ASIA'S MIDDLE-INCOME CHALLENGE: AN OVERVIEW

Gemma Estrada, Xuehui Han, Donghyun Park, and Shu Tian

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ABSTRACT

Developing Asia has undergone a dramatic shift over the past 5 decades from a region of mainly low-income economies toward one that is largely middle income. Compared with world aggregate data, developing Asia now has a much greater proportion of middle-income economies. The region faces the challenge of sustaining rapid growth after graduating from low to middle income, and moving further to high income. Evidence shows that it takes longer for economies to move from upper-middle to high income than shifting from lower-middle to upper-middle income. Still, developing Asian economies were able to shift more quickly than the rest of the world, whether the transition is from lower-middle to upper-middle income or from upper-middle to high income. The experience of newly industrializing economies shows that innovation, human capital, and infrastructure all played a vital role in their quicker transformation from middle to high income.

Keywords: Asia, economic growth, middle income

JEL codes: 010, 011

I. INTRODUCTION

Long the fastest-growing region of the world, developing Asia's economic growth slowed down noticeably since the global financial crisis of 2008–2009. The region's growth declined from 10.4% in 2007 to 5.9% in 2015. Therefore, the region has not been immune from the deceleration of global growth momentum in the postcrisis period. Even the People's Republic of China (PRC), which has become the world's second biggest economy after decades of fast growth, saw its growth fall from 14.2% in 2007 to 6.9% in 2015. Further, in light of Asia's growing share in the world economy and contribution to its growth, Asia's slowdown further dampens global economic prospects.

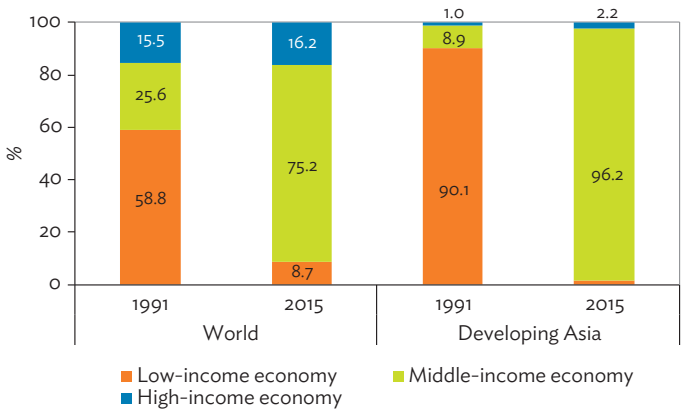
At the same time, it is likely that the deterioration of the external environment since the global crisis contributed to Asia's slower growth. Many Asian economies are export driven, and have been adversely affected by the postcrisis sluggishness of global trade. In particular, Asian exporters were hurt by the failure of the advanced economies, which remain major markets for the region. But internal factors are also at play in the decline in the region's growth. In this context, it is important to note that sustained rapid growth has transformed Asia from a largely low-income region to a largely middle-income region. Figure 1 shows the share of population in developing Asia and the world living in low-income, middle-income, and high-income economies in 1991 and 2015.[1] In 1991, more than 90% of Asians lived in low-income economies, compared with less than 60% for the world. By 2015, propelled by economic shifts in the region's largest economies—the PRC, India, and Indonesia—more than 95% in the region lived in middle-income economies. However, growing rapidly tends to become more difficult as the income gap with rich countries narrows. The transition from middle income to high income will not be driven by the same factors that enabled economies to move out of low income.

The concept of the middle-income trap crystalizes the notion that growing rapidly can become more difficult after a country moves up from low income to middle income. More precisely, according to the concept, the transition from middle income to high income is inherently more challenging than the transition from low income to middle income. The middle-income trap is firmly rooted in international historical evidence. Some middle-income countries are middle income for a very long time—for example, Latin America—and, hence, the notion that those countries are trapped in middle income. On the other hand, only a handful of countries—newly industrialized economies (NIEs) such as the Republic of Korea—have successfully made the final transition.

The confluence of a short-term trend—Asia's slowdown since the global financial crisis—and a long-term trend—the transformation of Asia into a middle-income region—means that now is a particularly opportune time to revisit the middle-income trap. More broadly, Asia now faces the challenge of continuing to grow rapidly after graduating from low income to middle income.

[1] The income groups are taken from the World Bank's classification of economies, based on gross national income per capita in United States (US) dollars.

Figure 1: Population Share by Income Group, Developing Asia and World



Source: Authors' estimates based on data from the World Bank Analytical Classifications. http://databank.worldbank.org/data/download/site-content/OGHIST.xls; and World Bank. World Development Indicators online database. http://databank.worldbank.org/data/home.aspx (both accessed 13 October 2016).

In many ways, the middle–high transition is fundamentally different from and more challenging than the low–middle transition. For instance, the government typically plays a more nuanced role in the economy since the private sector is now more developed. Another example is that productivity growth can no longer rely primarily on the low-hanging fruit of reallocating workers from low-productivity agriculture to higher-productivity manufacturing and services.

In this paper, we explore some key developmental challenges facing middle-income Asian economies, and puts forth concrete policy options for tackling those challenges. The next section documents Asia's transformation to a middle-income region over the past 50 years. The third section delves into some key constraints to the growth of middle-income countries. The section also analyzes the factors behind the success of the few countries that were able to transcend the middle-income challenge. The last section lays down some concrete policy options available for Asian economies to overcome the middle-income challenge.

II. ASIA'S TRANSFORMATION TO A MIDDLE-INCOME REGION

Over the past 50 years or so, developing Asia has undergone a dramatic shift from a region that consisted mainly of low-income economies toward one that is dominated by middle-income economies. Income classification constructed relative to the per capita income of the United States (US) in 1960 indicates developing Asia's dynamic transition since the 1960s. The income classification is based on 2011 purchasing power parity using Penn World Tables (PWT) 9.0 and covers 107 economies from 1960 to 2014. Out of the 107 economies with data since 1960, 15 are from developing Asia.[2]

[2] These cover 15 economies with income classification from 1960 to 2014, constructed using data from PWT9.0. These are Bangladesh; the PRC; Fiji; Hong Kong, China; India; Indonesia; the Republic of Korea; Malaysia; Nepal; Pakistan; the Philippines; Singapore; Sri Lanka; Taipei,China; and Thailand.

Figure 2 shows that the income distribution across the world gradually shifted from one that was largely low or middle income in 1960 toward one dominated by middle-income and high-income economies by 2014. While there were 56 low-income economies in 1960, constituting around one-half of the total number of economies with data, by 2014 their number dropped to just 24, equivalent to around one-fifth of all economies. Meanwhile, the number of high-income economies, or those that surpassed US per capita income of 1960, increased remarkably from only 2 in 1960 to 40 by 2014.

In 1960, 10 out of 15 large developing Asian economies were considered as either extremely low income or low income while the rest were lower-middle income. In 1980, slightly over half of Asian economies had reached middle-income status. Toward the end of the 1980s, three economies—Hong Kong, China; Singapore; and Taipei,China—had already achieved high per capita income, and the Republic of Korea later joined their ranks in the mid-1990s. By 2014, 9 out of the 10 low-income developing Asian economies had moved out of the low-income status, while 5 economies—the NIEs and Malaysia—had surpassed US per capita income of 1960, and thus considered high income on this measure (Figure 3).

Figure 2: Distribution by Income Class

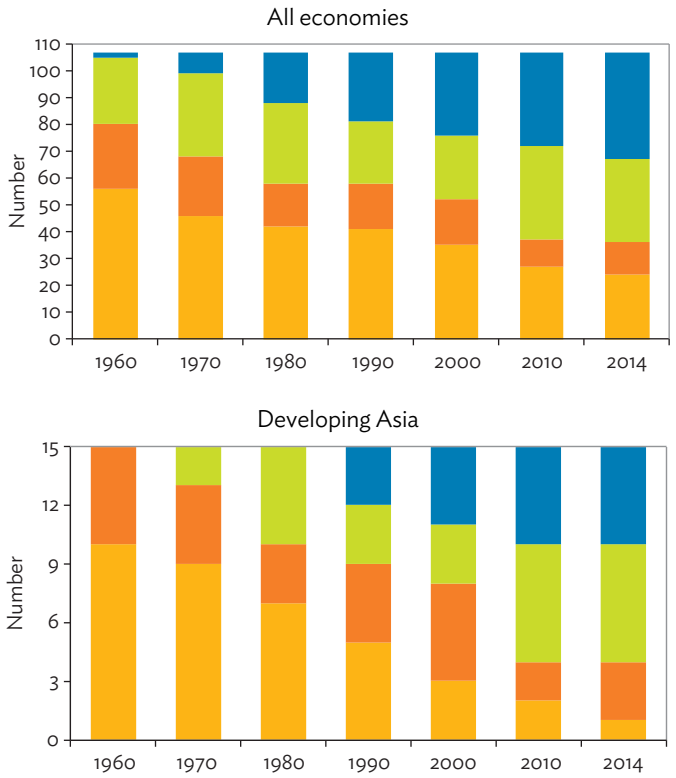


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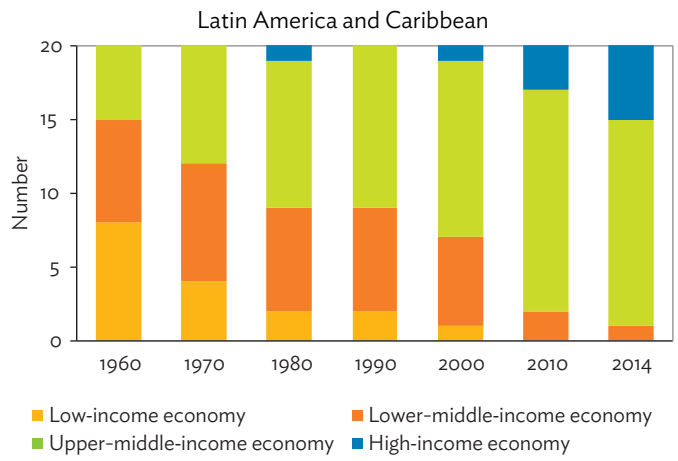
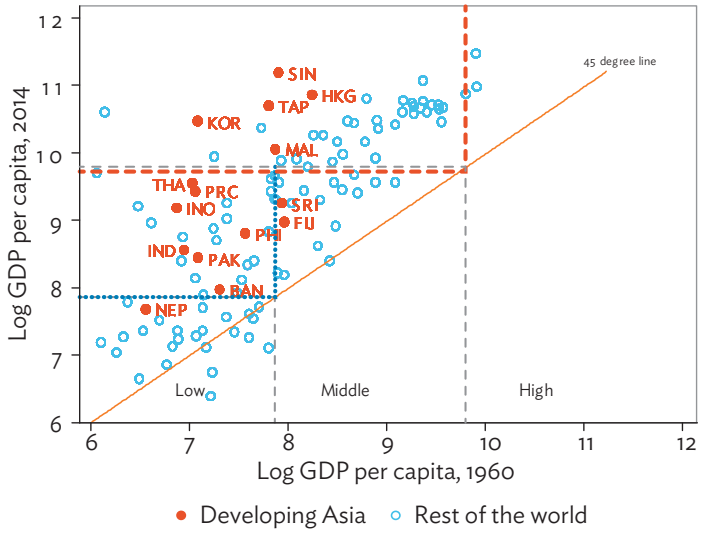
Figure 2 continued



Source: Authors' estimates based on data from Feenstra, Inklaar, and Timmer (2015).

Figure 3: Gross Domestic Product per Capita
(2011 purchasing power parity dollar)



BAN = Bangladesh; FIJ = Fiji; GDP = gross domestic product; HKG = Hong Kong, China; IND = India; INO = Indonesia; KOR = Republic of Korea; MAL = Malaysia; NEP = Nepal; PAK = Pakistan; PHI = Philippines; PRC = People's Republic of China; SIN = Singapore; SRI = Sri Lanka; TAP = Taipei,China; THA = Thailand.
Notes: The region defined by thick dashed lines is a successful transition from middle or low income to high income. The region defined by dotted lines is a successful transition from low income to middle income.
Source: Authors' estimates based on data from Feenstra, Inklaar, and Timmer (2015).

Developing Asia has undergone a more dynamic economic transition over the past 50 years compared with Latin America. As early as 1960, more than one-half of the economies in Latin America and Caribbean had already achieved middle-income status. Out of 20 economies in that region, 7 were lower-middle income, 5 were upper-middle income, and 8 were either extremely low or low income in 1960. By 1980, only two economies were low income while 17 were middle income. Over the next 35 years, the transition proceeded rather slowly, such that only between 2010 and 2014 did some economies surpass US per capita income of 1960 and, thus, could be regarded high income on this measure.

Standard income classification from the World Bank likewise shows the same dynamic shift in developing Asia in more recent years (Figure 4). While the World Bank database covers more economies, income classification started only in the late 1980s. For many countries, data were only available beginning the early 1990s (Box 1). Based on the World Bank classification, as of 2015, 49.3% of all economies were middle income. Only 14.2% were low income, while 36.5% were high income.[3]

Compared with aggregate data for the world, developing Asia now has a much greater proportion of middle-income economies. While half of the number of economies in the world are middle income, in developing Asia around 80% of its 45 economies in the World Bank classification are middle income, the highest proportion among developing regions. The share of the lower-middle income is higher than that of the upper-middle income in the region. Further, less than 5% are low-income economies, while 15.6% are high-income economies.

Between 1991 and 2015, developing Asia had a higher decrease in the share of low-income economies, but a lower increase in the share of high-income economies compared with the world. World Bank data reveal that, between 1991 and 2015, the number of low-income economies in developing Asia drastically fell from 15 to just 2 and, in terms of percentages, this represents a drop from 37.5% to just 4.4% compared with the rest of the world, where the proportion of low-income economies only fell from 28% to 14.2% or in terms of numbers, from 54 to 31 economies. Still, the proportion of high-income economies is still greater for the world as a whole compared with developing Asia, just as it was in the early 1990s. The share of high-income economies in the Asia rose from 10% to just 15.6%, equivalent to just three economies being added to the four high-income ones in 1991. In contrast, for the world, the increase was from 20.2% to 36.5%.

Developing Asia witnessed more significant economic transition from 2000–2010 compared to 1991–2000. Between 1991 and 2000, developing Asia saw four economies being added to the low-income group, five less lower-middle-income economies, and only two economies being added to the upper-middle-income economies. However, the period between 2000 and 2010 was remarkable for the region, such that the number of low-income economies fell by more than half, the number of lower-middle-income economies rose by around half, and the number of upper-middle-income economies increased by more than double. The only setback was that only one country moved from middle to high income during that decade in the region, compared with Latin America which experienced more economies joining the high-income ranks.[4]

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[3] The shares are based on 219 economies, of which 218 are from the World Bank database while data on one country (Cook Islands) are from the *Asian Development Outlook* database.

[4] The Republic of Korea was already high income by 1995, but shifted back to upper-middle income in 1998–2000, and by 2010 was again classified as high income along with Brunei Darussalam; Hong Kong, China; Singapore; and Taipei,China.

Since Latin America has remained largely a middle-income region, shifts in income class for this region have occurred mostly within the middle-income group. This was especially true between 2000 and 2010 when the number of lower-middle-income economies declined by almost half, all shifting to upper-middle income. Noteworthy though was that the number of high-income economies more than doubled in Latin America during that decade, and this number further increased between 2010 and 2014.

Box 1: Income Groupings from Penn World Tables 9.0 and World Bank Data Sets

The income classification constructed from Penn World Tables 9.0 (PWT9.0) ranks economies into five groups based on gross domestic product (GDP) per capita at constant 2011 purchasing power parity (PPP) dollars. These are (i) extremely low income at less than or equal to $1,096; (ii) low income between $1,096 and $2,585; (iii) lower-middle income between $2,585 and $5,351; (iv) upper-middle income between $5,351 and $17,600; and (v) high income at above $17,600. The cutoff lines were derived by making PWT9.0 data in 2011 PPP compatible with the World Bank thresholds for income groupings that are in gross national income (GNI) per capita (Atlas method). The ratios of the average GNI per capita (Atlas method) to GDP per capita in constant PPP per income group were applied to the thresholds in GNI per capita (Atlas method) to get the equivalent thresholds in GDP per capita in 2011 PPP. Adjustments were made to make the United States (US) income of 1960 as the threshold for classifying high-income economies. Further, the thresholds for lower-middle and upper-middle income were calibrated so that there are about the same number of countries in the lower-middle and upper-middle-income categories in 1960. The procedure broadly replicates that of Han and Wei (2015) who used 2005 PPP.

The World Bank classifies economies into four income groups: low, lower middle, upper middle, and high, based on GNI per capita in US dollars, converted from the local currency using the World Bank Atlas method. Countries are assigned groupings on 1 July each year, based on the estimate of their GNI per capita for the previous calendar year. The World Bank acknowledges that, while GNI per capita does not completely summarize a country's level of development, it is considered an easily available indicator that is closely related to nonmonetary measures of the quality of life such as life expectancy at birth, child mortality, and school enrolment rates. The thresholds are updated annually with an adjustment for inflation. The current methodology for estimating inflation uses the change in the special drawing rights deflator compiled from inflation measures of economies that are included in the International Monetary Fund's special drawing rights; namely, Japan, the United Kingdom, the US, and the euro area.

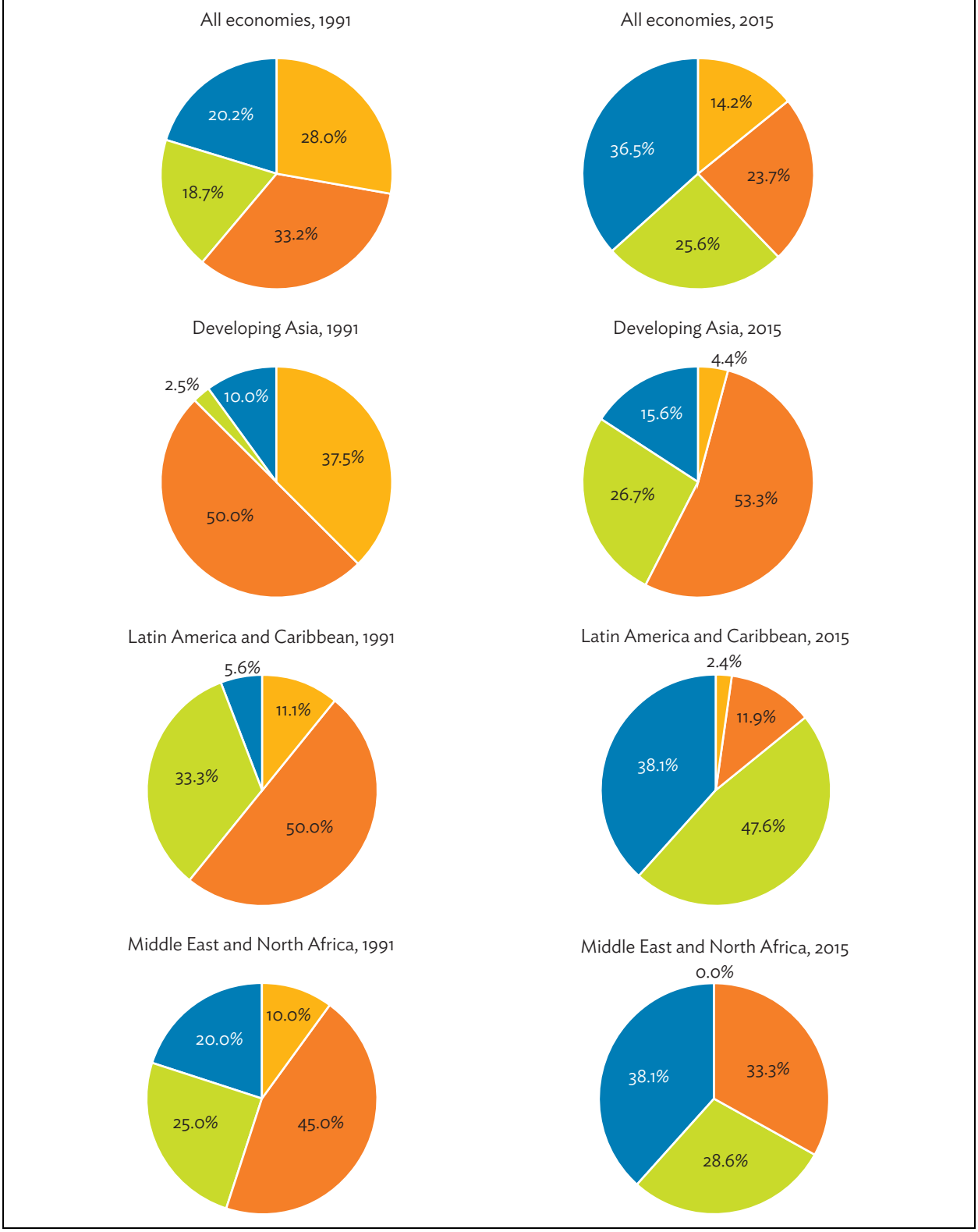
On 1 July 2016, the World Bank classified an economy in 2015 as low income, if its GNI per capita is $1,025 or less; lower-middle income if GNI per capita income is between $1,026 and $4,036; upper-middle income if GNI per capita is between $4,036 and $12,475; and high income if GNI per capita is $12,476 or more. Because these thresholds apply only to current GNI per capita in 2015, and other years apply different thresholds, they are not directly comparable with PWT thresholds that are based on GDP per capita at PPP in constant 2011 dollars.

Compared with the World Bank data, PWT includes more years but fewer economies. PWT also allows one to track income classification of economies starting in 1960, although only 107 out of its 182 economies have been classified since 1960. The World Bank covers 218 economies but data started only in 1987, with close to 90% of the economies classified annually beginning only in 1991.

There are cases when countries are classified differently under the two data sets. For example, a middle-income economy that graduated to high income in PWT may be classified as still middle income in the World Bank data. Take the case of Malaysia, which had a per capita GDP that already exceeded the 1960 constant US per capita GDP in PPP starting in 2007 in the PWT, and thus could be considered high income on this measure. However, in the World Bank data, it remains middle income. Kazakhstan and Turkmenistan are two other Asian economies that are classified as already high income based on PWT, but not in the World Bank data. Despite the differences, both PWT and the World Bank data sets show developing Asia's dynamic transition from generally low income to largely middle income.

Source: Authors' compilation.

Figure 4: World Bank's Classification of Economies, 1991 and 2015
(%)



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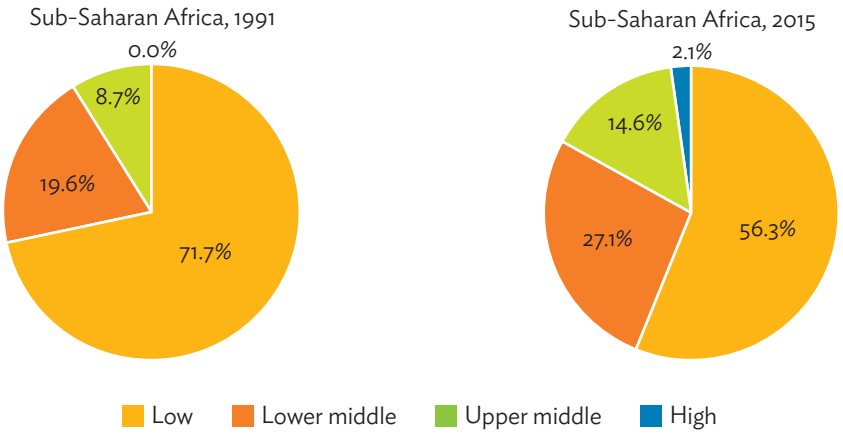


Source: Authors' estimates based on data from World Bank, World Development Indicators online database. http://databank.worldbank.org/data/home.aspx (accessed 13 October 2016); and *Asian Development Outlook* database.

III. SOME EVIDENCE ON THE MIDDLE-INCOME CHALLENGE

The topic of the middle-income challenge has received a great deal of attention in recent years. There are various studies that have examined the issue more closely and have applied different approaches.

There is a view that the middle-income trap is a problem of growth slowing down. Related to this, Eichengreen, Park, and Shin (2011) analyzed historical experience with growth slowdowns and found that correlates of growth slowdowns were positively associated with high growth in the earlier period, unfavorable demographics (in particular, high old-age dependency ratios), very high investment ratios, and an undervalued exchange rate. The analysis of Eichengreen, Park, and Shin (2011) also shows that growth slowdowns are productivity growth slowdowns, as 85% of the slowdown in the rate of output growth can be explained by a slowdown in the rate of total factor productivity (TFP) growth. Hence, slowdowns coincide with the point in the growth process where it is no longer possible to boost productivity growth by transferring labor from agriculture to industry, and where gains from adopting foreign technology begin to fade.

In their more recent study, Eichengreen, Park, and Shin (2013) looked at the correlates of growth slowdowns in fast-growing middle-income countries, and found that slowdowns occur in two modes in the $10,000–$11,000 range and another at $15,000–$16,000. Slowdowns are less likely to occur in countries where the population has a relatively high level of secondary and tertiary education. However, this was not evident for education in general. This suggests that high-quality human capital matters more than low-quality human capital for avoiding growth slowdowns. Advanced education may be critical for middle-income countries in moving toward the production of more technologically sophisticated goods and services. In addition, slowdowns are also less likely to occur where high technology accounts for a relatively large share of exports, thus indicating the importance of moving up the technology ladder in order to avoid the middle-income trap. As in their earlier paper, Eichengreen, Park, and Shin (2011), slowdowns are more likely to occur in countries with undervalued exchange rates, high old-age dependency ratios, and high investment ratios.

A. Transitioning to Higher Income: How Long Does It Take?

Empirical evidence suggests that it may take some time for an economy to move up to high income. Felipe, Kumar, and Galope (2017) estimated thresholds that are equivalent to the number of years it took countries to move from lower-middle income to upper-middle income, as well as from upper-middle income to high income. They used the thresholds to determine whether countries are in a middle-income trap. In particular, a country would be considered in the lower- (upper-) middle-income trap if it has been in the lower- (upper-) middle-income group longer than historical experience. One threshold is equivalent to the median number of years that countries spent in moving from lower-middle-income group to upper-middle-income group, while another threshold was equivalent to the median number of years that it took countries to move from upper-middle income to high income. Felipe, Kumar, and Galope (2017) found that it took about 64 years for economies that became lower-middle income in 1950 or before to graduate to upper-middle income. The transition was faster for economies that became lower-middle income after 1950, as it took only 28 years for them to graduate to upper-middle income. The faster shift in the postwar period was mainly driven by the East Asian economies, without which the median is 52 years.

This study reexamines the thresholds of graduating from lower-middle income to upper-middle income, and from upper-middle income to high income using 2011 purchasing power parity data from PWT9.0 in 1960–2014. Data show that there were 23 out of 107 economies which became lower-middle income and graduated to upper-middle income between 1960 and 2014. The median number of years that it took the economies to graduate from lower-middle income to upper-middle income was 15 years. The transition to upper-middle income was most evident in 2000–2009 when 10 out of the 23 economies moved to upper-middle income. The seven developing Asian economies that were able to shift to upper-middle income were the PRC; Indonesia; the Republic of Korea; Malaysia; the Philippines; Taipei,China; and Thailand. Except for Indonesia and the Philippines, these economies were able to move up from lower-middle to upper-middle income between 9 and 15 years, or no higher than the median number of years for all economies.

There is evidence that it takes longer for economies to move from upper-middle income to high income than moving from lower-middle to upper-middle income. Out of the total economies, there were 15 that became upper-middle income and graduated to high income. The median number of years it took these economies to advance from upper-middle income to high income was 23 years, and thus longer than the 15 median number of years of moving from lower-middle to upper-middle income. This pattern was also seen among developing Asian economies that became upper-middle income and graduated to high income; namely, the Republic of Korea, Malaysia, and Taipei,China. While it took the Republic of Korea about 10 years to move from lower-middle income to upper-middle income, it took 13 years for the country to move toward high income. For Taipei,China, the corresponding periods were 10 years from lower-middle to upper-middle income, and 17 years from upper-middle to high income.

In general, the shifts in income classification proceeded more quickly among developing Asian economies than the rest of the world whether the transition is from lower-middle to upper-middle income or from upper-middle income to high income. The median number of years for developing Asia in moving from lower-middle to upper-middle income is 13 compared with 17 for the rest of the world. Further, the shift to high income took another 19 years for developing Asian economies compared with 30 years for the rest of the economies. Hence, other economies may learn from the experience of successful developing Asian economies, particularly the NIEs, on how to overcome the middle-income challenge and transition to high income.

B. Structural Characteristics: Middle Income versus Low Income and High Income

In this section, we show that middle-income economies are structurally different from low-income and high-income economies. They differ in various important features, including demographic characteristics, infrastructure and human capital levels, finance sector development, and quality of governance. The box-and-whisker plots in Figure 5 show the heterogeneity among different income groups, as well as the variations within each income group.

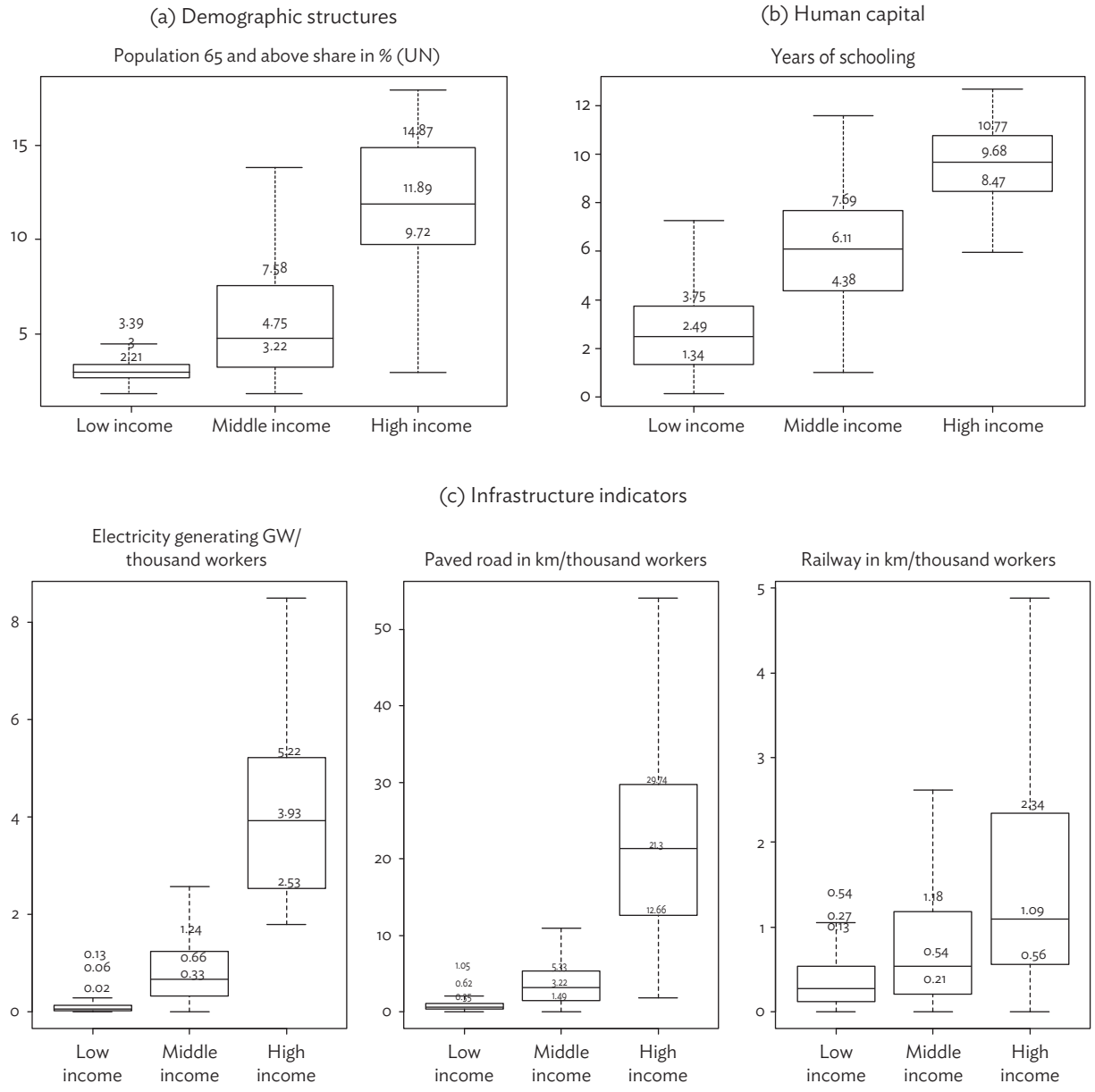
On demographic profile shown in Figure 5a, middle-income economies have a lower share of elderly population compared with high-income economies, but have higher shares than the low income. In particular, the shares of population ages 65 and above have a median of 4.8% in middle-income economies, less than half the 11.9% of the high-income economies, but higher than the 3% of the low-income economies. Favorable demographics will be an important source of growth among middle-income and low-income economies. This can provide an opportunity for catch-up with the high-income economies, but needs to be complemented by other critical factors that boost growth.

The levels of human and physical capital are considered important in driving productivity growth. Middle-income economies, however, tend to fare less compared with high-income economies in these measures. On human capital, the middle income trail the high income by about 3.5 years in terms of median years of schooling (Figure 5b). On physical capital, following direct measures of infrastructure development suggested by Calderón, Moral-Benito, and Servén (2014), the median length of paved roads in middle-income economies is only 3.2 kilometers (km) per thousand workers, substantially shorter than the 21.3 km for high-income economies. Road length in middle-income economies is only somewhat better than that of low-income economies that have median paved roads at less than 1 km per thousand workers. Other infrastructure development measures suggested by Calderon, Moral-Benito, and Serven (2014), in particular, electricity-generating capacity in gigawatts per thousand workers and total length of rail in kilometers per thousand workers, show the same wide gap of the low income and middle income versus the high income (Figure 5c).

The finance sector in middle-income economies also lags behind that of high-income economies in terms of both depth and efficiency. Domestic credit to private sector has a median of 26.4% of gross domestic product in middle-income economies. For low-income economies, the corresponding figure is 13.3%. Considered a measure of finance sector efficiency, the bank lending–deposit spread is 6.5% in the middle income, just in between the 4.2% for the high income and 8.3% for the low income.

Governance structures are less favorable in middle-income economies than in high-income ones. This is observed from the political constraints index constructed by Henisz (2002) that takes into account the structure of a country's political institutions and how this affects the choice of future policies. With values ranging between 0 and 1 and a higher number indicating better governance, the median for the middle income is 0.3 while it is 0.5 for high income. The middle-income economies are doing better than low-income economies at a bigger margin than its gap with high-income economies. However, governance quality in middle-income economies tend to have a larger variation compared with either the low-income or high-income economies.

Figure 5: Descriptive Statistics by Income Group



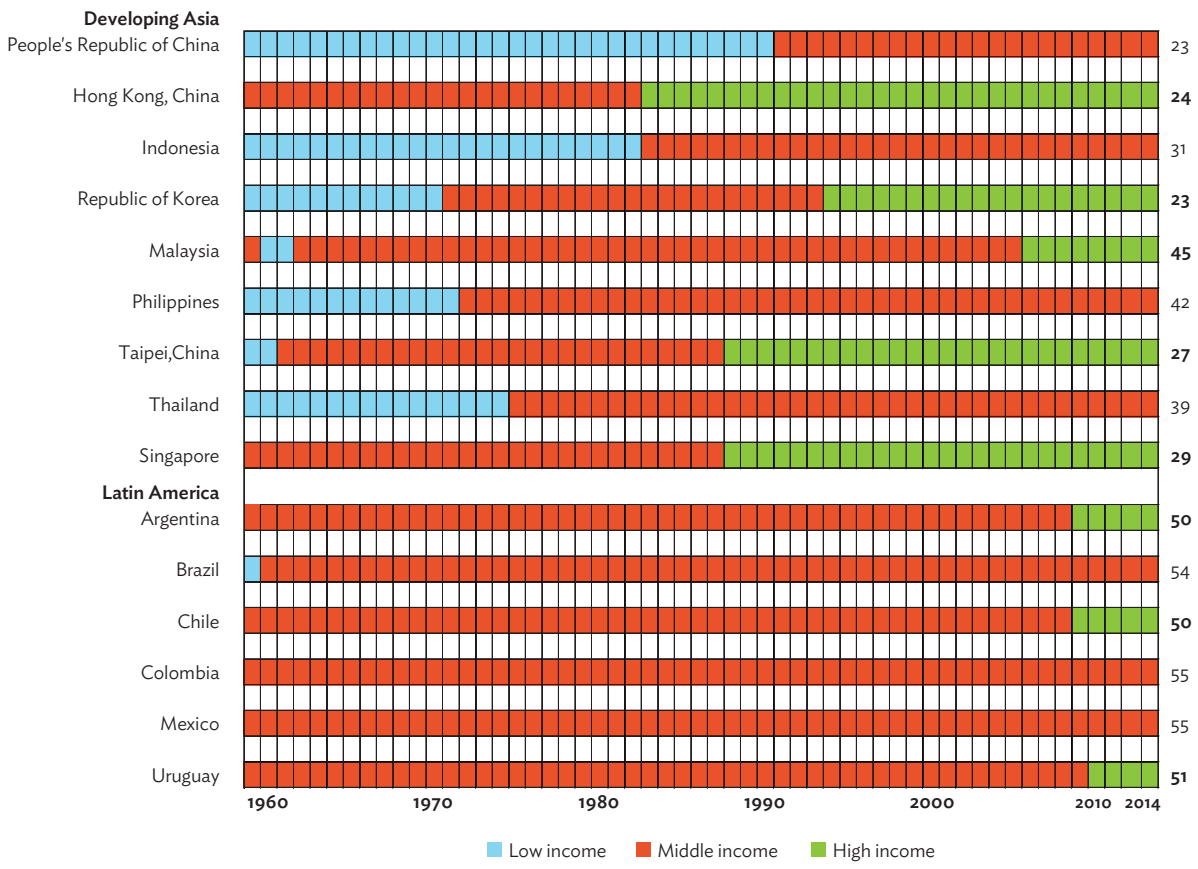
GW = gigawatt, km = kilometer, UN = United Nations.
Source: Authors' estimates using data from Cross-National Time-Series (CNTS) Data Archive; Henisz (2002); Penn World Table 9.0; Reinhart and Rogoff (2009); and World Bank. World Development Indicators online database. http://databank.worldbank.org/data/home.aspx (accessed 13 October 2016).

C. Difficulties in Overcoming the Middle-Income Challenge

It is important to examine the possible factors behind the slow transition among countries that have been stuck at the middle-income level for quite some time. Figure 6 shows the number of years that selected economies in developing Asia and Latin America stayed as middle income between 1960 and 2014. For the large Southeast Asian countries that started as low or middle income in 1960; namely,

Indonesia, Malaysia, the Philippines, and Thailand, their middle-income stage has so far averaged around 40 years. In Latin America, countries such as Brazil and Mexico have been middle income much longer, at over 50 years now.

Figure 6: Years as Middle Income, 1960–2014



Notes: Numbers beside the horizontal bars are the years as middle income between 1960 and 2014. Economies whose years are in boldface are those who have reached high income, based on the income classification using purchasing power parity in constant 2011 dollars from Penn World Tables 9.0.
Source: Authors' estimates based on data from Feenstra, Inklaar, and Timmer (2015).

In Mexico, despite past economic reforms, growth has not picked up substantially. Kehoe and Ruhl (2010) examined why Mexico's reforms toward openness to trade and foreign investment did not result in higher rates of economic growth, unlike the PRC. Mexico's opening in the mid-1980s initially resulted in large increases in trade and foreign direct investment, which as shares of gross domestic product reached levels that were comparable with those of the PRC. In the mid-1990s, Mexico was second to the PRC in merchandise trade as well as in foreign direct investment recipients among emerging and developing economies. However, by 2008 Mexico's ranking had fallen while the PRC continued to surge. Kehoe and Ruhl (2010) concluded that factors like an inefficient finance sector, lack of contract enforcement, and rigidities in the labor market kept Mexico from benefiting from its policy reforms related to international trade and investment.

Within developing Asia, Malaysia and Thailand, by the close of the century, achieved high productivity levels that were close to advanced countries, but have failed to sustain productivity

increases. Over the past 2 decades they have maintained similar pattern of labor-intensive production and exports that eventually faced strong competition from low-cost producers such as the PRC and India and, more recently, Viet Nam and Cambodia. They failed to move up the value chain and break into fast-growing markets that are knowledge intensive and innovation based (UNIDO 2009).

While Malaysia recorded improvements in average schooling and in key economic indicators such as business climate, infrastructure, and trade openness, its productivity gains have largely lagged behind. The country's approach toward technology adoption and creation differed with that of the Republic of Korea and Taipei,China—countries that relied on local technology creation supported by their governments and where governments were directly involved in creating winners. In the case of Malaysia, technology transfer and diffusion from multinational corporations was facilitated, but this did not yield in substantial gains relative to the other two economies. Multinational corporations helped in the transition toward higher export sophistication and upgrading, but less to technology diffusion (Cherif and Hasanov 2015).

As the middle-income challenge is an issue akin to economic growth slowdowns, Han and Wei (2015) examined the factors driving growth performance. They found that middle-income countries are faced with difference challenges that are conditional on their fundamental and policy conditions (Box 2).

Box 2: Factors Driving Economic Growth Using a Regression Tree

By using a nonparametric machine-learning approach–Regression Tree, Han and Wei (2015) examine what factors drive economic growth performance. They use real gross domestic product (GDP) per capita from the Penn World Table 8.0 to construct economic growth at the country-decade level. They divided the sample into 5 decades, i.e., 1960–1969, 1970–1979, 1980–1989, 1990–1999, and 2000–2009. For each country and each decade, they have a decade-average annual growth rate, which is used as the left-hand-side variable of the analysis.

For the potential factors, they include both structural factors and policy choices factors. The potential factors are represented by 31 variables, including demographic factors, such as working-age population share (15–64 years old), working-age population growth (15–64 years old), and sex ratio (male/female) from age 0–29; infrastructure factors, such as paved road in kilometer per 1,000 workers, power-generating capacity in gigawatts per 1,000 workers, and railway in kilometer per 1,000 workers; human capital such as years of schooling; financial development factors, such as percentage of domestic credit to private sector in GDP, bank credit to deposit ratio, and bank lending-to-deposit rate spread; macroeconomic stabilities, such as inflation, number of years with either banking or currency crises in a decade, and government debt share in GDP; openness, such as trade share in GDP and foreign direct investment (FDI)/non-FDI inflows; political institutional factors, such as political constraints, ideological polarization, executive constraints, economic freedom, corruption perception index, and democracy scale; external environment such as the growth rate of leading economies; and whether oil exporter economy. For most of the factors, they use their initial values at the beginning of each decade to mitigate endogeneity concerns.

Different from the traditional regression approach, the Regression Tree approach allows missing values for right-hand-side variables, which enable us to do horse-racing among many potential growth-driving factors with imposing priory assumptions. Another advantage of the Regression Tree approach is to represent nonlinear relationships between factors. That is, some variables only become constraining/promoting growth when another variable reaches a certain value. All country decades classified in the same ending group will share similar growth performance, which is represented by the average growth rate for that group, and share similar key common features, which are represented by the splitting structure of each branch.

continued on next page

Box 2 continued

For middle-income country decades, Han and Wei (2015) found different difficulties emerging conditional on the fundamental and institutional conditions. For example, when the fundamental demographics, measured by the share of population 15–64 years, is unfavorable—lower than 58.5%—a relatively high government debt ratio will emerge to constrain the growth performance and generate an expected annual growth rate lower than 1.7%. Meanwhile, for countries having such characteristics, if their financial development is poor too, measured by credit to private sectors, which is lower than 28.8%, they expect to have a negative growth rate as –1.3%. In such circumstances, the scenario facing the country is worse than being trapped: it moves backward. For example, in 1970, Sri Lanka had such conditions and then experienced a –4.46% annual growth in the decade from 1970 to 1980, a serious backward moving.

If a middle-income country faces unfavorable demographics with the share of population 15–64 years lower than 58.5%, is there any chance for it to enjoy high growth performance? The answer is yes. If it can manage the government debt ratio within a certain limit (lower than 56%) and the currency and banking crisis in a decade no longer than 1 year, it still can expect to have 3.6% annual growth rate.

On the other hand, if enjoying favorable demographics, does the country still face the risk of having stagnant growth scenario? The answer is yes. If a country's GDP level has reached $5,431 in 2005 purchasing power parity and has fewer political constraints, it still expects to have very looming growth scenario, an annual growth rate of 1.8%; or a country has a high government debt ratio, higher than 41.5%, when the demographics are not in a very favorable situation, that is the share of labor force age population is higher than 58.5% but lower than 64.4%, its expected growth rate is 2.8%, not reaching 3%.

Based on the findings, they argued that middle-income countries face different challenges conditional on their fundamental and policy circumstances.

Source: Han, Xuehui and Shang-Jin Wei. 2015. "Re-examining the Middle-Income Trap Hypothesis: What to Reject and What to Revive?" ADB Economics Working Paper Series No. 436.

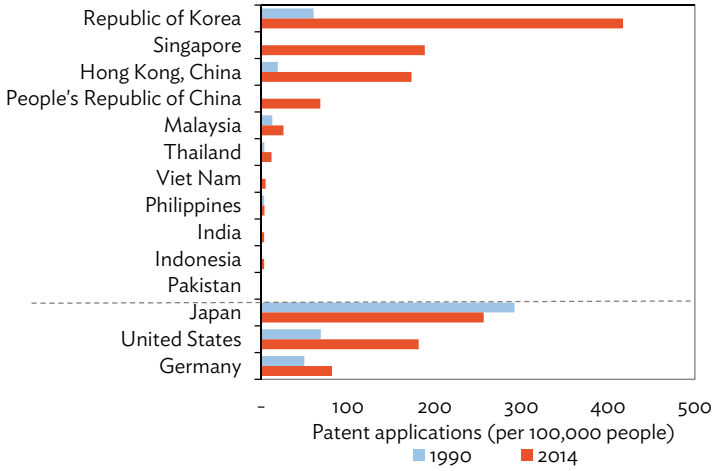
D. Newly Industrialized Economies: Exception to the Rule

There are key lessons that can be drawn from the experience of NIEs in overcoming the middle-income challenge. In 1960, both Singapore and Hong Kong, China were lower-middle-income economies while the Republic of Korea and Taipei,China were low income like most Asian economies at that time. The transition from middle-income to high-income status, which means exceeding US per capita income in 1960, took less than 30 years for NIEs, which were low income in 1960, or less than the median number of years for all countries. For the two economies that were already middle income in 1960, Hong Kong, China had 24 years and Singapore nearly 30 years as middle income between 1960 and 2014.

Like most Asian economies, the Republic of Korea and Taipei,China were both low-income economies in 1960. For Taipei,China, it took 27 years to transition from middle income to high income. For the Republic of Korea, the transition from middle income to high income spanned only 23 years. Economic growth averaged 9% in the Republic of Korea and 9.8% in Taipei,China during their middle-income stage. The experience of NIEs indicates that innovation, human capital, and infrastructure all played a vital role in their remarkable transition from middle to high income.

An important factor that enabled the NIEs to achieve high and steady growth is innovation, leading to their rapid technological progress. Both the Republic of Korea and Taipei,China sustained productivity increases through the development of new technologies by local firms, and thus were able to move into higher income levels (Cherif and Hasanov 2015; and Agenor, Canuto, and Jelenic 2012). The drive toward innovation was supported by strong protection of intellectual property rights. In 1990, 5 years before the Republic of Korea became high income, the country's number of patent applications per 100,000 people was already comparable with that of Germany and the US (Figure 7).

Figure 7: Patent Applications



Source: Authors' estimates based on data from World Bank. World Development Indicators online database. http://databank.worldbank.org/data/home.aspx (accessed 7 November 2016).

Direct government support played a key role in spurring innovation among the NIEs. In Taipei,China, authorities had a direct hand in creating innovative firms through the spin-off system, supported by returnees that gained significant experience and networks. The government relied on the following key strategies: (i) fostering close and long-term relationships between small and medium-sized enterprises and multinational corporations, (ii) focusing on public and quasi-public research institutes to spin off firms and create new technologies, (iii) technological leapfrogging at an early stage of development that was decided and led by the government, and (iv) huge investment in training engineers overseas. In the case of the Republic of Korea, the government pushed several chaebols to enter several industries simultaneously and export almost immediately to create global brands. State support included access to credit that was conditional on explicit and quantifiable export targets, and such pressure to export pushed companies such as Hyundai to move faster in terms of research and development (R&D) and technological upgrading (Cherif and Hasanov 2015).

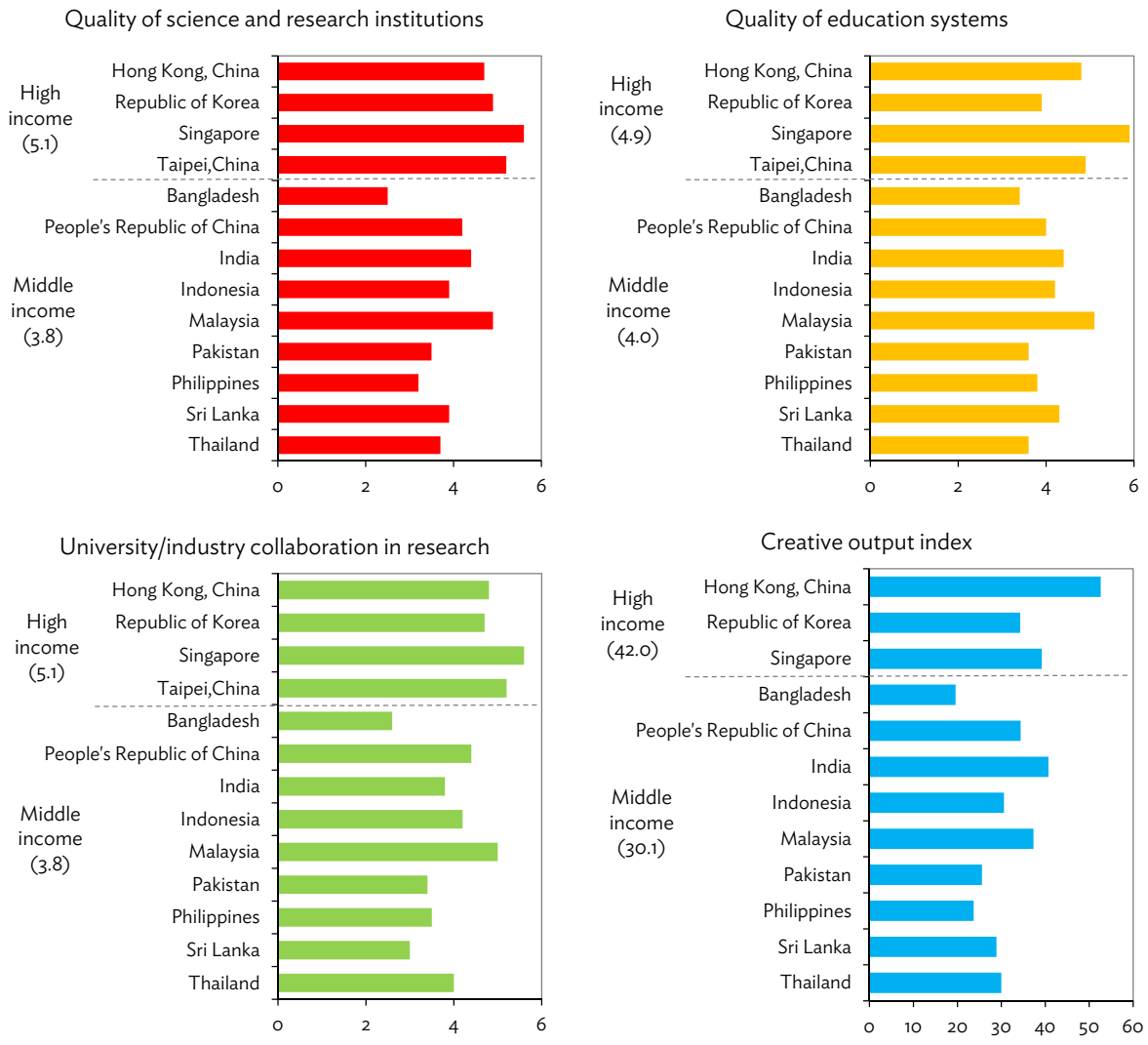
In addition to innovation, advanced infrastructure networks also facilitated a rapid pace of transition among the NIEs. Setting up high-speed communication and broadband technology was aided by the liberalization of telecommunication networks and related regulatory reforms. For economies such as the Republic of Korea and Taipei,China that have large export-oriented information equipment industries, the strong drive toward global competitiveness pushed them to develop robust broadband and multimedia industries in their own domestic markets. In the case of Singapore and Hong Kong, China, advanced infrastructure networks boosted their status as regional headquarters for large foreign multimedia companies (Agenor, Canuto, and Jelenic, 2012).

Human capital accumulation facilitated innovation among the NIEs and enabled them to transform into knowledge-based economies. Human capital accumulation can contribute to more skilled workers who are capable of utilizing and creating new knowledge. By shifting towards a knowledge-based economy, a country needs to follow a development approach that emphasizes more on the quality of education, including R&D investments in science and technology. Figure 8 illustrates

how high-income Asian economies in general have a stronger position in research and knowledge creation than middle-income economies.

The NIE experience shows that combining R&D and human capital investments with a sound institutional environment which provides incentives for efficient use of knowledge can shift an economy from investment-led growth to innovation-led growth. One good example of such a transformation is the Republic of Korea, which moved up to high income on the basis of innovation, human capital, and infrastructure (Box 3).

Figure 8: Knowledge Production: Selected Asian Economies



Note: Figures in parentheses are averages.
Sources: World Economic Forum. 2012. *Global Competitiveness Report 2012–2013.* Geneva; Dutta, Soumitra, ed. 2012. *The Globalization Innovation Index 2012.* Fontainebleau: INSEAD.

Box 3: Lessons from the Experience of the Republic of Korea

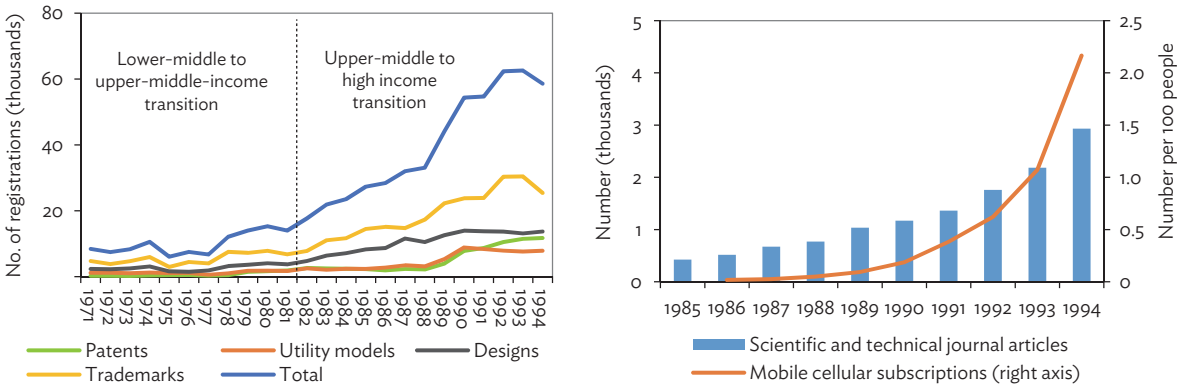
The Republic of Korea's journey toward a high-income economy benefited immensely from the adaptive policies and structural transformations which sustained its total factor productivity and economic growth. The experience of the Republic of Korea resonates more for larger developing Asian economies than the experiences of the other newly industrialized economies because the Republic of Korea itself has a large population—more than 50 million as of 2016. During its period of rapid growth, the country underwent a structural shift from labor-intensive to capital- and technology-intensive industries. From the 1960s until the early 1970s, resource-based light industries spurred the Republic of Korea's export-oriented growth. Capital-intensive industries, such as heavy and chemical industries (medium and high-technology industries), started to rise in the 1970s, lasting until the mid-1980s when high-technology industries started to surge. Its transition was supported by liberalization efforts. The government initiated key market-oriented reforms in the early 1960s until about the mid-1980s. Then, in the 1990s, it deregulated its finance sector, leading to more competition and better banking efficiency (Williams and Nguyen 2005).

Support for human capital accumulation through education reforms also played a critical role in the country's transition. During the 1960s and 1970s, secondary education was made universal, while vocational and technical high schools were established to meet skills demand of manufacturing industries. In the early 1980s, the Republic of Korea expanded tertiary education to boost human capital and adapt to the transition toward advanced industry.

Alongside education reforms, the Republic of Korea built up its research and development (R&D) capacity to enhance human capital. In the 1960s and 1970s, the country passed laws to promote science and technology and established science and technology institutes, adopting the United States graduate education and research system. In particular, the government passed The Science and Technology Promotion Act and The Science Education Act in 1967. It also established the Korea Institute of Science and Technology in 1966 and the Ministry of Science and Technology in 1968. In 1971, the government founded the Korea Advanced Institute of Sciences Act that highlighted R&D and adopted the United States graduate education and research system.

During its transition to upper-middle-income status, the Republic of Korea's knowledge production increased tremendously. The number of patents registration increased from 2,609 in 1981 to 11,683 in 1994 and the number of scientific and technical journal articles increased by nearly six times, from 424 in 1985 to 2,931 in 1994 (Box Figure). In the 1980s, the government encouraged the private sector to participate in R&D activities with policies such as tax subsidy and accelerated depreciation. Even small and medium-sized enterprises were actively involved in R&D, with some small and medium-sized enterprises allocating as much as 10% of total sales to R&D (Park 2000). Development of advanced infrastructure such as mobile telephone and broadband networks was also important in driving innovation in the Republic of Korea by lubricating knowledge creation and dissemination. Thus, various initiatives enabled the country to move toward the production of high-technology goods. Between 1988 and 1994, the country's proportion of high-technology exports to total manufacturing exports increased from 15.9% to 22.7%. This feat was achieved before the Republic of Korea turned high income in the mid-1990s.

Box Figure: Selected Technological Development Indicators for the Republic of Korea



Sources: Korea Intellectual Property Office. http://www.kipo.go.kr/upload/en/download/Registrations.xls; and World Bank. World Development Indicators online database. http://databank.worldbank.org/data/home.aspx (both accessed 13 October 2016).

IV. ADDRESSING THE MIDDLE-INCOME CHALLENGE

Drawing on the analysis, this section describes the broad contours of the policy options available for Asian economies to overcome the middle-income challenge. The middle-income challenge is a global issue rather than an Asia-specific issue, and middle-income countries across the world are confronted with similar constraints to growth and must pursue similar policies to overcome those constraints. That is, the PRC and Thailand face similar constraints and policy options as Brazil and Mexico.

Above all, in order to grow rapidly and eventually reach high income, middle-income economies must foster TFP growth. Although investment will continue to play a major role in economic growth after a country graduates from low income to middle income, productivity growth is likely to play a relatively larger role. While the growth of low-income countries is driven largely by more workers and machines, the growth of middle-income countries depends, to a larger extent, on better,—i.e., more productive, workers and machines. The experience of the NIEs, one of the few economies to escape the middle-income trap, underlines the central role of innovation in the middle-income to high-income transition. Therefore, one key policy direction is for governments to invest in innovation and encourage the private sector to invest in innovation. A specific example is public investment in information and communication technology and broadband. Besides innovation, more efficient resource allocation can also contribute to higher TFP.

Investment and TFP growth are not mutually exclusive, and the growing relative importance of TFP in growth does not dilute the contribution of investment to growth. In particular, one type of investment—infrastructure—can foster TFP growth. Infrastructure such as roads, ports, and power plants raises the productivity of the entire economy rather than just specific groups of firms and industries. While Asia has invested heavily in infrastructure in the past, the region still faces huge investment needs in the future. Developing Asia as a whole is in the midst of a demographic transition toward older populations. Population aging further strengthens the case for investing in human capital. To some extent, more skilled workers can compensate for slower growth, or even decline, of the workforce. Having reached middle income, which typically entails deeper integration into the global financial and trade systems, developing Asia will be more vulnerable to external shocks. Therefore, sustaining growth requires resilience against shocks and crises which can derail medium- and long-term growth trajectory.

Asia's journey from middle income to high income will be a much more challenging journey than its relatively fast and smooth journey from low income to middle income. Empirically, very few countries around the world made the final jump from middle to high income although plenty of countries moved up from low to middle income. This stylized fact attests to the difficulty of shifting from an input-based growth model to a productivity-based growth model. Yet some countries, most notably the Republic of Korea and the other NIEs from developing Asia, were able to innovate their way from middle to high income. This gives some cause for optimism about developing Asia's ability to continue to grow rapidly and eventually reach high income.

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Asia's Middle-Income Challenge: An Overview

Developing Asia has undergone a relatively rapid transformation from a region that consisted mainly of low-income economies toward one that is largely middle income. A key challenge for the region is sustaining rapid growth to move further to high income. The experience of newly industrializing economies shows that innovation, human capital, and infrastructure are critical to enabling a quicker shift to high income.

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