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Avoiding Middle-Income Growth Traps

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Since the 1950s, rapid growth has allowed a significant number of countries to reach middle-income status; yet, very few have made the additional leap needed to become high-income economies. Rather, many developing countries have become caught in what has been called a middle-income trap, characterized by a sharp deceleration in growth and in the pace of productivity increases. Drawing on the findings of a recently released working paper (Agénor and Canuto 2012), as well as a growing body of research on growth slowdowns, this note provides an analytical characterization of "middle-income traps" as stable, low-growth economic equilibria where talent is misallocated and innovation stagnates. To counteract middle-income traps, there are a number of public policies that governments can pursue, such as improving access to advanced infrastructure, enhancing the protection of property rights, and reforming labor markets to reduce rigidities–all implemented within a context where technological learning and research and development (R&D) are central to enhancing innovation. Such policies not only explain why some economies–particularly in East Asia–were able to avoid the middle-income trap, but are also instructive for other developing countries seeking to move up the income ladder and reach high-income status.

Middle-Income Traps Past and Present

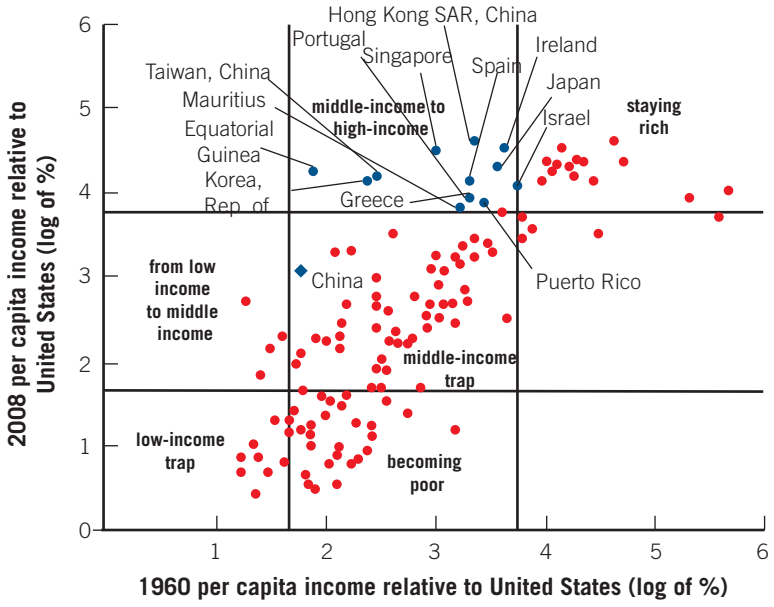
In the postwar era, many countries have managed to fairly rapidly reach middle-income status, but few have gone on to become high-income economies.[1] Rather, after an initial period of rapid ascent, many countries have experienced a sharp slowdown in growth and productivity, falling into what has been called a "middle-income trap." To be sure, the World Bank (2012) estimates that of 101 middle-income economies in 1960, only 13 became high income by 2008–Equatorial Guinea, Greece, Hong Kong SAR (China), Ireland, Israel, Japan, Mauritius, Portugal, Puerto Rico, the Republic of Korea, Singapore, Spain, and Taiwan, China (figure 1).

By contrast, although many countries in Latin America and the Middle East reached middle-income status as early as the 1960s and 1970s, a great majority of them have remained there ever since. In Latin America, for instance, income per capita relative to the United States fell almost continuously from 1960 to 2005, especially after the debt crises of the early 1980s (figure 2). Likewise, economic growth in many Middle Eastern and North African countries has waned and given way to high unemployment, as evidenced most recently by the social and political upheavals that took place during the Arab Spring of 2011.

Becoming Stuck in the Middle

Formal evidence on growth slowdowns[2] and middle-income traps has suggested that at per capita incomes of about US$16,700 in 2005 constant international prices, the growth rate of per capita gross domestic product (GDP) typically slows from 5.6 to 2.1 percent, or by an average of 3.5 percent-

Figure 1. Per Capita Incomes Relative to the United States, 1960 and 2008



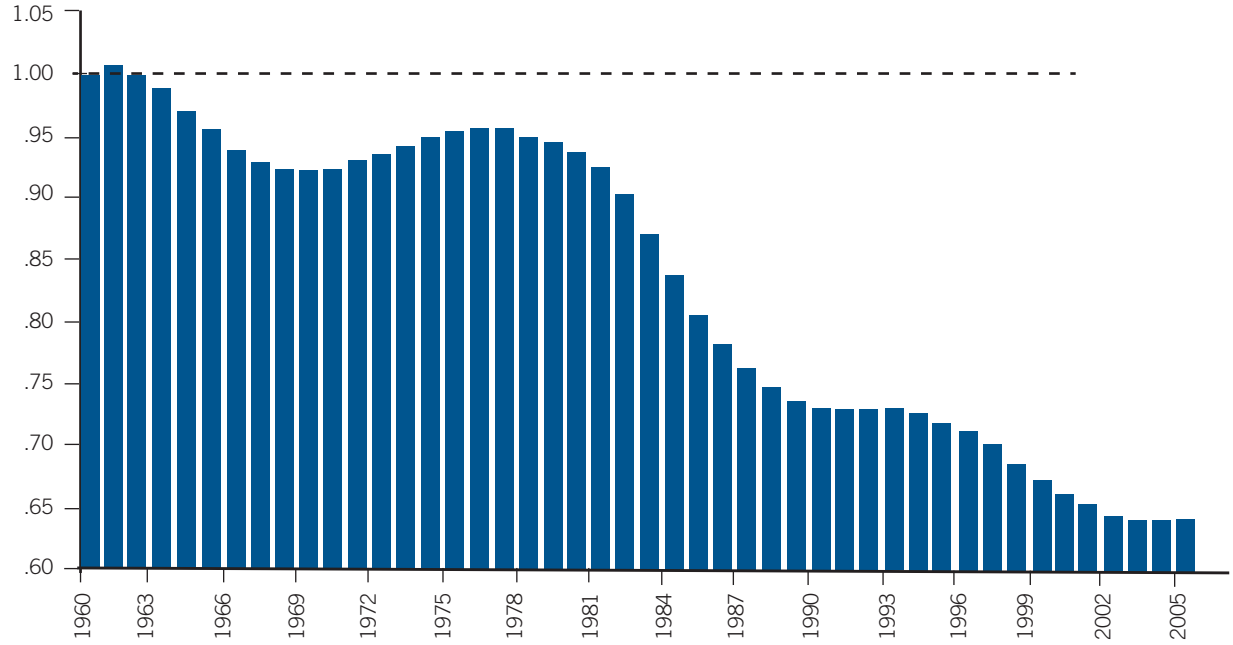
Source: World Bank 2012.

age points. Using regression and standard growth accounting techniques, this analysis (Eichengreen, Park, and Shin 2011) argues that growth slowdowns are essentially *productivity* growth slowdowns, whereby 85 percent of the slowdown in the rate of output growth can be explained by a slowdown in the rate of total factor productivity growth—much more than by any slowdown in physical capital accumulation. Therefore, middle-income traps are not simply the natural implication of decreasing marginal returns to investment in physical capital, as a simple neoclassical growth model would suggest.

A common explanation of growth slowdowns is based on a Lewis-type development process (Canuto 2011; Eichengreen, Park, and Shin 2011; and World Bank 2012). In that perspective, factors and advantages that generate high growth during an initial phase of rapid development disappear when middle- and upper-middle-income levels are reached, thereby requiring new sources of growth to maintain sustained increases in per capita income.

During an initial phase of development, low-income countries can compete in international markets by producing labor-intensive, low-cost products using technologies imported from abroad. These countries can achieve large productivity gains initially through a reallocation of labor from the low-productivity agricultural sectors to high-productivity manufacturing sectors—or to modern services. However, once these countries reach middle-income levels, the pool of underemployed rural workers drains and wages begin to rise, thereby eroding competitiveness. Productivity growth from sectoral reallocation and technology catch-up are eventually exhausted, while rising wages make labor-intensive exports less competitive on world markets—precisely at the time when other low-income countries become engaged in a phase of rapid growth. Accordingly, growth slowdowns coincide with the point in the

Figure 2. Latin America: Per Capita Income Relative to the United States, 1960–2005



Source: IDB 2010.
Note: Index, 1960 = 1.

growth process where it is no longer possible to boost productivity by shifting additional workers from agriculture to industry and where the gains from importing foreign technology diminish significantly (figure 3).

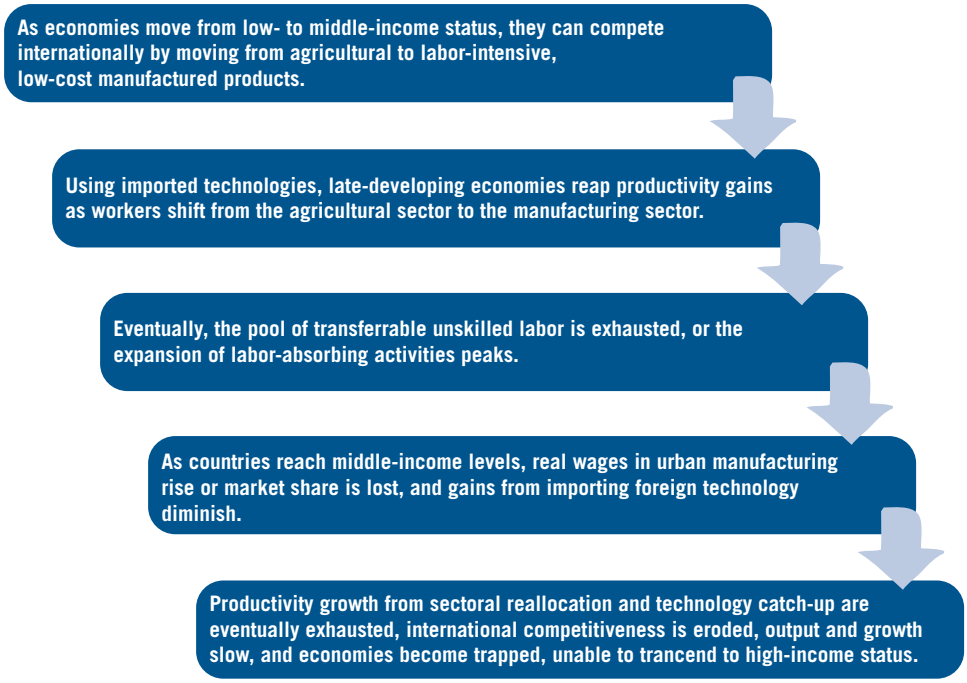
An Overlapping Generations Perspective on Middle-Income Traps

An alternative characterization of a middle-income trap has been developed in a recent working paper (Agénor and Canuto 2012).[3] Although this analysis fundamentally agrees that productivity slowdowns are a major cause of middle-income traps, it differs from the existing literature in terms of the reasons why productivity growth may weaken and what type of public policies can help avoid such a slow-growth equilibrium. In particular, several factors may affect productivity growth, including individual decisions to acquire skills, access to different types of public infrastructure, and *knowledge network externalities*—which are defined as the possibility that a higher share of workers with advanced levels of education has a positive impact on performance, that is, the ability to benefit from existing knowledge, of all workers engaged in innovation activities.[4]

Using an overlapping generations (OLG) model that distinguishes between two types of labor, basic and advanced, this most recent analysis focuses on embodied human capital, in which advanced skills are defined as specialized knowledge that can be acquired by devoting a given amount of time to higher education in early adulthood. In this model, individuals with either basic or advanced skills can both work in the production of final goods (or manufacturing), whereas only those with advanced skills can work in the innovation sector (or, more generally, design activities). Because labor is relatively more productive in the design sector, an increase in the supply of workers with advanced skills is growth enhancing. Critically, this model also assumes that occupational choices are endogenous; individuals choose to invest in education only if wages in the design sector are high enough, compared to manufacturing. Due to the combination of a *knowledge spillover* and a *learning-by-doing* effect, the marginal productivity gain associated with the stock of ideas is initially increasing, which is particularly relevant for countries at low levels of development.

Subsequently, the model considers two types of infrastructure: *basic* infrastructure, which consists of roads, electricity and basic telecommunications, and *advanced* infrastructure, which consists of advanced information and communication technologies (ICTs) in general, and high-speed communications networks in particular. It is now well established that access to broadband facilitates the buildup of domestic and international knowledge networks and promotes dissemination of information and research (see Canuto, Dutz, and Reis [2010]). Broadband networks also serve as a tool that other sectors can leverage to develop previously untapped platforms (such as distance education and telemedicine) and enable the development of digital content—all of which can help promote innovation. Thus, while basic infrastructure helps to promote the production of final goods, advanced infrastructure is particularly important to promote

Figure 3. Becoming Stuck in the Middle-Income Trap



Source: Authors' illustration.

design activities.[5] Because labor supply decisions are endogenously related to relative wages, there is a two-way interaction between these activities and the proportion of the population acquiring advanced skills.

The key extension of this model is that if the marginal benefits associated with nonrival (disembodied) knowledge depend in a nonlinear fashion on the share of the population involved in design activities (being high for a range of values for that share), as a result of a knowledge network effect, then multiple equilibria may emerge, one of them (the lower-growth equilibrium) being synonymous with middle-income traps. This low-growth equilibrium is also characterized by a misallocation of talent, because a number of individuals with high ability, who could be highly productive in research activities, end up working in manufacturing and performing more routine tasks.

Avoiding the Middle-Income Trap and Moving Up the Income Ladder

Building on the model described above, there are a number of public policies that developing countries can employ to avoid or escape from middle-income growth traps. Such measures include developing advanced infrastructure in the form of high-speed communications networks, improving the enforcement of property rights through patent protections, and reforming labor markets to ensure that rigidities do not prevent the efficient firing and hiring of employees. Fundamentally, these policies attract more high-ability workers into the design sector, improve productivity and wages in that sector, and increase a country's capacity for innovation.

Access to advanced infrastructure

Escaping from a middle-income trap may be achieved by a sufficiently large increase in investment in advanced infrastructure, particularly in high-speed communications networks. Intuitively, to benefit from existing ideas, there must be enough high-ability individuals involved in the design sector; but if productivity in that sector is low because of a lack of access to advanced infrastructure, wages will continue to be low—implying that few high-ability individuals will choose to invest in the advanced skills needed to operate in that sector. The availability of good-quality information and communications infrastructure play an important role in fostering innovation both by facilitating the cheap circulation of disembodied knowledge flows across and within national borders as well as by reducing the transaction costs of international trade and foreign investment. Thus, improving access to advanced infrastructure boosts productivity and wages in the design sector, which draws more labor and triggers the shift in labor supply that magnifies (at least temporarily) the benefit associated with exploiting the existing stock of ideas.

Enforcement of property rights

To create incentives for individuals and firms to engage in innovation and design activities, the enforcement of patents is essential; however, in developing countries, this is often lacking. A poorly functioning system to administrate patents and enforce property rights may create a deadweight loss for the economy and make it more likely for countries to be caught in a middle-income trap. Conversely, improved enforcement of property rights enhances innovation and translates into higher wages in the design sector, which would draw more high-ability workers into that sector. Consequently, it is more likely that the knowledge network externalities alluded to earlier would kick in and set the economy on a path to higher productivity and output growth.

Labor market reforms

It is well recognized that labor market rigidities may discourage hiring, which increases the likelihood of being caught in a middle-income trap. Suppose that the impact of labor market distortions—such as firing costs—on labor costs in the manufacturing and design sectors can be captured by a proportional effect on the gross wage in each sector. If the distortion affects both sectors in the same way, then the foregoing discussion remains essentially the same, because what matters for labor movements (the allocation of high-ability workers across sectors, which in turn affects productivity and output growth) is the *relative* wage.

However, it could be argued that some types of labor market restrictions, especially those on firing costs, may be particularly detrimental to design or innovation activities. The reason is that in such activities, it is often more difficult to observe the productivity of a worker before hiring—in contrast to routine tasks in manufacturing, where observability, both ex ante and ex post, is less costly. Thus, the risk of hiring a worker who turns out to be a poor performer is higher in activities where a college degree does not necessarily provide a reliable signal about future performance. In such conditions, the labor market distortion acts as a disincentive to seek higher education—with adverse consequences for innovation and growth. By exacerbating the misallocation of talent, labor market distortions may make it more likely that the economy will end up in a lower-growth equilibrium.

Broader Implications

Beyond the specific public policy issues discussed in the previous section, there are several broader lessons that are useful in the context of the ongoing debate on how countries can avoid falling into a middle-income growth trap, or more generally, transition from imitation to true innovation.

First, it is necessary to consider the composition of the labor force during the development process. The common view is that imitating available (imported) techniques is an

easier task than true innovation. Thus, in the early stages of development, when the main issue is to copy and adapt available technologies, a relatively low level of skills, or specialization in basic technical skills, helps promote growth.[6] At later stages, however, true innovation requires more advanced skills, and in a wider range of areas. The shift from low-technology to more advanced activities then becomes the main vehicle for productivity change in an economy. Technological learning spurs productivity growth and increases real wages, which in turn cause firms to exit low-technology, labor-intensive activities and enter more capital-intensive, technologically sophisticated sectors. Because these sectors have stronger learning effects, and possibly more spillovers to the rest of the economy in terms of skills development and knowledge, growth is further strengthened.

Underpinning this transition from imitation to innovation is the productivity of labor in the design sector. In an imitation trap, productivity and wages are relatively low in that sector, thereby mitigating incentives to invest in higher education. In turn, the lack of highly educated workers constrains production in design activities and prevents the exploitation of externalities associated with knowledge networks. In this sense, there is a *two-way causality between education and innovation*. Countries may remain caught in a low or moderate growth equilibrium because they are unable to get enough high potential workers into innovation activities; and because wages are low as a result, a fewer number of individuals with high potential are willing to make the investment necessary to acquire the skills needed to be employed in the innovation sector. The composition of the labor force depends, therefore, on the interaction between supply and demand factors, and this explains why, as noted earlier, a middle-income growth trap is also often characterized by a misallocation of talent.

Second, the idea that market failures lead to underinvestment in research has long been the principal rationale for government funding of R&D (OECD 2010). However, the presence of bottlenecks or other failures that impede innovation activities can constitute equally crucial (if not more important) obstacles to these activities. In particular, the foregoing analysis argued that the lack of advanced infrastructure, which may be especially productive in the design sector (in part because it promotes knowledge networks), plays a critical role in helping a country escape from a lower-growth trap, not only because of its direct effect on productivity, but also because of its effect on the supply of high-skilled labor. In turn, a growing skill base facilitates a shift in production from labor-intensive to skill-intensive activities and an increase in the pace of innovation. Somewhat paradoxically, a reallocation of (limited) government resources from direct subsidies to research and innovation activities, toward the provision of advanced infrastructure, can be effective at promoting design activities and magnifying their impact on economic growth.

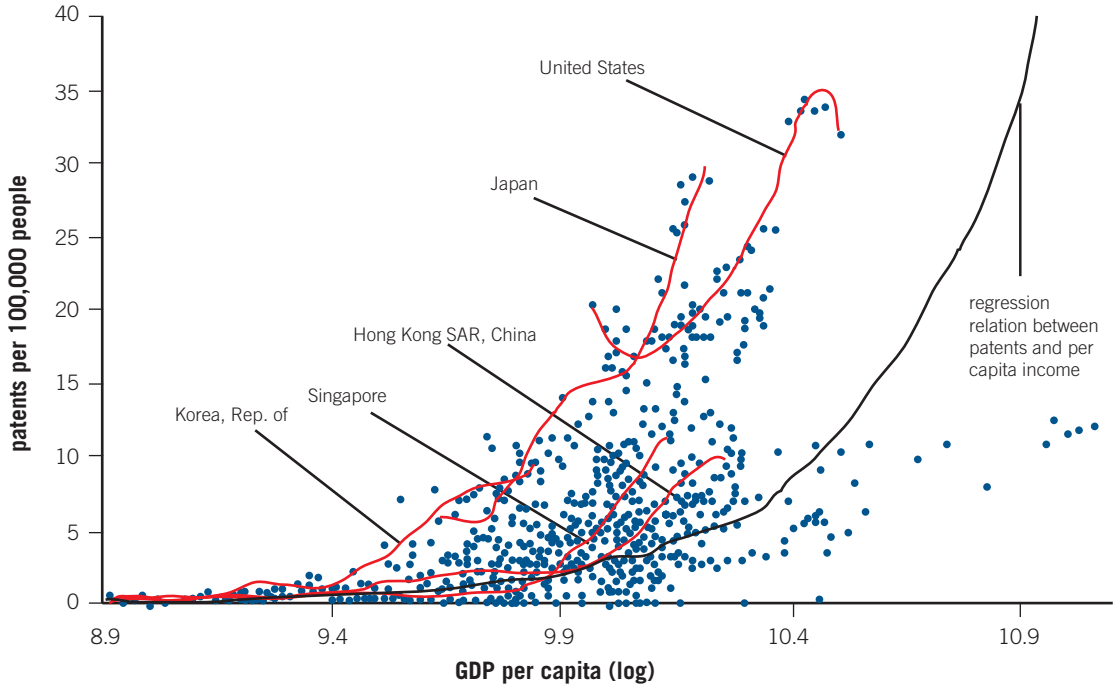
Middle-Income Traps and the East Asian Experience

As mentioned earlier, only 13 countries were able to transition from middle- to high-income status since the 1960s. Of these countries, five were from East Asia—Hong Kong SAR (China), Japan, Korea, Taiwan, China, and Singapore—four of which comprise the so called "Asian Tigers" of the late 20th century. Given their success, it is instructive to reflect on their experience to draw lessons for other middle-income countries seeking to move into high-income status. Interestingly, many of the public policies highlighted above—as well as a larger framework for innovation based on technological learning and public sector support of R&D investments—can be extrapolated from the East Asian success story. The best practices of these countries are particularly valuable for high-growth emerging markets, such as China and other large middle-income countries, which are already showing signs of slowing.

First, of the East Asian economies that were able to escape the middle-income trap, all have succeeded in developing advanced infrastructure networks, particularly in the form of high-speed communications and broadband technology. Due equally to the liberalization of telecommunications networks and related regulatory framework reforms, a number of countries in the region have been able to develop and enhance the availability of information and communications services (Gill and Kharas 2007). To be sure, previous research on regional competitiveness underscores the importance of broadband telecommunications technologies and interactive multimedia. For countries with large export-oriented information equipment industries, such as Japan, Korea, and Taiwan, China, a drive to enhance international competitiveness perpetuated the development of broadband and multimedia industries in domestic markets. Likewise, other economies in the region that were able to escape the middle-income trap, such as Singapore and Hong Kong (China), developed their advanced infrastructure networks to enhance their role as regional headquarters for major foreign multimedia companies (Langdale 1997).

Another key factor underlying the success of the East Asian economies that were able to transition from middle- to high-income status was their ability to push the technological frontier and move from imitating and importing foreign technologies to innovating technologies of their own. Strong intellectual property rights' protections have been a major factor in facilitating this home-grown innovation. According to the World Bank's *Doing Business* Database,[7] intellectual property rights in economies such as Hong Kong SAR (China), Korea, Singapore, and Taiwan, China, rival

Figure 4. Patents in East Asia



Source: U.S. Patent and Trademark Office and World Bank estimates; Gill and Kharas 2007.

those in place in Japan, the United States, and other high-income countries.

As a result of a well-functioning system of intellectual property rights' protections, many countries in the region have become global leaders in patenting their own technologies. Using the number of patents issued by the United States Patent and Trademark Office as a measure, economies in the region have generated patents at around the same rate as the advanced economies (figure 4). In particular, Taiwan, China, now generates nearly as many patents as the best-performing developed economies, such as Japan and the United States, with Hong Kong SAR (China), Korea, and Singapore not far behind (Gill and Kharas 2007). Supporting this innovation has been a commitment to investments that promote upgrading skills and direct public funds to R&D efforts. According to the United Nations Educational, Scientific, and Cultural Organization (UNESCO) database on R&D expenditures, Korea, Singapore, and Taiwan, China, now devote resources to R&D spending comparable to levels in the United States and other highly innovative developed economies (Gill and Kharas 2007).

Last, flexible labor markets and open economic policies have allowed for the reallocation of labor across sectors within the most successful economies in the region. Countries in the region have relied extensively on international trade to accelerate their labor transfer by inserting themselves into the labor-intensive segments of global value chains. Such a transfer was facilitated by advances in ICTs and by decreasing transport costs and lowering international trade barriers (Canuto 2011). This labor market flexibility has facilitated the new labor transition, now increasingly toward innovative occupations.

Conclusion

The features of East Asia's experience in transitioning from middle- to high-income status provide important lessons for other countries that are attempting to follow suit. The middle-income trap is not an ineluctable outcome; it can be avoided if governments act early—rather than late, when the benefits of cheap labor and the gains from imitating foreign technology are all exhausted—and decisively to promote innovation. Doing so requires timely implementation of public policies aimed at improving access to advanced infrastructure, enhancing the protection of property rights, and reforming labor markets. These policies are central to fostering technological learning, attracting talented individuals into R&D activities, and encouraging the buildup of national and international knowledge networks.

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Notes

1. The term "middle-income trap" was apparently first used by Gill and Kharas (2007); see also Commission on Growth and Development (2008). "Middle-income economies" are defined in accordance with the World Bank's classifications by income group, as given by http://data.worldbank.org/about/country-classifications.
2. The authors define a growth slowdown based on three conditions: the first requires that prior to the slowdown, the seven-year average growth rate is 3.5 percent per annum or greater. The second condition identifies a growth slowdown with a decline in the seven-year average growth rate by at least 2 percentage points. The third condition limits slowdowns to cases in which per capita GDP is greater than US$10,000 in 2005 constant prices—thereby ruling out episodes related to countries that have not yet successfully developed.
3. Another view of the middle-income trap, which also focuses on occupational choices in a globalized world, is developed in Eeckhout and Jovanovic (2012).
4. Indirect evidence of the importance of (local) knowledge networks is provided by Weinberg (2011), who found that per capita GDP in developing countries is positively related to the number of important scientists born in and staying in a country.
5. Of course, all production sectors (not only design activities) may benefit from advanced infrastructure. For instance, it is well documented that in recent years ICTs have helped integrate supply chains both within and across borders, thereby boosting efficiency in the production of manufactured goods (Canuto 2012). However, this does not affect the logic of this argument.
6. Imitation activities may take the form of task-based production, that is, specialization in some stage of a value chain rather than in final products. However, task-based production may reinforce a country's specialization in low-technology, less sophisticated activities—which can be viewed as another form of a middle-income trap, that is, an "imitation trap." The United Nations Industrial Development Organization (UNIDO 2009) compared the sophistication of product- and task-based manufacturing and found no evidence that task-based production is less technologically sophisticated than production of final products.
7. Doing Business Database, World Bank and International Finance Corporation, http://www.doingbusiness.org/.

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