegu Textile	Lucky-Goldstar (LG)	Samsung Electronics
4	Hanil Cement Co.	Daelim E&C (construction)	Hyundai Motors
5	Daewoo	Hyundai Motors	Hyundai Engineering & Construction
6	Tong Yang Nylon Co.	Ssangyong C&E (construction)	Lucky-Goldstar (LG)
7	Korean Air	Korean Air	KIA Motors
8	Cheil Jedang	Hanwha (chemicals)	Korean Air
9	Lucky (LG)	Capro	Samyang Steel (Hyundai BNG Steel)
10	Union Steel Co., Ltd.	SK	Ssangyong C&E
Sum of values in mil. \$	500.5	506.8	28,791.4
as % of GDP	2.56	0.78	10.16
Sales sum / GDP	6.34	7.32	13.93

Table 5.2 (cont.)

	2000	2010	2020
1	Samsung Electronics	Samsung Electronics	Samsung Electronics
2	SK Telecom	POSCO	SK HYNIX
3	KT (telecom service)	Hyundai Motors	Samsung Biologics
4	KEPCO	KEPCO	NAVER
5	POSCO	Hyundai Heavy Industries	LG Chemicals
6	HYNIX (semiconductor)	LG Chemicals	Celtrion
7	Samsung Electro-Mechanics	Hyundai Mobis	Hyundai Motors
8	KT&G (tabaco)	LG Electronics	Samsung SDI
9	Hyundai Motors	HYNIX	KAKAO
10	KIA Motors	LG Display	LG Health & Beauty
Sum of values in	133,117.7	291,667.4	603,015.2
mil. \$			
as % of GDP	23.1	25.5	36.67
Sales sum/GDP	19.06	25.70	14.97

Source: Calculations using the data from KIS VALUE, ECOS (ecos.bok.or.kr); KOSTAT (kostat.go.kr); data from the Center for Economic Catch-Up

checked or even reversed, depending upon the indicators considered. Figure 5.1 shows that the top four or top thirty business groups' combined sales revenue as a percentage of GDP peaked at 80% and 60%, respectively, around the year 1998, which was the height of the financial crisis. This demonstrates their relative strength and resilience during crisis conditions. The sharp drop in these numbers since 2000 is related to the fact that some chaebol groups went bankrupt before and during the crisis and the rise of new SMEs and startups. However, these ratios increased again beginning in the mid-2000s and peaked in 2008, the year of the global financial crisis. Since then, they have entered a state of decline, which has accelerated since 2013. A similar trend can be confirmed in terms of Samsung Group's value-added as a percentage of national GDP, the top four and thirty BGs' sales as a ratio of total industry sales, and the top four and top thirty BGs' total wealth (assets) as a percentage of total national wealth (Figure 5.1). Overall, various measures of the share of big businesses have tended to fluctuate with the business cycle, and the long-term trend does not increase indefinitely but instead suggests an upper limit.

In Korea, this inverted U-shaped trend of increasing centralization among big businesses followed by gradual decentralization is consistent with the increasing concentration of the NIS during the catching-up stage, which was followed by eventual decentralization beginning in the 2010s (see Figure 2.3D), as discussed in Chapter 2. In other words, Korea's NIS displayed a tendency of increasing concentration of innovation during the 1990s and 2000s, only to reverse in the late 2000s and move toward decentralization.¹⁵ This reversal of centralization indicates that these catching-up economies experienced an increasing concentration of innovation among a small number of large inventors and corporations during their rapid catching-up period. Subsequently, some decentralization occurred, albeit only recently after they had become mature or had entered a post-catching-up phase.

¹⁵ Refer to Figure 4 in Lee and Lee (2021a).

In summary, based on the experiences of South Korea, we can conclude that the formation and growth of locally owned, export-oriented corporations and BGs can be considered an organizational device for sustaining catch-up rather than simply an organizational response to market failure.¹⁶

5.5 KOREA'S SECOND DETOUR: FROM SHORT- TO LONG-CYCLE SPECIALIZATION

The preceding section proposed that locally owned, export-oriented conglomerates are an essential element of the Korean model of development. Thus, while such big businesses are crucial to sustained catch-up, it is necessary to point out that their capabilities were first built and utilized according to a specific mode of sectoral specialization and structural transformation. In other words, in addition to building innovation capabilities and promoting big businesses, developing countries must also solve the question of how to choose the right sectors and activities, especially after they reach the middle-income stage. This is because capability building does not take place in a vacuum but rather in specific businesses and sectors. The nature and criteria of sectoral specialization are long-discussed issues in economics, particularly within debates over unbalanced growth theories. Moreover, it is interesting that in Korea, the final stage of structural transformation accompanied the emergence of an industrial structure centered on short-cycle technology-based sectors, such as IT, after first passing through a stage of labor-intensive sector specialization and then capital-intensive specialization.

5.5.1 *Theoretical Criteria for Sector-Level Specialization at the Middle-Income Stage*

The comparative advantage framework considers the natural and physical endowment of a nation, including its labor force, as the

¹⁶ See Steers et al. (1989).

basic criteria for specialization¹⁷. Given that many developing countries initially face labor abundance, as revealed by Lewis (1954), they are advised to specialize in labor-intensive sectors. Consistent with the Hecksher–Ohlin trade theory and its variations (Kahn, 1951; Sen, 1957), the capital–labor ratio is a key variable in such criteria. Despite some criticisms, this allocation criterion is useful and workable because the structural transformation of the industrial structure from agricultural to labor-intensive and then to capital-intensive manufacturing sectors characterizes the typical process of development and structural transformation (Kuznets, 1966).

However, this investment strategy does not offer an answer to the question of what countries must do when increasingly scarce and expensive labor drives them to enter capital-intensive sectors during the middle-income stage. An exemplary country is South Korea, which started as a labor surplus economy in the 1950s and later experienced an economic boom after entering labor-intensive manufacturing sectors. In the early 1970s, South Korea reached the Lewis (1954) turning point of scarce labor, during which the rapid growth of light industries increased wage rates, thereby driving the country to enter various capital-intensive sectors (i.e., automobiles, steel, shipbuilding, and chemicals) in the mid-1970s. Given the diverse types of capital-intensive sectors, nations need to be guided as to which sector they should enter first. However, the endowment-based theory of comparative advantages neither distinguishes between capital-intensive sectors nor suggests criteria for choosing among these sectors.

5.5.1.1 *Latent Comparative Advantages*

As one of the first to investigate the limitations of static comparative advantage, Viner (1958) applied dynamic modifications to the concept of comparative advantage, which Lin (2012a, 2012b) further developed into the concept of latent comparative advantages. Lin argued that endowment is not necessarily given or exogenous but

¹⁷ This subsection is based on Lee (2013b) and Lee (2013c).

rather can change endogenously as the country grows or accumulates capital. Therefore, developing countries must conform their present endowment structure to that of forerunning countries (or countries with a GDP per capita that is twice as high as the concerned developing country) and then target mature or leftover industries from these countries.

This theory of latent advantage is an advancement, in that it suggests a criterion for choosing from various potential capital-intensive sectors; namely, it helps a developing country choose a sector that is new to the developing country yet old to the benchmark countries ahead of it. Although this strategy can help developing countries catch up with the forerunning or incumbent economies, latecomer countries always remain behind these economies. Some aspects of the actual experience of Korea are consistent with this suggestion; however, Korea not only inherited old sectors (i.e., steel and automobile) but also leapfrogged into emerging sectors (i.e., telecommunication equipment) and directly competed with the forerunning economies in these sectors (Lee, 2013c). Therefore, although this strategy may prove useful for lower-level MICs, the same cannot be said for upper-level MICs attempting to upgrade their industrial structure to match those of emerging or close-to-frontier sectors. We still need additional theoretical criteria for the sectoral specialization of MICs.

5.5.1.2 Product Spaces and Diversification

Hausmann et al. (2007) developed the concept of “product space” to determine the sophistication of a country’s trade structure. They proposed that a country can achieve gradual sophistication (and diversification) in its trade structure by moving into neighboring spaces or capturing low-hanging fruit. Therefore, the export structure of a country must be expanded to include highly sophisticated products to achieve sustained export performance and economic growth. However, such an idea has some limitations from the perspective of developing countries.

Hausmann et al. (2007) and Hidalgo et al. (2007) considered the proximity between product spaces as an important variable in

determining the feasibility of diversification. However, their criterion does not disclose much information about the “directions” of diversification because there exist numerous spaces located at similar distances. In other words, they focus on the “distance” rather than the “specific directions” of diversification. The distance-based argument of diversification fails to address which sectors among the similarly distanced ones the latecomer economies must diversify in first.

The empirics of Hausmann et al. (2007) and Hidalgo et al. (2007) are based on trade data, which do not contain any information on the value added of traded products or information on how products are made. Therefore, technological (or value-added) content cannot be assessed based on such data (Sturgeon & Gereffi, 2012). Although developing countries export high-tech goods, as reflected in their trade data, the highest value-added components of these goods are often produced in a third party country or advanced economy.¹⁸ Hausmann et al. (2007) and Hidalgo et al. (2007) also used income level as a weighting factor to calculate the degree of sophistication; that is, countries that produce the goods currently exported by high-income countries are considered highly sophisticated. This method makes such a measure tautological. In other words, a country can become rich by producing goods currently made by rich countries.

Further, this strategy does not consider the ability of a country to compete in the international market. Specifically, the strategy informs latecomer countries that they must try to produce products being made by incumbents but does not inform them about how to compete with these incumbents in identical or similar sectors. Instead of avoiding direct confrontation with incumbent countries, latecomer countries must find a niche within which they can survive and compete effectively in the market.

In summary, Hausmann et al. (2007) and Hidalgo et al. (2007) failed to propose an effective method for MICs to reach the core

¹⁸ For example, only \$4 out of the \$299 retail price of an Apple iPod goes to China (Linden et al., 2009).

structure. Instead, they merely argued that countries can reach the core only by traversing “empirically infrequent” (meaning long) distances, which is a very difficult task to achieve. However, Hausmann et al. (2007) and Hidalgo et al. (2007) do not discuss how these countries can traverse long distances to reach the core space. This observation may help us understand why poor countries have trouble developing more competitive exports and fail to match the income levels of rich countries.

5.5.2 *A Detour from the Short-Cycle to Long-Cycle Technology-based Sectors*

The above discussion gives latecomer firms and economies, particularly those at the middle stage of development, some ideas on what to look for regarding viable specialization criteria. Given their weak capabilities, latecomers need to establish their niche in the international division of labor and participate in sectors where they can achieve better growth prospects and survive by competing effectively with incumbents. In this case, “the possibility for entry/survival with some growth prospects” represents a viable criterion.

I have proposed in my earlier book (Lee, 2013c) that for middle-income countries, CTT presents a viable criterion for technological specialization. The cycle time of technologies measures how fast technologies change or become obsolete over time.¹⁹ Additionally, short CTT means that “creative destruction” (Schumpeter, 1942, p. 73) occurs more frequently and therefore the knowledge base of existing technologies is more quickly destroyed or made obsolete.²⁰

¹⁹ Jaffe and Trajtenberg (2002) defined the cycle time of technologies as the time difference between the application or grant year of the *citing* patent with that of the *cited* patents. Park and Lee (2006) applied this concept in the context of industrial catch-up in South Korea and Taiwan.

²⁰ Aghion and Howitt (1992) developed an endogenous growth model, focusing on the intertemporal implications of expectation of creative destruction, in which the prospect of future research associated with creative destruction discourages current research by threatening to destroy the rents created by current research. In the context of my book, I focus on the entry barrier implication of creative destruction.

Thus, Lee (2013c) argues that qualified latecomers can achieve considerable advantages by targeting and specializing in technological sectors with a short cycle time because in short CTT-based sectors, the dominance of incumbents is often disrupted by new innovations and the continuous emergence of new technologies can generate opportunities. Minimal reliance on existing technologies represents both lower barriers to entry and profitability, which are associated with few collisions with the technologies of advanced countries, fewer royalty payments, first- and fast-mover advantages, and product differentiation (Lee, 2013c). In other words, a sector that is based on technologies with a short cycle time satisfies the two criteria for viability, namely, entry possibility and growth prospects. This is because short-cycle technology-based sectors have minimal reliance on existing technologies and can leverage the opportunities resulting from the emergence of new technologies. For example, information technologies have a shorter cycle than pharmaceuticals in the sense that new innovations in information technology tend to rely less on existing or stock knowledge.²¹

The advantage of specializing in short-cycle technologies is consistent with the leapfrogging concept, according to which the emerging generations of technologies allow catching-up countries to obtain a head start.²² When competing under a new techno-economic paradigm, both incumbents and latecomers begin from the same starting line, and incumbents often adhere to the existing technologies from which they derive their supremacy. Leapfrogging is similar to the “long jumps” (Hidalgo et al., 2007) that economies must

²¹ For this reason, not all emerging technologies are considered short cycle because even new products in the pharmaceutical industry tend to rely heavily on existing or stock knowledge, depending on the nature of such innovations (i.e., disruptive or competence-enhancing). Therefore, information technology is more prone to disruptive innovations than long-cycle sectors.

²² Replacing analog technologies with digital ones provides a window of opportunity for some latecomers, especially South Korea. The digitalization of products and the production processes entails fewer disadvantages for latecomers because the functions and quality of these products are determined by electronic chips rather than by the skills of engineers, who are more critical for analog products.

perform to pivot into product spaces that are located far from their current position and achieve subsequent structural transformation.

5.5.2.1 *The Korean Experience: From Short to Long Cycles*

The technological development of South Korea over the last three decades of its catch-up period (Lee, 2013c) has witnessed the increasing specialization of South Korean firms in short-cycle technologies. South Korea began by specializing in labor-intensive (low value-added, long-cycle technology) industries, such as the apparel and shoe industries, in the 1960s. The economy then entered the medium-cycle sectors of low-end consumer electronics and automobile assembly in the 1970s and 1980s; the shorter-cycle sectors of telecommunication equipment (telephone switches) in the late 1980s; and then memory chips, cellphones, and digital televisions in the 1990s.

I consider the mid-1980s as an important turning point, because this was when South Korea achieved sustained catch-up beyond the middle-income stage. Korea reached the middle-income level during this period, and its GDP per capita reached 25% of that of the United States. Since then, South Korea has continued to increase its R&D expenditures, and the country's R&D-to-GDP ratio eventually surpassed the 1% level. Along with this upgrading of technological capabilities, the country has pursued various short-cycle technology-based sectors, such as the information technology sector.²³

Specializing in short-cycle technologies does not entail a fixed list of technologies (Lee, 2013c). Instead, in sectors with short-cycle technologies, new technologies always emerge to replace existing ones. In other words, the criterion for technological specialization

²³ One intriguing question is whether policymakers in South Korea were aware of such criteria as short-cycle time when they planned their economic development. While the answer is “no,” they were, in fact, continually asking themselves, “What’s next?” They closely observed which industries and businesses were likely to emerge in the immediate future and thought carefully about how to enter emerging industries (Lee, 2013c). New or emerging industries and businesses are often the ones with short-cycle technologies because they rely less on existing technologies. Therefore, in effect, the policy makers were always chasing short-cycle industries.

is less about the cycle length itself and more about entry barriers. In this sense, latecomers should choose technological sectors that are less reliant on existing technologies dominated by incumbents. Additionally, continuous technological emergence suggests that new entrants have fresh windows of opportunity available to them that are not confined to the old, dominant technologies. This concept stands in stark opposition to the product life cycle theory of Vernon (1966), according to which latecomers merely inherit old or mature industries (or segments thereof) from incumbent economies (Lee, 2013c). In fact, South Korean firms continually sought to enter newly emerging, shorter-cycle technologies and, in the end, achieved technological diversification.

That is, in contrast to Hausmann et al. (2007), who suggested that developing countries should seek to emulate rich countries as quickly as possible, we propose that the transition strategy of a developing country must involve entering sectors that are based on short-cycle technologies instead of those that are dominated by rich countries, such as long-cycle technologies. However, as countries reach technological maturity and achieve a somewhat high level of capabilities (as South Korea did in the early 2000s), they are driven to adopt long-cycle technologies, such as biomedical or pharmaceutical industries, which is what Samsung has been trying to achieve recently.

Figure 5.2 illustrates the trend of normalized CTT as calculated from US patents for selected economies (South Korea, Taiwan, China, Brazil, and Germany). Now, considering that all the average CTTs have tended to increase across all fields since the early 2000s, I present the series of normalized (or relative) CTT by dividing the absolute CTT values by the average of all patents registered each year. Thus, in Figure 5.2, the values lower than 1 refer to relatively short CTTs, whereas the larger values refer to relatively long CTTs. These figures are based on a three-year moving average of CTTs to show a smooth transition, with the average relative CTT of Germany highly stable at approximately 1.1 for most of the period beginning in the 2000s.

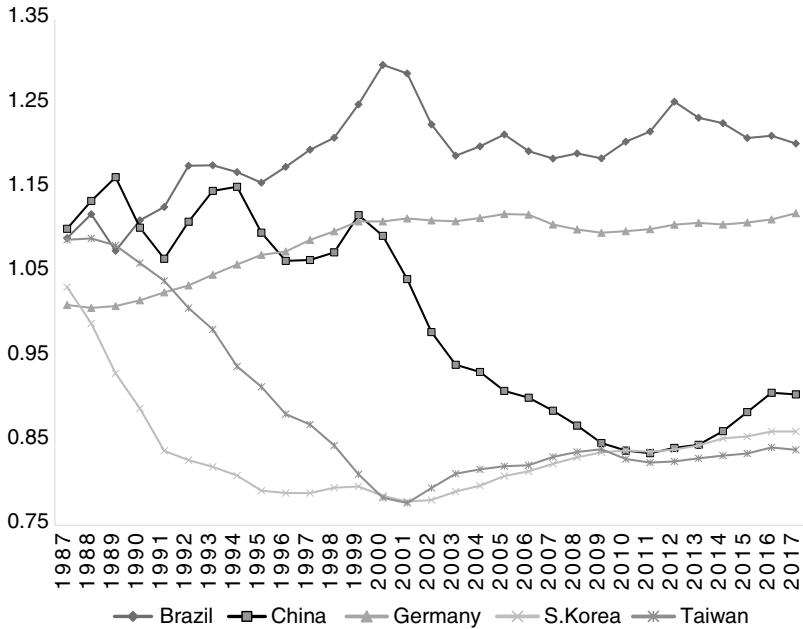


FIGURE 5.2 Trend of relative (normalized) cycle time in selected economies

Notes: The numbers refer to the three-year moving average of cycle time of technologies of patents filed by each economy.

Sources: Drawn using the United States Patent and Trademark Office bulk patent documents.

Most importantly, South Korea and Taiwan have experienced a decrease in CTTs from approximately 1.05 in the mid-1980s to approximately 0.78 at the end of the 1990s or 2000, which encompasses the period of their rapid catch-up in economic growth. Since the 2000s, these two economies have shown a reversal of the CTT trend into an increasing trend. Such reversals indicate that these economies have passed the short-to-long turning point, realizing a new gradual specialization into long-CTT sectors. This new pattern of specialization also means that their NIS are transitioning from catch-up to mature conditions. China has followed the path of South Korea and Taiwan with an approximate ten-year lag, and it experienced

Table 5.3 Top ten classes and number of patents registered by South Korea, 2000–2003 and 2013–2017

2000–2003				2013–2017			
Class	Patent count	Class Name	Rel. CTT	Class	Patent count	Class Name	Rel. CTT
1	438	Semiconductor device manufacturing: process	0.78	1	438	Semiconductor device manufacturing: process	0.78
2	365	Static information storage and retrieval	0.70	2	726	Information security	0.80
3	257	Active solid-state devices (e.g., transistor)	0.79	3	714	Error detection/correction and fault detection/recovery	0.80
4	349	Liquid crystal cells, elements, and systems	0.76	4	455	Telecommunications	0.77
5	345	Computer graphics processing & display systems	0.80	5	257	Active solid-state devices (e.g., transistor)	0.79
6	327	Miscellaneous electrical nonlinear devices & systems	0.83	6	73	Measuring and testing	1.08
7	370	Multiplex communications	0.68	7	370	Multiplex communications	0.68
8	313	Electric lamp and discharge devices	0.95	8	725	Interactive video distribution systems	0.87
9	348	Television	0.82	9	345	Computer graphics processing & display systems	0.80
10	375	Pulse or digital communications	0.78	10	429	Chemistry: electrical current producing apparatus, product, and process	0.99
		Weighted mean	0.78			Weighted mean	0.82

Notes: Rel. CTT means the relative (normalized) cycle time of technologies

Source: Adaptation of Table 2 in Lee and Lee (2021a)

the same decrease in the average CTT from the mid-1990s to the end of the 2000s, which is consistent with its rapid catching-up in economic growth. By contrast, Brazil has recorded very high values, which is interpreted as an undesirable pattern of specialization. Long CTT corresponds to high barrier-to-entry technologies that present difficulties for latecomers seeking to realize commercial success (Lee, 2013c, Chapters 3 and 6).

Table 5.3 reveals further details of US patenting by South Korea; in particular, it provides information on the top ten patent classes, where the largest number of patents were filed for the two periods of 2000–2003 and 2013–2017. During the former period, the average CTTs of Korea reached the lowest points in Figure 5.2, whereas the latter period represents a dramatic change in the top ten classes. For instance, in Korea in the early 2000s, the top three classes were all fields related to integrated circuit chips, and other classes also correspond to those with relatively short CTT, mainly those below 0.8. By contrast, in the mid-2010s, six new classes emerged in the top ten, with most having a CTT above 0.8. Class number 73 (measurement and testing) features a long CTT of 1.08 and ranks in the top six, besides the class of chemistry. Thus, the weighted average CTT of Korea increased from 0.78 during the early 2000s to 0.82 during the mid-2010s.

The above graph and table of CTTs are suggestive of the changing nature of NIS in South Korea and Taiwan during the post-catch-up stage that began in the 2000s. These two economies are moving away from sectors based on short-cycle technologies and pursuing sectors based on long-cycle technologies. Thus, their NIS are approaching the levels of countries with advanced or mature NIS, and regression analysis by me and a colleague (Lee & Lee, 2021a), has confirmed the contribution of long-CTT specialization since the 2000s to economic growth. In this way, the so-called “detour” hypothesis, which posits that a successful catching-up economy follows a technological detour of initially specializing in short CTT sectors and later turning to long-CTT-based and thus high-entry-barrier sectors, has

been confirmed. Firm-level data also shows that Korean firms are no longer simply oriented toward short-CTT technologies, as they have diversified into non-short-CTT technologies, which is also discussed in Chapter 4 (Section 5.5), relying on a previous work of mine with a colleague (Im & Lee, 2021).

Further, Table 5.2 displays lists of the top ten firms in terms of their values in the stock market from 1974 to 2020. In the past, the top ten firms were in either the IT or auto and steel sectors. In the most recent year of 2020, three bio and health firms were in the top ten, including Celtrion, Samsung Biologics, and LG Health, some of which produce so-called biosimilars and COVID-19 vaccines and medicines. Additionally, the top ten list includes two digital platform firms, Naver (Korean counterpart to Google) and Kakao (Korean counterpart to Facebook). In sum, half of the top ten firms are new firms. This phenomenon reflects the trend of increasing diversification into non-short-cycle fields and the rise of new, non-chaebol firms.

One may doubt the necessity of entering industries with long CTT, which is usually difficult for latecomers to achieve because of the high entry barriers and long gestation periods. Instead, one might suggest that South Korea should continue specializing in sectors with short CTT (e.g., IT), where they currently excel. However, the problem is that other next-tier latecomer countries, such as China, can also quickly and easily catch up with South Korea in such industries in a short time span. In fact, China is rapidly catching up in sectors with short CTT, such as cell phones; however, it has been relatively slow with regard to medium- and long-cycle technology-based industries, such as producing parts and source materials for automobiles and machinery (Lee et al., 2017). In other words, although the old catching-up NIS enabled Korea to catch up with high-income economies in the 1980s and the 1990s, a transition to post-catch-up NIS is currently necessary, and this includes moving into long-cycle technologies.

Since the 2000s, the South Korean government has been promoting certain industries, including biotechnology. Moreover, big businesses, such as Samsung, LG, and SK Group, have all entered

these new industries. At the same time, the further advancement of short-CTT activities is increasingly carried out by new ventures and startups, including the creative industries of music, film, and other entertainment sectors. These new ventures in services, which are outside the manufacturing industry, are an example of exploring the low entry barriers of short-CTT activities via the power of digital technologies that enable various new channels of marketing and business-to-consumer approaches.

5.6 THE KOREAN MODEL AS A DETOUR TO MANAGE THE GLOBAL–LOCAL INTERFACES

The discussion in Sections 5.4 and 5.5 underscores the two essential detours of the Korean model for catch-up, which have been somewhat ignored in the literature. The first detour involves initially promoting large domestically owned and export-oriented big businesses, often in the form of business groups, and subsequently promoting SMEs. The second detour involves first specializing in short CTT- and later long-CTT-based sectors. By combining these two detours, we arrive at a definition of the Korean model as “short-CTT sector specialization led by domestically owned, export-oriented conglomerates.” Some discussion of this model follows.

First, it is important to note the necessity of combining local ownership and short-CTT specialization in this model. This is because, without local ownership, short-CTT specialization may be inadequate to achieve sufficiently fast localization of knowledge creation and diffusion. As addressed in Section 3.4 of Chapter 3 in the discussion of the three regions of Shenzhen, Penang, and Taipei, the same specialization in short-CTT sectors in the IT industry led to divergent outcomes regarding innovation and economic growth. The difference between the fast catch-up in Shenzhen and the slow catch-up in Penang lies in the contrast between the rapid and strong emergence, growth, and eventual dominance of domestically owned firms in Shenzhen and Penang’s continued reliance on MNCs. MNCs tend to rely on their home countries for important R&D and thus

are less interested in enhancing local R&D activities and local innovation. Thus, as Shenzhen did, latecomer economies should start by learning from FDI and MNCs but should also pursue the eventual creation of domestically owned firms. In particular, if a country reaches the upper middle-income stage or approaches the frontier, it cannot expect to benefit from technology transfers and licensing from incumbent firms and countries; rather, it must conduct its own indigenous R&D.

This transition from foreign learning to local innovation is an essential aspect of all successful catching-up stories in East Asia. As discussed above, the affiliates of Samsung Electronics shared ownership with their Japanese partners to facilitate learning. Moreover, Samsung also bought back these former shares from their Japanese partners, securing domestic ownership. Similarly, Hyundai Motors shared ownership with Japanese Mitsubishi to facilitate technology transfers, and it too later bought out its Japanese partners. In contrast, Daewoo Motors, another automaker in South Korea, entered a joint venture with GM. However, as GM held a controlling stake in the joint venture, it was apprehensive about using its Korean affiliate to conduct R&D, and therefore, it did not feel the need to conduct R&D in Korea. Only after separating from GM did Daewoo return to conducting R&D.

South Korea maintained a policy of limiting foreign ownership of Korean companies in strategic industries to less than 50% until 1986, when this practice was abolished. A similar cap had existed in China, too, although it was only for a very limited number of industries, including automobiles. Consumer goods and other labor-intensive industries, however, had no such regulations. The net costs and benefits of such restrictions on foreign ownership are debatable, and it is often difficult to maintain such a policy for a long period. Thailand had also imposed similar restrictions in several industries, including automobiles. However, it had to abolish these restrictions pursuant to the demands of the WTO. Since then, Thailand has adopted a policy of promoting the automobile sector by relying

fully on foreign-owned car manufacturers, such as Japanese manufacturers. This approach has achieved mixed results, as its level of domestic value-added as a share of its gross exports remains limited (Lee, Qu & Mao, 2021).

The case of Proton, the now defunct, nationally owned automaker in Malaysia discussed in Section 3.3 of Chapter 3, illustrates that local ownership should be subject to market discipline from either export or domestic markets, or, even better, both. Otherwise, local ownership might degenerate into an entrenchment. Thus, the effective model for latecomer development should include export orientation. Export orientation is, of course, needed because all latecomers must have enough dollars or convertible currencies to pay for their imports of capital goods and technologies (licensing fees and royalties), without which growth cannot be sustained.

The above discussion also indicates the importance of strategically managing local–global interfaces. Given the lack of indigenous bases for knowledge and capital, all latecomers must learn from foreign countries and firms. Eventually, however, they must seek to generate domestically owned firms. This detour process is difficult because the transition from foreign to local firms often involves competition with incumbents or separation and independence from former partners. That is why many latecomers fail to realize the transition and become stuck in the MIT. As discussed above, the need to specialize in short-CTT sectors arises because latecomers must identify sectors that have low barriers to entry and are frequently subject to creative destruction. Entry into such sectors allows latecomers to avoid a direct collision with incumbents. Likewise, latecomers also require big businesses to enter into competition with incumbents. SMEs, in contrast, are insufficient for outcompeting large incumbents. With a business group structure, a latecomer can concentrate all its resources in new sectors and ventures so that it can endure initial loss-making or otherwise difficult periods, taking advantage of internal capital markets and resources. When these are insufficient, latecomers should seek help from the public sector or government

in terms of asymmetric industrial and innovation policy, which has been observed in the Korean experience.

It is also important to note that the Korean model discussed above involves a detour from big business dominance to decentralization by SMEs, combined with a transition from short- to long-CTT sectors. The detour reflects the actual experience of South Korea, where the dominance of big businesses was checked by the tendency toward decentralization that began in the 2000s, which was the post-catch-up stage.

Given that these two aspects of decentralization and diversification are typical attributes of advanced Western economies, this long-term detour can also be discussed in the context of the possible convergence of the Korean model. The point is that such convergence has been possible only through a detour that has gone in the opposite direction from that of the advanced economies. Such a detour has also been observed in terms of the fact that the Korean economy used to be mostly closed or protected by high tariffs and asymmetric support for domestic companies. However, Korea is now a mostly open economy with free trade agreements with the United States, the EU, China, India, and more. Therefore, this detour has taken Korea from a closed to an open economy. This convergence via divergence (or detour) constitutes the so-called “catch-up paradox” (Lee, 2019, p. xxi) that can be summarized in the following sentences: “You cannot catch up if you just keep catching up.” “To be open, you have to be closed for a while.” And, “A detour can be faster than a straight road.”

In this context, the Korean model can be redefined as a “detour from short- to long-CTT specialization led by export-oriented, indigenous conglomerates.” Of course, it was also a detour to political democracy via a transitory phase of political authoritarianism. This political transition or democratization was realized by mass demonstrations in 1987 and the subsequent beginning of a new civilian government in 1993. During this period, South Korea was reaching the end of its upper middle-income stage and was entering a high-income

stage, which was marked by its entrance into the OECD. In other words, South Korea finished the process of democratization before it became a high-income economy. The middle class, which arose alongside economic growth and prosperity, demanded democratization. The activism of citizens was mostly peaceful and compromising and thus did not disrupt economic growth before South Korea was able to join the OECD. Although the mismanagement of financial liberalization led to the 1997 crisis, the recovery was quick and prompt, again owing to the strength of large domestic firms.

However, the crisis ended in IMF reform, which accelerated Korea's transition to financialization, increasing sociopolitical cleavages and path-dependent convergence in terms of slow growth and rising inequality. Specifically, the share of foreign owners of Korean stocks jumped from less than 5% before the crisis to about 40% in the post-crisis period of the early 2000s, becoming one of the highest rates in the world. These foreign shareholders have been contributing to the reform of corporate governance in Korean firms, causing them to align with Anglo-American style governance in the name of global standards. Additionally, they have tended to demand greater dividends rather than profit reinvestment, which has translated into lower investment and firm growth, and as a consequence, has possibly eliminated domestic jobs and increased inequality.²⁴ My colleague and I (Im & Lee, 2021), have conducted a firm-level analysis to show that Korean firms no longer borrow heavily or invest aggressively, which is also discussed in section 4.5 of the Chapter 4. Instead, they pursue high profitability.

The country now faces the serious challenges of growth slowdown, rapid aging, and rising income inequality between rich and poor, which are similar to the issues of advanced or mature economies. If these challenges become permanent features of South Korea,

²⁴ A firm-level analysis by Kim and Cho (2008) confirms this negative linkage from more foreign share to less investment. Shin and Lee (2019) confirm the positive linkages from more dividends payment to more inequality measured by the income share of the top 10% richest.

this will signal the end of East Asian capitalism, which is characterized by high growth and low inequality, and the convergence toward Anglo-American capitalism, which is characterized by low growth and high inequality. Taking the perspective of the literature on the varieties of capitalism, an empirical analysis done by my colleague and me (Lee & Shin, 2021) classifies Korea and Japan since the 2000s as liberal market economies – that is, Anglo-American-type capitalist countries – in terms of the three criteria of GDP growth, employment rates, and the income share of the richest top 10% of citizens.

5.7 SUMMARY AND CONCLUDING REMARKS

This chapter attempted to redefine the Korean model of catch-up development by identifying new elements that have seldom been discussed in the literature. In doing so, Section 5.2 provides an evaluation of the existing theories of the Korean model of development. I then suggested that the “Korean miracle” happened not owing to any favorable initial conditions but rather in spite of several disadvantageous conditions. Moreover, overcoming these obstacles required government initiatives, including various forms of industrial policy. We also noted that inclusive institutions did not precede economic growth. Rather, capability building for economic growth proceeded under political authoritarianism, and the resulting economic growth at a later stage brought about political democracy.

Next, Sections 5.3 and 5.4 underscore the two essential factors of the Korean model that have been largely overlooked in the literature. They are, first, domestically owned and export-oriented conglomerates, often in the form of business groups, and second, specialization in short-CTT-based sectors, such as IT. By combining these two factors, we can say that the driving forces of the Korean miracle were short-CTT sector specialization led by domestically owned and export-oriented conglomerates. This understanding of the Korean miracle indicates the importance of strategically navigating global–local interfaces, thereby promoting the emergence of large domestically owned corporations and a period of increasing

concentration. However, the longer-term evolution of Korea's economic development has involved detours in two senses. First, it has been a detour from dominance by big businesses to decentralization alongside the emergence of SMEs. And second, it is a transition from short- to long-CTT sectors. In this sense, the Korean experience is an exemplary case of an innovation–development detour that can be summarized as a detour from short- to long-CTT specialization led initially by export-oriented, indigenous conglomerates, followed later by SMEs.

In the typical context of latecomer economies, asymmetric promotion of a few firms is necessary due to the limited tangible and intangible resources at the initial stage. Thus, certain firms are selected first, and then these firms tend to grow further through a system of positive reinforcing mechanisms that reward high-performing firms by selecting them for a second round of resource mobilization and concentration. Further, BGs and conglomerate structures facilitate business diversification into new and high-end sectors and activities, thereby expanding the selected corporations. Short-cycle specialization is necessary because realizing catch-up growth during the upper middle-income stage cannot be achieved simply by diversifying into areas closely related to the existing businesses. Instead, it often involves venturing into promising but low barrier-to-entry activities largely unrelated to the existing activities.