The Lahore Journal of Economics
22 : SE (September 2017): pp. 153–182

Financing Technological Upgrading in East Asia

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Abstract

There has been considerable discussion on the drivers of economic growth in East Asia. While most studies recognize that capital accumulation and macroeconomic management were critical in hastening growth, few have examined systematically and comparatively how policy frameworks – spearheaded through selective interventions – stimulated technical progress and the different performance outcomes achieved by these countries. This article attempts to address the gap by systematically analyzing the investment regimes, sources of finance, technological upgrading and policy frameworks of Indonesia, Malaysia, the Philippines, South Korea and Thailand with a view to explaining their economic growth performance.

Keywords: Finance, innovations, industrial policy, technological upgrading, East Asia.

JEL classification: O16, O40.

1. Introduction

The East Asian economies' successful experience of growth and distribution led the World Bank (1993) to classify them as high-performing economies. Among these, Singapore and Hong Kong are often removed from policy lessons since their city-state and colonial structures gave them gateway status to trade with the rest of the world. Among the high-performing economies, we exclude China because of its sheer size and socialist structures, which would be politically difficult to introduce in most countries. Taiwan is excluded because of data constraints. Accordingly, we re-examine the financing of technology development in Indonesia, Malaysia, the Philippines, South Korea and Thailand. In doing so, we attempt to evaluate the sources, direction and management of investment and their impact on industrial technological upgrading in these countries.

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Among the selected East Asian economies, South Korea grew by 22.2 times over the period 1960–2015, followed by Thailand, Malaysia and Indonesia, which grew by 9.9, 7.5 and 6.4 times, respectively, over the same period. The Philippines grew by only 2.4 times over 1960–2015. While numerous reasons might explain such contrasting growth outcomes (ranging from political leadership and human capital development policies to trade strategies), monetary and fiscal policies are likely a key factor in explaining technological upgrading in these countries. That the most successful of these countries, South Korea, relied heavily on debt and grants in its early decades of development suggests that the management of capital – rather than simply capital endowments at the origin, as argued by Summers (2003) and Rodrik (2011) – may be the most powerful explanatory factor.

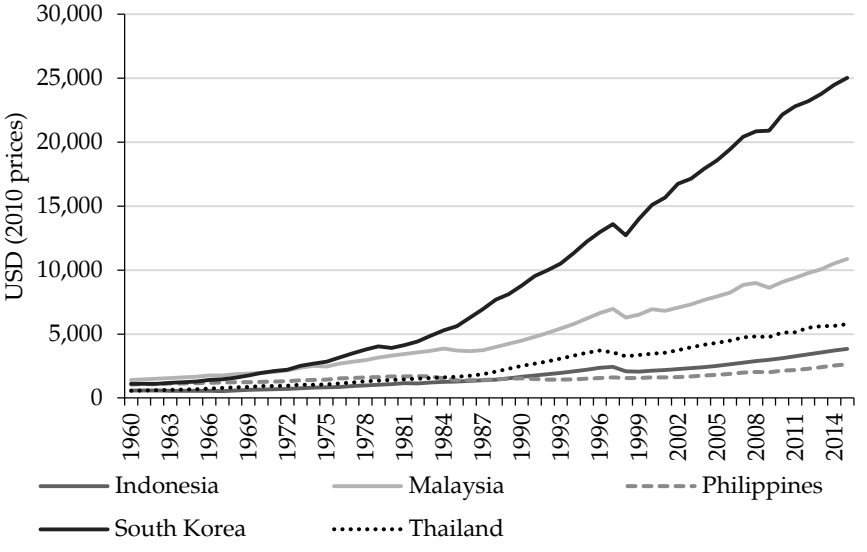
This paper attempts to analyze the key factors driving technological upgrading and rapid economic growth in Indonesia, Malaysia, the Philippines, South Korea and Thailand. The rest of the paper is organized as follows. Section 2 compares the economic growth performance of these five East Asian economies over the period 1960–2015. In Section 3, we consider the theoretical arguments relevant to analyzing and explaining the different outcomes. Section 4 evaluates East Asian investment flows and sources. Section 5 analyzes the technological upgrading that took place in these economies (note: our discussion is based on selected measurable outputs). Section 6 discusses the type of governance mechanisms deployed by these economies to explain differential growth outcomes. Section 7 concludes the study.

2. GDP per Capita Growth

This section compares the economic growth performance of Indonesia, Malaysia, the Philippines, South Korea and Thailand. In current US dollars, South Korea had the highest GDP/capita in 2015 at USD27,222, followed by Malaysia in distant second place at USD9,768. The commensurate figures for Thailand, Indonesia and the Philippines are USD5,815, USD3,346 and USD2,904, respectively. In constant 2010 prices, Malaysia's GDP/capita (USD1,408) was highest, followed by South Korea (USD1,103), the Philippines (USD1,059), Indonesia (USD577) and Thailand (USD571) (Figure 1). The GDP/capita of these countries has grown at different speeds over the period 1960–2015. In constant 2010 prices, the GDP/capita of South Korea expanded by 22.7 times over this period, followed by Malaysia, Thailand, Indonesia and the Philippines – 7.7, 10.1, 6.6 and 2.5 times, respectively (Figure 1). The annual average GDP/capita

growth rates of South Korea, Malaysia, Thailand, Indonesia and the Philippines were 5.8, 3.8, 4.3, 3.5 and 1.7 percent, respectively.

Figure 1: GDP per capita, selected East Asian economies, 1960–2015



Source: Adapted from the World Development Indicators database.

While the nature of trade policies and integration with global markets have been important in explaining differential growth rates (see Krueger, 1980; Weiss, 1990; Krugman, 1986), it is widely acknowledged that investment policies and technical change were critical in building the creative capacity of these countries to grow through global integration and competition. Therefore, we consider the key theoretical issues underlying the latter two in explaining the differential economic growth rates achieved by these economies.

3. Theoretical Considerations

Marx (1957), Veblen (1915) and Schumpeter (1942, 1961) laid the foundation for a real assessment of technology through the unbundling of the 'black box' (Rosenberg, 1975, 1982). This spawned a plethora of work defining technological capabilities (see Dahlman, 1984; Pavitt, 1984; Lall, 1992). While technology and technological capabilities were the primary focus of these scholars, manufacturing also became an important platform

for stimulating productivity through learning and innovation in processes, products and organizational technologies (Rasiah, 2002, 2004).

The catch-up literature, which has its historical origins in Marx and in Luxembourg's (1967) notion of capitalist integration and accumulation, was supplemented by the work of Veblen (1915), Gerschenkron (1962) and Abramovitz (1956). These works gave rise to the developmental function of the state, which goes beyond a regulatory role. The empirical foundations of the developmental state, articulating the active role of government in stimulating industrial structural change, can be found in works explaining industrial catch-up by Japan (Johnson, 1982), Korea (Amsden, 1989) and Wade (1990). While Amsden (1989), Amsden and Chu (2003), Chang (1994) and Kim (1997) provide explicit accounts of catching up for given industries, Johnson (1982) and Wade (1990) do not present any empirical evidence of innovation and technology against the industrial policies pursued by Japan and Taiwan, respectively. This explains the need to re-investigate the topic. Moreover, none of these works distinguish between the expansion of incremental and radical innovations when analyzing technological upgrading.

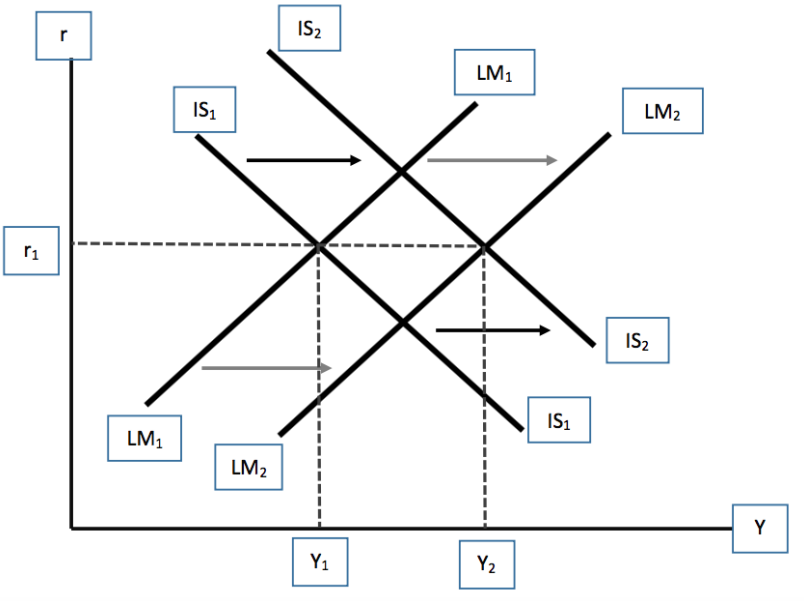
Elsewhere, we have discussed how the type of industrial policy and the nature of technological upgrading strategies helped these countries stimulate economic growth (see Rasiah & Nazeer, 2015, 2016). In making these arguments, we address the importance of an autonomous but progressive state in directing growth and structural change (see also Poulantzas, 1969; Jessop, 1989; Skocpol, 1994, 1995; Evans, 1995). In this paper, we focus on both the innovation strategies and investment policies employed to achieve technological upgrading.

3.1. Investment Regimes

Five financial models are examined in this section to develop a theoretical guide to evaluating investment regimes in Indonesia, Malaysia, the Philippines, South Korea and Thailand. In the typical Keynesian investment–savings (IS) and liquidity preference monetary (LM) model (Figure 2), governments can expand income through both monetary and fiscal policies. Savings are the basis of such investment in these models. Monetary policy can take the form of changes in the interest rate or money supply in closed-economy models. In open-economy models, either the currency or capital market is fixed to prevent runs in one from the other. Savings can be expanded when the government lowers taxes. These savings and/or increased government expenditure shifts the IS curve to the right.

An increased money supply to match the income increase then shifts the LM curve to the right. Once fiscal and monetary policies are matched, then an increase in income (Y2 – Y1) from the increase in investment can be achieved at the same or a similar interest rate (r1).

Figure 2: Keynesian IS-LM curves



Source: Authors' estimates.

Neoclassical economists do not prescribe fiscal and monetary policies, as markets are assumed to clear any disequilibrium. Markets are considered the best establisher of interest rates and investment functions, while flexible exchange rates and capital market convertibility are critical prerequisites to governing investment and savings. However, typical macroeconomic analyses do not broach the role of innovation in expanding income. Typically, governments seek to offset a fall in aggregate demand – arising from either a deflationary impact on the domestic economy due to a fall in domestic demand or from a contraction in exports – by introducing fiscal stimulus packages, which occurred in many countries, following the global financial crisis of 2007/08 (Stiglitz, 2009).

Feldman (1928/1964) and, subsequently, Mahalanobis (1953) targeted capital goods production as a means of supporting the production of domestic consumer goods in the former Soviet Union and India, respectively. The focus here was on domestic accumulation based on a

closed economy and without a significant assessment of savings or of the capacity of these economies to finance further accumulation. Hence, not only were they unable to appropriate gains from trade, but they were also denied a scrutiny of the capital sources used to finance growth. Unsurprisingly, both models eventually became unpopular.

A second neoclassical model examines exchange rates and capital flows based on free markets and factor endowments. With Solow (1956) and Romer (1986), the Solow–Romer neoclassical model of relative prices determines the choice between capital and labor in production and existing demand patterns.[1] Capital accumulation is the basis of economic growth, but is driven by factor endowments, with technical change captured in static terms even in this endogenous growth model. Capital market convertibility is critical in such models, so that both currency and capital markets are required to be flexible (see also Fleming, 1962; Mundell, 1963).

The McKinnon–Shaw model of financial repression became popular in the 1960s as governments sought to stimulate capital accumulation. Savers face lower rewards compared to the costs borne by investors, and governments can settle debts easily by keeping saving rates low. High interest rates are supposed to simultaneously stimulate savings and sterilize entrepreneurial markets, so that only capable entrepreneurs seek to borrow to make their businesses viable.

Consistent with Summers (2003), Rodrik (2011) notes that savings need not be an essential requirement, as capital can come from abroad, while making the case that integration with the global economy is a key requirement. Under this framework, the terms of the capital sought and its management are more important than simply domestic savings. While Summers and Rodrik offer insights into the importance of managing capital regardless of whether it is drawn largely from domestic savings or from aid, like the other macroeconomic approaches, this too lacks any deep assessment of innovation and technology. As with typical neoclassical arguments, Rodrik simply assumes that economic growth in developing economies is targeted at infrastructure development and capital accumulation through the absorption of technology from abroad. Kalecki (1976) recognizes this shortcoming in Keynesian approaches and argues that fiscal policies only make sense if they help raise the productive capacities of an economy.

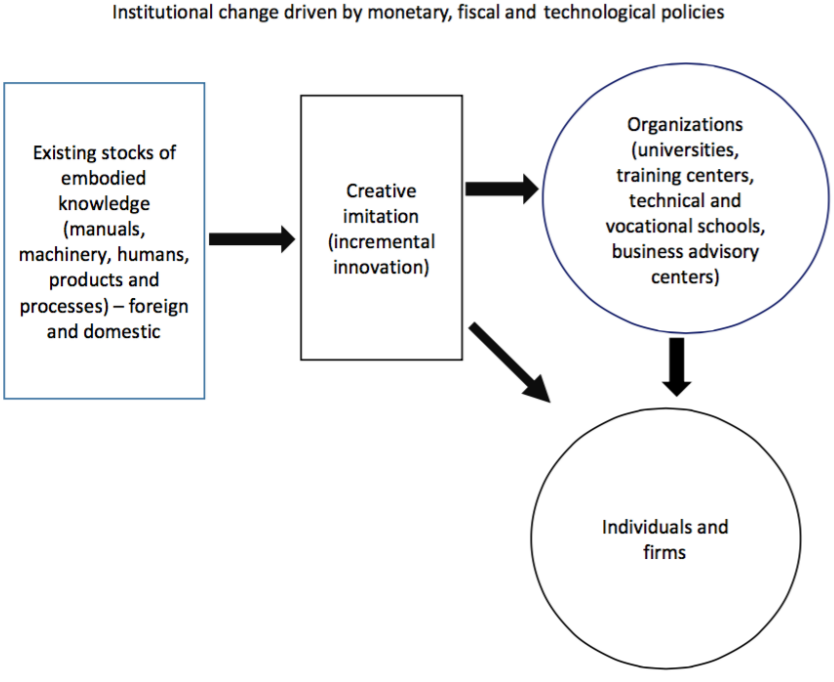
[1] Following Romer (1986), the Solow–Romer model endogenizes technology so that the residual, its exponents argue, captures total factor productivity.

3.2. Innovation Regimes

Drawing on earlier economists such as Marx, Schumpeter brought innovation into the discussion on spurring economic development. Schumpeter (1934) referred to entrepreneurs as innovators who generate incremental innovation, and who adapt, modify and proliferate existing stocks of knowledge without significantly generating new knowledge. These latecomers play a key role in stimulating economic development through adaptive learning, as they creatively transform existing stocks of knowledge.

The extension of Schumpeter's notion of incremental innovation on a broader national scale is shown in Figure 3. Existing stocks of knowledge not new to the universe, but new to the enterprises seeking them, are both imported from abroad and drawn from national sources such as manuals, machinery, licensing and the acquisition of brownfield firms. They are also accessed through nonpecuniary knowledge flows and creatively adapted to solve production and distribution problems and to generate new products, processes and organizational structures.

Figure 3: Systemic flows of knowledge and entrepreneurial synergies



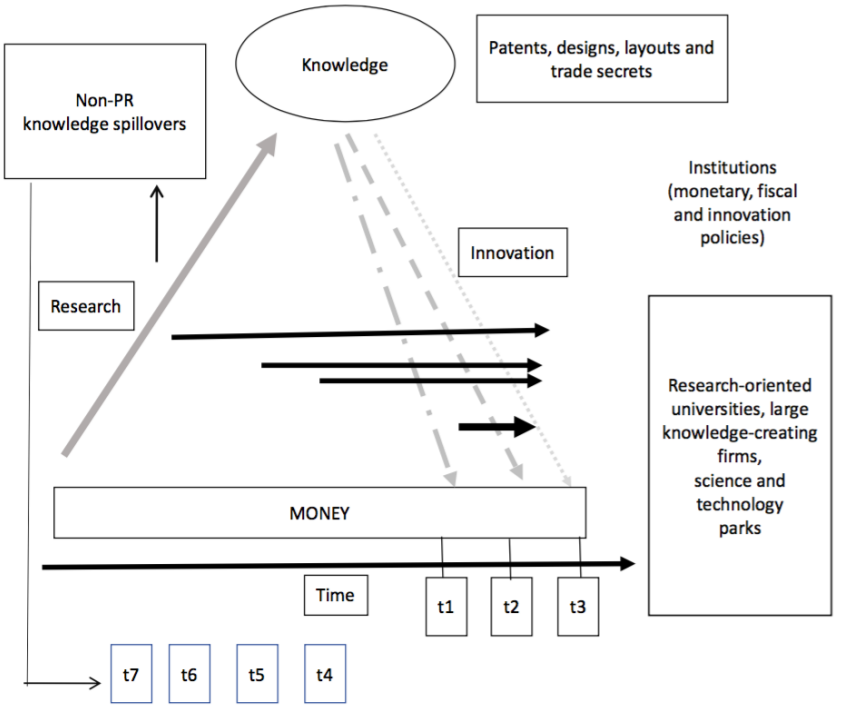
Source: Rasiah (2017).

Institutional change through a blend of institutions then molds economic agents – both firms and individuals – that solve collective action problems through organizations and stimulate incremental innovation in national economies. Such technical change activities are financed largely by firms, but the government can assist by institutionalizing the methods, processes and connections between producers and users. Hence, there is no need for governments to offer R&D grants for such activities.

Subsequently, Schumpeter (1943) emphasized the initiators of new cycles of innovation and business by focusing on large R&D laboratories that could generate new stocks of knowledge to produce radical innovations. Since he did not envisage the development of science and technology (S&T) parks and strong university–industry linkages, his focus was on the internal R&D operations of large firms, which raised the concentration in certain industries. Innovation structures have since transformed to allow smaller firms to produce new stocks of knowledge through integration with S&T parks and with university R&D laboratories.

As shown in Figure 4, research is critical to generating new stocks of knowledge. However, the returns on research are always uncertain. Even if new stocks of knowledge are generated, not all these can be appropriated and registered with property rights by those who carried out the research. Nor can all registered property rights be scaled up to generate returns.

Figure 4: New stocks of knowledge synergies



Source: Rasiah (2017).

Nonetheless, such new stocks of knowledge are critical to spurring cycles of innovation. Latecomers eventually appropriate significant aspects of new knowledge without paying for it, owing to the nonexcludable nature of public goods: they end up producing products t4 to t7 in Figure 4 when first-movers only manage to sell products t1 to t3. Since public goods are also nonrivals, it is important for governments to finance major aspects of such knowledge stocks.

Barring a handful of large firms, financing radical innovation activities generally requires strong government assistance. Not only is there the need to institutionalize linkages between R&D labs/universities and firms, but it is also important for governments to develop S&T parks to scale up the research being carried out at firms. The uncertainty element should be underwritten using R&D grants. Since the incidence of failure can be high in frontier R&D activities, governments offering financial support must have an evaluation and appraisal mechanism to reduce failures and the dissipation of new knowledge. A significant share of new discoveries recorded in the US, Germany and Japan were financed by governments.

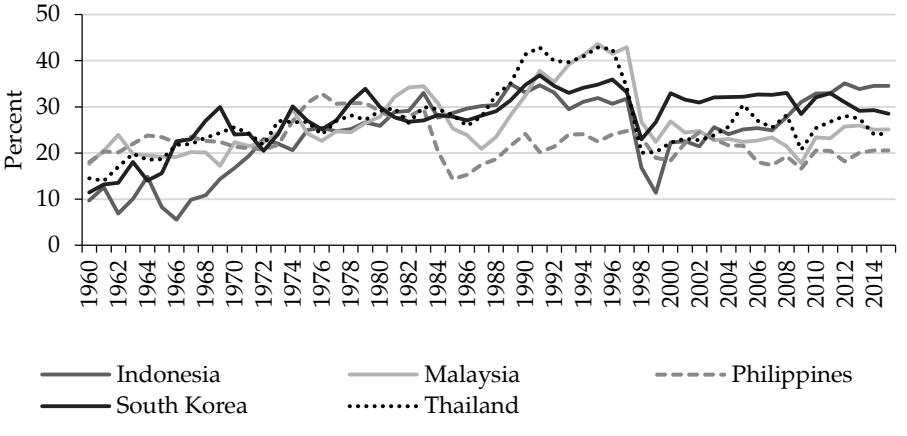
4. Sources of Financing

This section looks at capital formation and its sources, which include savings, aid and grants. Since South Korea had a poorly developed stock market until the 1980s, we discuss how monetary and fiscal policies were used either to spearhead growth or support recovery from financial crises. Instead of focusing solely on how to stimulate economic growth, we examine how funds were used to support technological upgrading.

4.1. Investment Patterns

Over the period between 1960 and the Asian financial crisis of 1997/98, gross fixed capital (GFC) as a share of GDP rose in Indonesia, South Korea and Thailand (Figure 5). Malaysia and the Philippines, however, faced a considerable fall in GFC, caused by a sharp contraction in commodity prices. The Philippines was also affected by a severe balance of payments (BOP) and debt servicing crisis, which led to the introduction of a structural adjustment package under the International Monetary Fund (IMF). The crisis affected all five countries, with Indonesia, Malaysia, South Korea and Thailand seeking bailouts from the IMF, although Malaysia managed to avoid this, following the introduction of Keynesian capital controls in 1998. All five countries faced a sharp currency depreciation, following a speculative attack on the baht, which generated a domino effect on the ringgit, won, peso and rupiah. Chronic BOP and short-term debt deficits failed to translate into currency falls, owing to currency pegs and expanding capital markets from a rise in portfolio equity and foreign direct investment (FDI).

Figure 5: GFC as a share of GDP, selected economies, 1960–2015

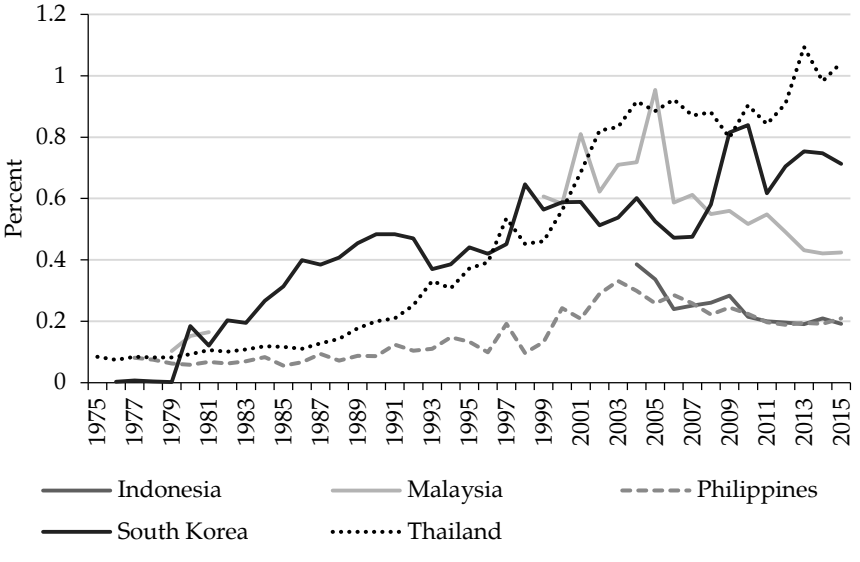


Source: Adapted from the World Development Indicators database.

While the global financial crisis affected external demand, which led to a contraction in GDP in Malaysia, the Philippines, South Korea and Thailand, its impact was not serious since these economies had learnt from the Asian crisis and had kept their nonpayment loans low. Having been decoupled from developed export markets since 2000, Indonesia did not undergo a serious crash in exports during this crisis.

Instead of simply targeting investment to support capital accumulation and infrastructure development, significant allocations of capital were also targeted at stimulating knowledge inflows through payments made for intellectual property (IP) rights from abroad and learning through incremental innovations in all five countries (Figure 6). During the 1970s, the institutionalized framework in South Korea drew extensive licensing agreements and firm acquisitions for upgrading, which helped the chaebols catch up in strategic industries faster than firms in the other four countries. While there was government support for R&D in Indonesia, Malaysia, the Philippines and Thailand, these amounts were small. Government expenditure in Malaysia began to focus on technology and R&D in 1991, following the introduction of the Action Plan for Industrial Technology Development and the Intensification of Research in Priority Areas program.

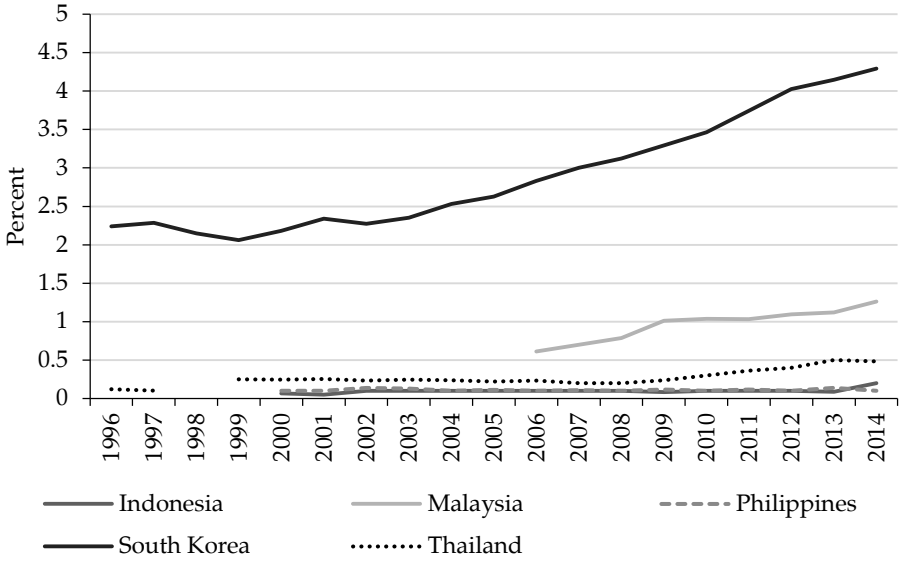
Figure 6: International IP payments, selected economies, 1975–2015



Source: Adapted from the World Development Indicators database.

Owing to the lack of historical data, we present R&D expenditure as a share of GDP for these countries since 1996 (Figure 7). What is clear from the data is the significantly higher percentage and steeper gradient of R&D expenditure in South Korea compared to Indonesia, Malaysia, the Philippines and Thailand. Indeed, South Korea (4.1 percent) had the second highest R&D expenditure as a share of GDP in 2014 after Israel (4.5 percent).[2] Malaysia ranks second among the five countries in Figure 7. The government began to raise R&D expenditure in 2005, following efforts by the Ministry of Science, Technology and Innovation and the Ministry of Higher Education to support the deepening of scientific research and intellectual output. Thailand ranks third, while Indonesia and the Philippines have extremely low levels of investment in R&D.

Figure 7: R&D expenditure as a share of GDP, 1996–2014



Source: Adapted from the World Development Indicators database and national sources.

4.2. Sources of Funds

Typically, the supply of money from incomes and domestic interest rates as well as exchange rates and the potential for earnings abroad influence national savings. However, investment is affected not just by savings, but also by net FDI, aid, grants and portfolio equity investment,

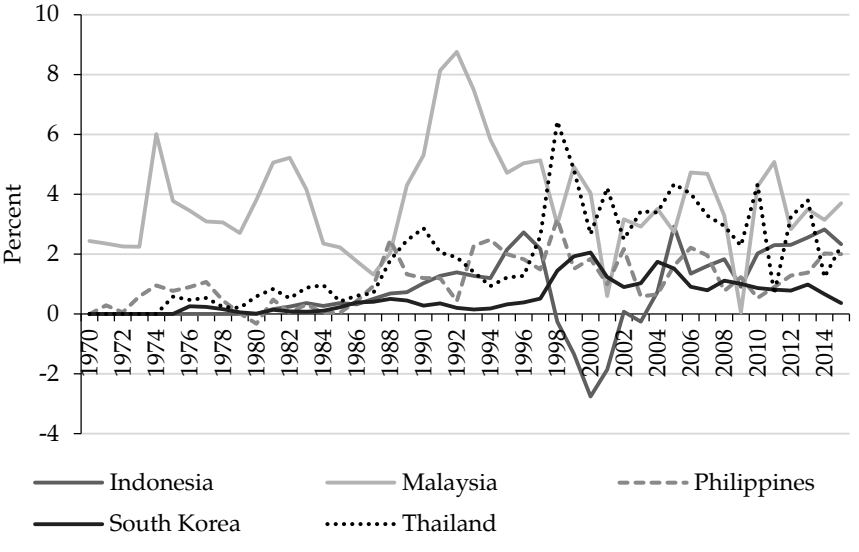
[2] http://data.uis.unesco.org/

which have a bearing on overall gross capital formation. Here, we examine the sources of funds to explain the investment levels discussed above.

Savings as a share of GDP were lowest in Indonesia and South Korea in the 1960s, with the former seriously derailed by the removal of Sukarno and the New Order government established under Suharto. Malaysia had the highest savings level until the mid-1980s. However, as South Korea faced its first wave of technological expansion in 1975–78, savings grew strongly as the government sought to draw high arbitrage differential gains to service its debt while subsidizing preferred firms targeted for technological catch-up.

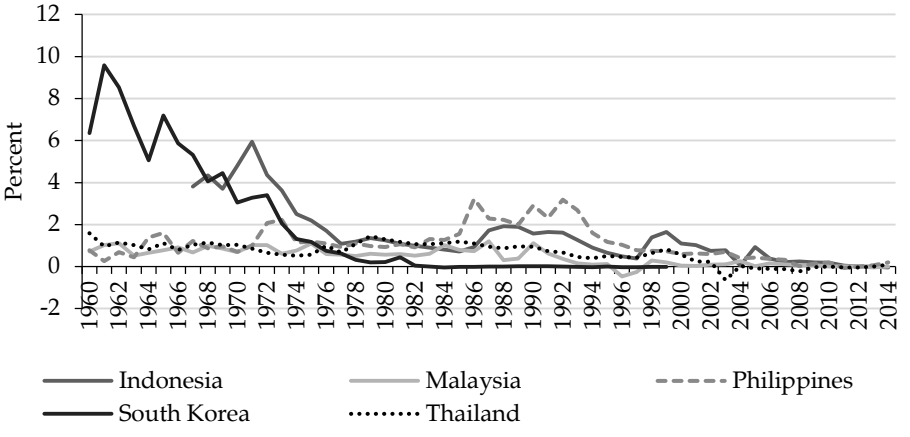
Net FDI was a major source of investment financing in Malaysia throughout and in the Philippines and Indonesia since the 1990s (Figure 8). In South Korea, overseas development assistance (ODA) and grants were the primary sources of funds used to develop infrastructure and support national firms' technological catch-up in the late 1960s and 1970s (Figure 9). Aid was also important in Thailand in the late 1960s, early 1970s, and late 1980s and 1990s. The Philippines enjoyed high levels of ODA during the late 1980s and 1990s.

Figure 8: Net FDI, selected economies, 1970–2015



Source: Adapted from the World Development Indicators database.

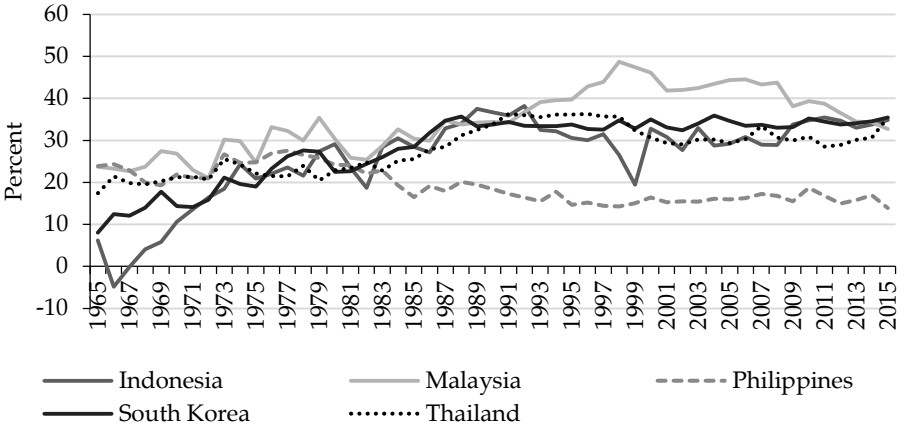
Figure 9: ODA, selected economies, 1960–2015



Source: Adapted from the World Development Indicators database.

The periods 1973–75 and 1979–81 experienced a fall in savings when oil prices rose four times and 2.5 times, respectively. Savings also fell in other countries owing to the inflationary pressure created by the oil shocks and falling commodity prices. Although all five countries were affected by the Asian financial crisis of 1997/98, only Indonesia faced a sharp fall in savings due to massive capital flight (Figure 10). The Philippines began with the highest savings ratio in 1965, but the introduction of liberal policies in the mid-1980s caused the savings ratio to decline. Savings in South Korea stabilized during the mid-1980s at over 30 percent of GDP.

Figure 10: Savings as a share of GDP, selected economies, 1960–2015



Source: Adapted from the World Development Indicators database.

We can see that domestic savings were not central to financing economic development in general and technological upgrading in particular. Indeed, South Korea relied heavily on aid and grants in the 1960s and early 1970s. FDI was significant in Malaysia's case in the 1970s, while its significance in Thailand and Indonesia rose in the mid-1990s, although there was a sharp fall during the Asian financial crisis. Domestic savings were important in Malaysia, Thailand and the Philippines in the 1960s and 1970s. In the latter, domestic savings as a share of GDP fell and stagnated in the early 1980s, as a series of structural adjustment packages from the IMF were initiated to help the country overcome its chronic BOP deficit.

5. Technological Upgrading Experience

This section analyzes the innovation experience of Indonesia, Malaysia, the Philippines, South Korea and Thailand. Since we cannot assess incremental innovations, especially those not registered as IP, we look at the innovation output of these countries based on the number of patents granted in the US – considered the most rigorous criterion. We also examine innovation dependence on foreign countries by analyzing the trade balance between receipts and payments for international IP recorded by these countries.

While significant inflows of knowledge from abroad and the evolution of knowledge domestically are key drivers of incremental and radical innovations, these sources are difficult to capture. We focus, therefore, on imports of IP captured by payment receipts against the sale of IP. Exports of IP can be viewed as a part of radical innovations. We examine the patents granted in an industry common to all five countries: the integrated circuits (IC) sector. Although not necessarily synonymous with radical innovations, IC patents granted in the US can be seen as a rough proxy for radical innovations. Table 1 shows the number of US patents granted in Indonesia, Malaysia, the Philippines, South Korea and Thailand for the IC industry.

Table 1: Patents filed in the US, IC firms in East Asian developing economies, 1985–2011

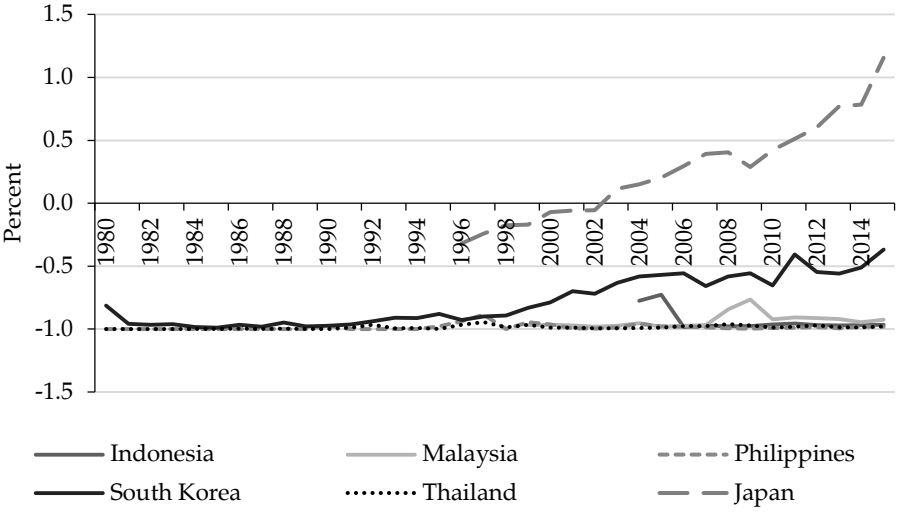
Period		Indonesia	Malaysia	Philippines	South Korea	Thailand
1981–85	N	0	0	0	1	0
	F	0	0	0	0	0
1986–90	N	0	0	0	103	0
	F	0	0	0	2	0
1991–95	N	0	0	0	1,526	0
	F	0	1	0	1	0
1996–2000	N	0	0	0	5,095	0
	F	0	5	5	11	3
2001–05	N	0	4	0	8,049	0
	F	0	39	40	139	45
2006–11	N	0	3	0	25,014	0
	F	0	270	70	409	3
2012–15	N	0	17	0	27,610	0
	F	10	444	41	606	46

Note: N = firms with complete or majority national control, F = firms with complete or majority foreign control.
Source: United States Patent and Trademark Office (2016).

Patents registered by national IC firms in South Korea rose sharply from 1 in 1981–85 to 27,610 in 2012–15. Malaysia ranks second, with only 17 national patents in 2012–15. Patents granted to foreign firms operating in South Korea rose from 0 in 1981–85 to 606 in 2012–15. Again, Malaysia ranks second at 444 patents. Indonesia, the Philippines and Thailand follow with fewer than 50 patents each. The results show that the incentives, grants and innovation ecosystem evolved by the government in South Korea successfully moved national firms to the technology frontier. Among IC firms, Samsung Semiconductor is a world leader in memory chips. Foreign firms still dominate patent filing in the other countries, but the far smaller number of patents demonstrates the weak innovation capacity of firms in these countries.

Figure 11 shows the international trade balance in IP receipts and payments for the five countries relative to Japan, Asia's leading technology producer. We can see that Japan began to experience a positive balance in 2003, and has since enjoyed a sharp expansion in its IP trade surplus. Indeed, its IP receipts were over double its IP payments in 2015, indicating that the country has become a strong net IP exporter with a significant degree of radical innovations.

Figure 11: IP trade, selected economies, 1980–2015



Source: Adapted from the World Development Indicators database.

All five East Asian countries have a negative IP trade balance, but that of South Korea has improved tremendously in trend terms from –1.00 in 1987 to –0.37 in 2015. The Philippines and Thailand have performed the worst: with marginal IP exports, their trade balance has remained negative (–0.98 in 2015). Malaysia has not fared much better, with a corresponding trade balance of –0.93 in 2015. Although its R&D expenditure has risen since 2012, it will take time for such investments to translate into IP tangible enough to improve the country's IP trade balance significantly.

6. Governance Mechanisms

While the direction of investment with a strong focus on innovation activities, both incremental and radical, is important in explaining the differential growth outcomes of Indonesia, Malaysia, the Philippines, South Korea and Thailand, the management of financing and the governance of technological upgrading were also key to growth.

6.1. Growth Performance Policies

All five countries had in place some form of import substitution behind tariffs, quotas and incentives to export. However, only South Korea managed to execute effective appraisal instruments on a large scale and thus drive national firms toward the technology frontier. While it has

enjoyed radical innovation on a national scale, Indonesia, Malaysia, the Philippines and Thailand have experienced incremental innovation. In this section, we discuss the policies implemented by these countries with respect to growth performance.

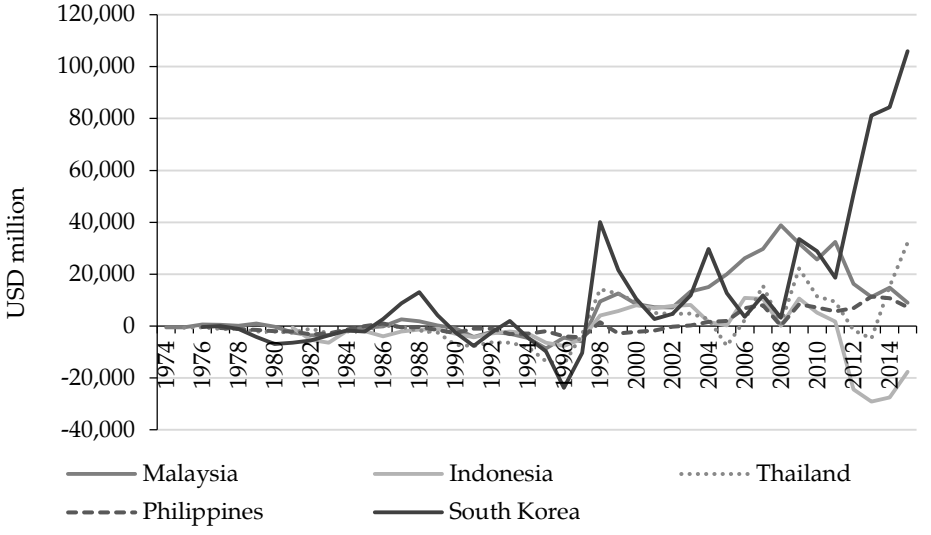
Government policies in South Korea favored national firms in spearheading economic development. Restrictions on FDI were removed only in 1985 and FDI allowed in nonstrategic industries during the 1960s (Amsden, 1989; Kim, 1997). As foreign exchange from aid fell sharply in the 1970s, the government pressured all firms accessing subsidized loans and protection in the domestic market to increase exports. This was strictly enforced: violators were penalized and nonperformers removed from the list of productive rent-recipients (Amsden, 1989). The selection of corporate directors with an engineering background was also critical during the late 1960s and 1970s, given that firms such as Samsung, Hyundai, POSCO and Daewoo began at the bottom of the technology frontier. Since the government controlled the establishment of technology licensing agreements and the acquisition of firms (it controlled all foreign exchange dealings), it could influence technology transfer effectively. Indeed, the catch-up of Daewoo, Hyundai and Samsung relied heavily on technology acquisition from foreign firms (Edquist & Jacobsson, 1987; Kim, 1997).

While government expenditure in all five countries was strong, fiscal policy in Indonesia, Malaysia, the Philippines and Thailand was less interventionist in promoting technology than in South Korea. In 1991 and 2000, respectively, Malaysia and Thailand introduced proactive policies to stimulate technological upgrading, including incentives and grants. These instruments spurred the production of innovation output, including patent filing and scientific publications, but in the absence of effective vetting and appraisal and few university–industry linkages, firms in these economies could not appropriate significant innovation gains.

Between the late 1960s and 1985, the won–US dollar exchange rate remained fixed, the handling of foreign currencies was tightly regulated by the central bank and all commercial banks were government-owned in South Korea. Managing these key financial instruments enabled the government to channel funds directly to productive activities. Exchange rate management and ownership ended, following the Plaza Accord of 1985 when the won was floated and Korean banks gradually privatized. The liberalization that followed left the economy vulnerable to harmful financial practices, culminating in the financial crash of 1997/98.

By effectively managing investment to support innovation, which drove rapid economic growth and structural change, South Korea turned its BOP deficits of the 1970s, 1980s and 1990s into massive surpluses by 1998 (Figure 12). Malaysia did reasonably well from 1998 to 2008, but its surpluses have fallen since then. Thailand (2012/13) and Indonesia (2012–15) have faced deficits, but shown improvements since 2013.

Figure 12: BOP trends, selected economies, 1974–2015



Source: Adapted from the World Development Indicators database.

6.2. South Korea

As the country endowed with the least natural resources of the five examined here, South Korea, embarked on a stringent policy of supporting productive investments (Amsden, 1989; Chang, 1994). Export orientation was identified as a measure of competitiveness and exporting firms enjoyed subsidized interest rates, protection in domestic markets and access to foreign currencies. During 1970–80, exporting firms enjoyed a real interest rate of between –10.3 and –16.3 percent, compared to the kerb market rate of 16.3–28.2 percent (Dornbusch & Park, 1987: 419).

Even after Park Chung, the export sector faced a real interest rate of 4.7–7.7 percent during 1982–86, compared to the normal market rate of 20.8–23.4 percent. The emphasis on exports and a fixed won–US dollar exchange rate till 1985 helped clear the current and capital account deficits accumulated through large imports of raw materials and capital goods. FDI

was restricted in strategic sectors and not tied to any incentives. Importantly, the Economic Planning Board, which had direct access to the President, could successfully execute government policy (Kim, 1991).

While trade and financial coordination were important (implemented through quotas and tariffs, and subsidized interest rates for targeted firms), technological catch-up became the means of upgrading and manufacturing expansion (Amsden, 1993). Moreover, human capital development became a key thrust of technological catch-up. On the one hand, the government invested heavily in widening and deepening the supply of S&T-based human capital (Vogel, 1991). On the other, large outflows of students seeking a science education in the West generated experiential knowledge – gained from studying at the best research universities and working at frontier firms – as they returned in large numbers or participated in knowledge flows to stimulate technological catch-up (Saxenian, 2006). The government also supported initiatives by Korean firms to acquire technologically superior firms to move up the value chain. For example, Samsung purchased Schlumberger, Zilog and Micron Technology to hasten its catch-up in memory production (Edquist & Jacobsson, 1987).

Under Park Chung Hee, the state had enough autonomy to play a developmental role (see Jessop, 1989; Skocpol, 1994, 1995). The stringent application of what Chakravarty (1987) and Sen (1983) call the 'carrot-and-stick approach' drove technological catch-up by Korean firms. Thus, national firms such as Samsung, Hyundai, POSCO and Daewoo could shape the world technology frontier either alone or as one of the lead firms doing so in their respective industries (Amsden, 1991). To this end, the government offered large grants to stimulate R&D. Indeed, South Korea's R&D expenditure as a share of GDP was less than 2 percent a year before reaching 2 percent in 1994. It has since risen from 2.2 percent in 1996 to 4.1 percent in 2014.[3] Commercialization was a key instrument used by the government to stimulate innovation by national firms.

6.3. Malaysia, Thailand and the Philippines

Early import substitution policies in Indonesia, the Philippines and Malaysia in the 1950s and 1960s – following the laissez faire regimes of the Dutch, Spanish and British, respectively, strong American influence in the

[3] http://data.uis.unesco.org/ and https://stats.oecd.org

Philippines since 1898 and British influence in Malaysia – did little to spur industrialization (Rasiah & Nazeer, 2016). American goods enjoyed free access to the Philippines until 1954, following the Bell Trade Act of 1946 (Hutchcroft, 1989). British goods could enter colonial Malaya and (after 1957) independent Malaysia without trade restrictions until the enactment of the Pioneer Industry Ordinance in 1958 (Rasiah, 1993).

Indonesia opposed foreign ownership until Suharto's New Order regime replaced the Sukarno government. Thailand was never directly colonized, but was integrated strongly with European trade interests. Despite strong American influence in the 1960s, Indonesia had strong import substitution policies in place. Ownership was tightly controlled until the early 1990s when special privileges were given to exporting firms relocating in Batam and Bintan. Import-substitution industrialization in Indonesia, Malaysia and the Philippines enjoyed tariff and quota protection, but lacked the discipline of performance standards needed to spur technological catch-up.

Patronage through clientelist influences from the Bourgeoisie dictatorship in the Philippines (Ofreneo, 2016) and Thailand (Phongpaichit & Baker, 2004), from the ruling political party in Malaysia (Gomez & Jomo, 1999) and from the army in Indonesia constrained the capacity of competition to stimulate upgrading. It was under such constrained policy regimes that their governments launched national car and steel firms in Malaysia (Jomo, 1990), the 'people's car' in the Philippines (Ofreneo, 2016), steel and aircraft firms in Indonesia and cement firms in Thailand.

Export processing zones were set up in the Philippines and Malaysia in the early 1970s, in Thailand in the 1980s and in Indonesia in the 1990s to stimulate FDI inflows and employment. However, both import substitution and export orientation coexisted in these countries. Apart from the Marcos regime of the 1970s and early 1980s, when the communist rebellion threatened to undermine foreign manufacturing activities in the Philippines, foreign multinationals dominated manufactured exports in both countries.

While all four countries introduced a range of incentives and offered basic infrastructure (at least in export processing zones) to attract FDI, they had no strategy in place to stimulate technological upgrading for several decades. Malaysia attempted to do so in 1991, but could not for want of a framework to govern this upgrading. Strategic industries were identified and given financial incentives and grants, but no roadmap or appraisal was implemented. While the 'carrot' (rents) was proffered, the 'stick' (discipline)

remained largely absent. Thus, manufactured exports in Malaysia remained in low value-added assembly and processing activities.

Malaysia and Thailand have done better than the Philippines and Indonesia. This is primarily because Malaysia attempted to stimulate upgrading in 1991, while resource endowments helped generate foreign exchange from oil and gas exports and oil palm processing. In Thailand's case, the country supported upgrading in 2000 in industries such as the automotive industry (Intarakumnerd & Chaoroenporn, 2013).

The institutions set up thereafter include the Human Resource Development Council, the Malaysian Technology Development Corporation, the Multimedia Super Corridor and the Malaysia Industry Government High Technology and Multimedia Corporation. Additionally, the Malaysian Institute of Microelectronics Systems was corporatized, S&T parks established and R&D grants provided. Nonetheless, there has been no effective selection, monitoring and appraisal of state-promoted industrial enterprises (Rasiah, 1999). In the case of the Philippines, which accepted structural adjustment packages in the mid-1980s, no active industrial policy has re-emerged (Ofreneo, 2016).

Localization policies – especially in automobile assembly, based on components sourced domestically – and joint ventures were the norm in all four countries during import substitution. This rule still applied in 2016 through nontariff barriers in Malaysia after the ASEAN Free Trade Area was launched in 1992. Such provisions were deregulated in the Philippines, Thailand and Indonesia in the 1980s, 1990s and 2000, respectively. While such policies stimulated joint ventures in components and knocked down parts production, they were confined to low value-added national and regional markets.

The lack of connectivity to a highly evolved innovation system networked with universities, R&D laboratories and science parks has restricted technological upgrading in supply chain firms in Indonesia and the Philippines. The development of meso-organizations such as R&D labs, linkages with universities and provision of grants in numerous industries in Malaysia and in electronics and automotive products in Thailand has enabled some firms to progress to designing activities (Rasiah, 2013; Intarakumnerd & Chaoroenporn, 2013).

To some extent, Malaysia was the first to follow South Korea's example when the government launched its 'Look East' policy in 1981.

Subsidized interest rates were offered to state-supported heavy industries (automobiles, cement and steel) and double-deduction incentives to exporting firms (Jomo, 1990). While the state-supported heavy industries enjoyed strong protection in the domestic economy, there was no pressure to export, although some firms such as Proton managed to export small shares of output intermittently.

In the absence of a 'stick' to compel firms to perform in global markets, they have not been subject to the discipline needed for national firms to compete overseas. The country's steel and automobile firms have yet to achieve international competitiveness. Nevertheless, palm oil conglomerates such as Sime Darby, IOI and Felda Global Ventures, and construction firms such as United Engineering Malaysia, Gamuda and YTL have gained from technology transfers via foreign firms and strategic development to become world-class firms (Perkins, Rasiah & Woo, 2017).

Despite being endowed with the least resources and facing large debts in its early years, South Korea has – of the five countries – effectively managed its productive investment as a driver of technological catch-up among national firms. As a result, it has witnessed extensive structural change and rapid economic growth. Its autonomous government used the carrot-and-stick approach to engender the conditions needed for capital accumulation and technical progress. Malaysia, Thailand, Indonesia and the Philippines, which were less insulated from clientelist pressures, have also managed to grow, but not as swiftly – either given the lack of emphasis on discipline (in the first two countries) or the lack of concerted national focus on technological progress.

7. Conclusion

The evidence shows that managing financial flows and using them effectively to stimulate technological upgrading, rather than accumulating domestic savings, is the key to rapid economic growth. Indeed, South Korea relied heavily on aid and grants in its early years of rapid growth and imposed stringent governance conditions on rent recipients to stimulate exports. Malaysia and Thailand follow in terms of economic growth, but remain far behind South Korea. These countries used incentives and grants to support the development of R&D activities between firms and labs/universities, but had no stringent mechanism to appraise and retain such support for firms that managed to increase their exports in higher value-added activities.

Not only does South Korea have a far higher per capita GDP than the other five countries, but it has also managed to transform several industrial corporations into shaping the global technology frontier. While incremental innovation characterizes all five economies, only South Korea has managed to participate in radical innovations. The combination of an autonomous state and strong governance mechanisms for sustaining discipline among firms has ensured that the rents received (through subsidized interest rates, tariff protection in early years and grants) are used productively.

Indonesia, Malaysia, the Philippines and Thailand have tried to reproduce these elements, but on a much lower scale, without effective governance and under clientelist pressures. Much of the manufactured exports sector still comprises foreign-owned firms in these countries. Formal technological catch-up strategies were never part of government planning in Indonesia, the Philippines or Thailand, although all three countries made an effort to stimulate heavy industry. Malaysia launched its Way Forward Policy in 1991 to drive technological transformation, but its execution fell short since the developmental role required to implement such a policy was compromised by political patronage.

Consistent with the arguments presented by Summers (2003) and Rodrik (2011), the evidence shows that it does not matter whether investment funds are generated through overseas debt, grants or domestic savings. What matters is how these investment flows are managed and how their use to finance technical progress is governed. South Korea, for instance, had the largest debt and the smallest domestic savings in its formative years, but went on to become a developed economy in one generation. What mattered was how it managed its financial resources. However, as with typical macroeconomic analyses, both neoclassical and Keynesian, fiscal policies have not emphasized the critical force behind such successes. Marx (1957) and Schumpeter (1934, 1943) were correct in putting technology at the forefront to explain economic transformation. Indeed, Kalecki (1976) makes the point that fiscal policies can only be effective if they stimulate productive investment.

South Korea's phenomenal success depended greatly on its focus on technological catch-up and leapfrogging as well as on its stringent implementation and enforcement of a governance mechanism of productive rents that gradually improved matching between recipients and performers, and prevented rent dissipaters from sapping the economy. Its success is all the more impressive because it transformed national firms from backward latecomers to frontier first-movers in a number of industries.

While Malaysia, Thailand, Indonesia and the Philippines have experienced significant incremental innovation, all four countries lie well below South Korea in terms of technological capabilities and economic growth. Malaysia and Thailand began to finance innovative activities in the 1990s and 2000s, respectively, which has helped them achieve upper middle-income status. However, the lack of effective meso-organizations and governance mechanisms has reduced the synergies essential to sustaining long-term economic growth.

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