

IMF STAFF DISCUSSION NOTE

Anchoring Growth: The
Importance of Productivity-Enhancing
Reforms in Emerging Market and
Developing Economies

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Developing Economies**

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EXECUTIVE SUMMARY

Recent growth performance. Emerging market and developing economies (EMDEs) as a group have experienced a remarkable period of growth until recently, with convergence resuming in many countries. Improvements in growth performance have been facilitated by better policy and institutional settings, increased trade and financial integration, and exceptionally favorable external conditions (notably strong external demand, buoyant commodity prices, and ample global liquidity). Productivity gains accruing from shifts in the composition of output toward high-productivity sectors have also played a role in some EMDEs. This overall picture, however, masks an uneven pace of convergence across regions and countries, reflecting considerable heterogeneity in growth drivers.

Sustaining convergence. The global economic outlook remains tepid and tailwinds of the past decade are fading. Growth in many EMDEs has already slowed, reflecting a combination of cyclical factors and domestic supply-side constraints in some countries. Prospects will depend on how well countries do in establishing macroeconomic and structural conditions conducive to sustained growth. Although further capital deepening, the fostering of human capital accumulation, and increases in labor utilization remain potential sources, convergence in a less favorable external environment and with less benign demographics could be testing. Productivity-enhancing structural reforms are needed to boost technological catch-up, facilitate structural transformation into higher productivity sectors and new activities, and better allocate existing resources in the economy.

Varying challenges. For low-income countries, maintaining a dynamic growth trajectory will require raising agricultural productivity, continued shifts of labor out of agriculture, rapid accumulation of capital, and technology diffusion in labor-intensive sectors. For many emerging market economies, productivity gains from past reforms and sectoral reallocation away from agriculture may have already peaked and, in any event, old growth models may no longer suffice. Sustaining growth and income convergence will instead require more intensive patterns of growth, greater flexibility to shift resources across sectors, efforts to reduce resource misallocation within sectors, and the capacity to innovate and apply more knowledge and skills-intensive production techniques. These strategies would be especially important as economies become increasingly services-based. In many resource-rich EMDEs, efforts to enhance productivity in sectors of comparative advantage, while facilitating economic diversification would be pivotal for achieving sustained growth.

Calibrating reforms to stage of development. Empirical evidence based on countries' distance to the global technology frontier suggests that reform priorities for unlocking productivity growth and sustaining growth potential vary across income groups. In low-income countries, strengthening economic institutions needed for market-based economic activity, reducing trade barriers, reforming agricultural and banking sectors, and improving basic education and infrastructure would spur productivity growth. In lower-middle income countries, to varying degrees, reforms in banking and agricultural sectors, reducing barriers to FDI and increasing competition in product markets for a more vibrant services sector, improving the quality of secondary and tertiary education, and efforts to alleviate pertinent infrastructure bottlenecks would be a priority. In upper-middle income countries, boosting productivity growth will require a focus on deepening capital markets, developing more competitive and flexible product and labor markets, fostering a more skilled labor force, and investing in research and development and new technologies.

I. CONTEXT

1. **Unprecedented growth.** Growth in emerging market economies (EMs) as a whole took off in the 1990s, followed by growth in low-income countries (LICs).² Many emerging and developing economies (EMDEs) exhibited relative resilience during the 2008-09 global financial crisis, rebounding sooner and faster than advanced economies.
2. **Fading tailwinds.** Global growth, however, remains subdued and tailwinds of the last decade are fading. Seen against risks of persistently weak external demand, potentially tighter and more volatile financing conditions, and less favorable terms of trade, sustaining the recent growth performance in EMDEs could prove difficult. Growth in many major EMs (China, India, Brazil) has already slowed, reflecting a combination of cyclical and supply-side considerations. In some countries, the severity of the post-crisis downturn in the euro area and tighter credit conditions (e.g., in emerging Europe) and social and political disruptions (e.g., in the Middle East and North Africa (MENA)) have dragged down growth potential. Strong economic fundamentals, robust macro-prudential policy frameworks, and the ability to absorb domestic and external shocks, are key determinants of whether growth can be sustained—even if not as rapid as in the recent past. However, sound macroeconomic policies alone will not be sufficient.
3. **The challenge ahead.** Structural reforms are needed to achieve sustainable robust growth and to foster convergence to higher income levels. In some countries, sustainability of long-run growth performance requires changes to economic structures and new growth models. Although reform efforts need to be country-specific, they share common goals of facilitating factor accumulation, and alleviating the most binding regulatory, institutional, and structural bottlenecks to growth. Policy reforms to lift productivity growth—a key driver of long-term growth prospects and improvements in living standards—would be pivotal in this regard.
4. **This note.** This note examines the drivers of growth in EMDEs during the past decades and discusses the role of productivity-enhancing reforms in bolstering future growth prospects. A companion technical note provides a conceptual framework and new empirical analysis to assess the determinants of aggregate and sectoral productivity growth across different country income groups. Policy lessons are drawn keeping in mind that appropriate policies need to be tailored to the stage of economic development and to other pertinent features that give rise to the heterogeneous experiences of EMDEs. Although some of these policies are not the traditional focus of surveillance or directly within the purview of Fund expertise, they are critical to ensuring continued convergence to higher income levels in these countries.
5. **Roadmap.** Section II documents stylized facts about the sources of growth in EMDEs, emphasizing the aggregate and sectoral patterns of productivity growth. Section III describes the

² The definition of income groups follows the IMF *World Economic Outlook* (WEO) classification of advanced and emerging market and developing economies (EMDEs), with EMDEs classified as LICs if they are currently eligible for concessional IMF loans.

growth challenges faced in light of these facts. Section IV discusses policies needed to boost productivity and sustain growth in the longer term.

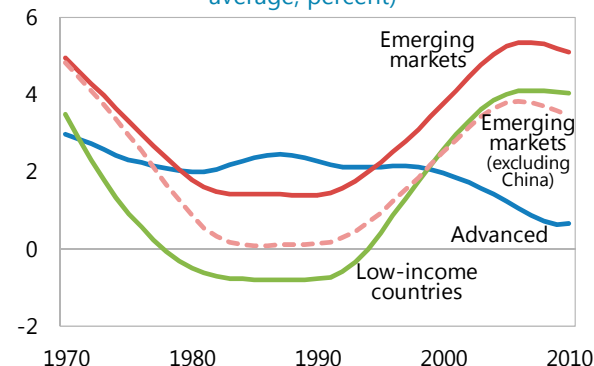
II. UNDERSTANDING PAST GROWTH DRIVERS: A SUPPLY-SIDE PERSPECTIVE

Despite the broad-based uptick in growth in EMDEs during the past decade, the underlying drivers of catch-up convergence at the aggregate and sectoral levels have varied, implying different challenges for sustaining the growth momentum. Furthermore, convergence gaps with advanced economies remain wide, pointing to significant catch-up growth potential.

A. Sources of Growth

6. **Convergence.** Rapid growth in EMDEs since the mid-1990s reflects a resumption of catch-up convergence. Economic theory predicts that economies further from the global technological frontier will experience stronger economic growth given high-return investment opportunities and the benefits of absorbing imported technologies. Indeed, growth in real GDP per capita picked up in the second half of the 1990s, and, by the mid 2000s, EMDEs as a whole grew faster than advanced economies, despite the Tequila, Asian, and Russian financial crises and the sharp transition-related collapses in output in Eastern Europe (Figure 1).

Figure 1. Annual Trend Growth of GDP per Capita, 1970–2010 (purchasing-power-parity weighted average, percent)

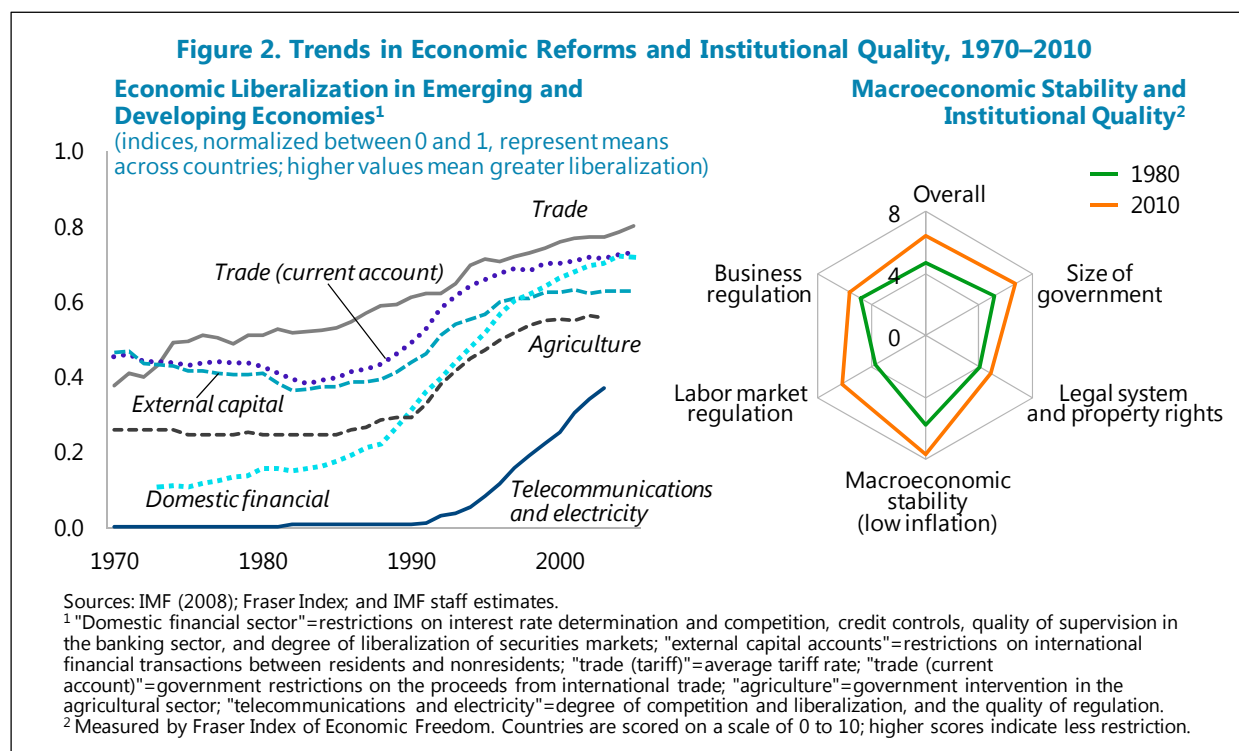


Sources: Penn World Table 8.0; IMF, World Economic Outlook; World Bank, World Development Indicators; Maddison dataset; and IMF staff calculations.
Note: Trend growth is estimated using the Hodrick Prescott filter.

7. **Favorable external environment.** A range of external factors supported growth. The expansion of global and regional value chains led to a trade-investment nexus for many countries in Asia and in Central, Eastern, and South Eastern Europe (CESEE), stimulating technology and knowledge transfer (IMF, 2013a). Concomitantly, technology-led declines in transportation and communication costs facilitated the fragmentation of production, buoyed global trade, and propelled the growth of information and communication technology (ICT) services. Historically-high commodity prices and easy financing conditions translated into higher investment (including foreign direct investment (FDI)) in commodity and non-commodity exporters alike, especially in the last decade (Kochhar and others, forthcoming).

8. **Domestic drivers.** Wide-ranging structural reforms, better policy making, and greater trade and financial openness provided a conducive environment, allowing countries to take advantage of these propitious external conditions (IMF, 2012a, 2013b). Macroeconomic stability improved across a broad spectrum of countries and economic institutions were strengthened (Figure 2), albeit with important differences across countries. Reform efforts in product markets, trade, and domestic

financial liberalization also picked-up markedly in the 1980s and 1990s, driven by a closing of reform gaps with advanced economies and the influence of reformist neighbors; in some instances, crises also served to catalyze reforms (IMF 2008). Demographic tailwinds also played a role: the number of workers grew more rapidly than the number of dependents in many EMs, providing a demographic dividend in support of policy reform (IMF, 2012b).

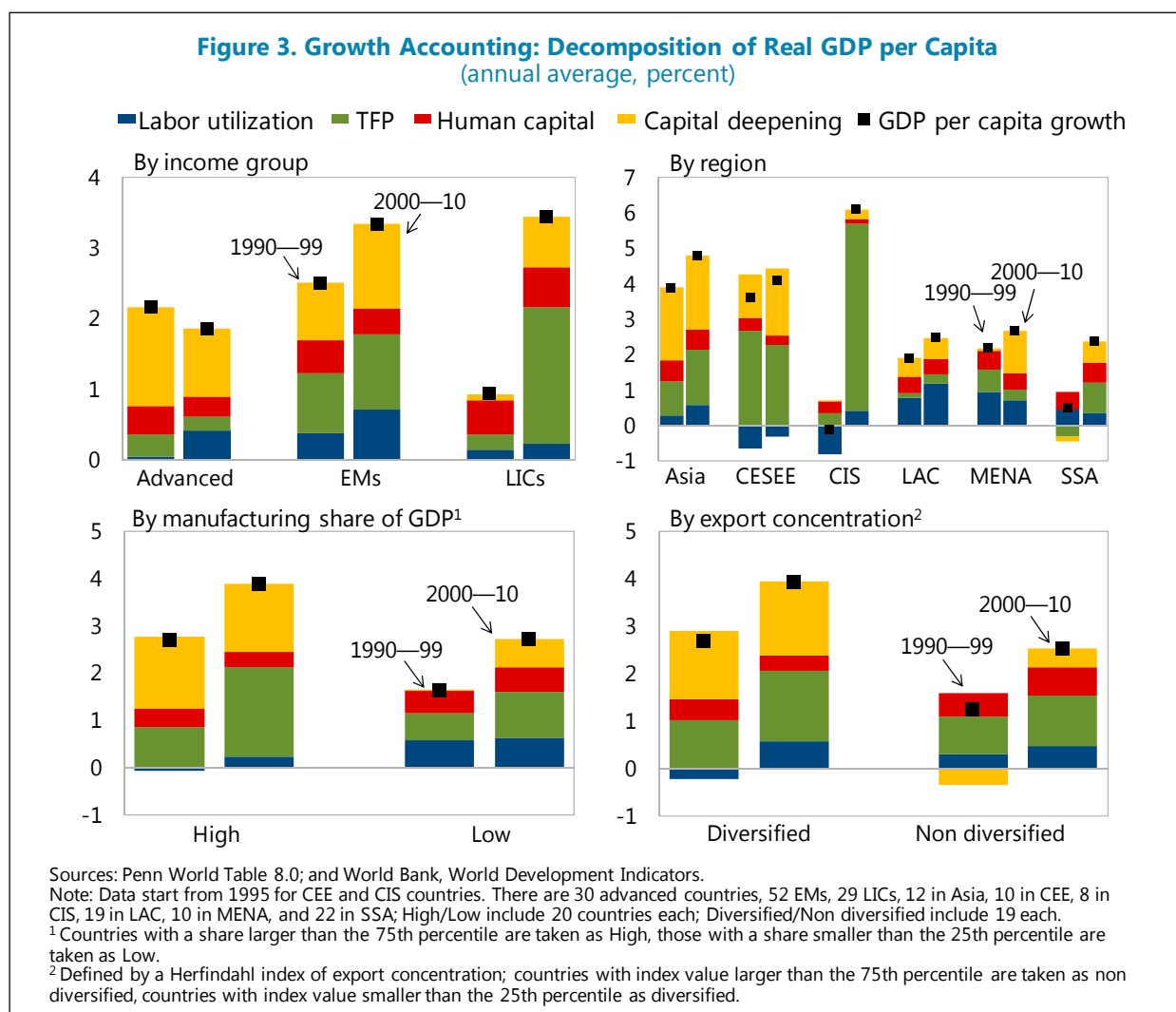


9. **Heterogeneity.** Despite the broad-based uptick in growth in the 2000s, a growth accounting exercise suggests that catch-up has been driven by different factors (Figure 3). In particular, differences in real GDP per capita growth rates across regions were driven mainly by labor productivity, reflecting the contribution of technology and efficiency gains (total factor productivity or TFP), greater capital intensity, or both.³

- In Europe and Central Asia, *productivity gains* have accounted for a substantially larger share of real GDP per capita growth than in other regions since the mid-1990s, whereas labor utilization lagged. These sizeable increases in TFP reflected dramatic changes to economic structures since the onset of the transition in these countries, a rebound in capacity utilization in the Commonwealth of Independent States (CIS), and tighter integration with the euro area in CESEE.

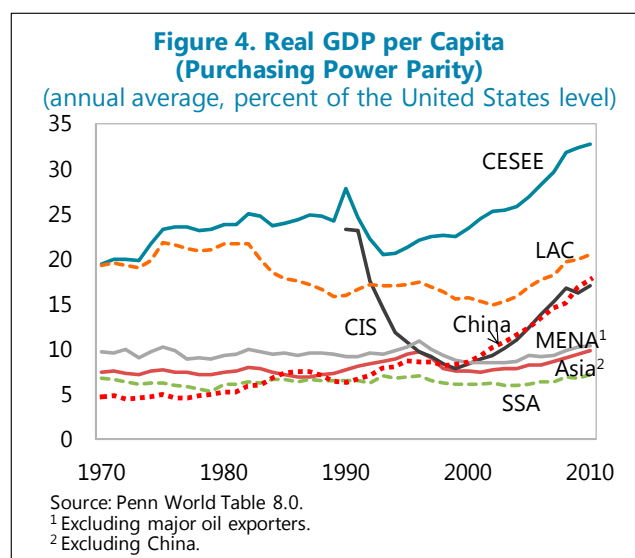
³ In growth terms, real GDP per capita can be decomposed into labor utilization and average labor productivity, the latter reflecting contributions from capital stock per worker (capital intensity), human capital per worker, and total factor productivity (TFP). TFP is measured as a residual, and any measurement errors in the labor and capital series will be captured in the estimate of TFP. Extensive robustness checks were performed using alternative data sources to assess whether the broad patterns across countries and over time were broadly consistent.

- In developing Asia, rapid growth predated the 1990s, with *capital deepening* playing a more important role in the catch-up processes of the faster-growing countries compared with other regions, fostered, in part, by high domestic savings rates in East Asia, although the region experienced solid *TFP gains* as well.
- *Labor utilization*, rather than capital deepening or TFP growth, was the main driver of growth in Latin America and the Caribbean (LAC) and MENA (especially in oil-exporting countries) compared with other regions, reflecting increasing labor force participation and lower unemployment (to near historic low levels) in LAC. The contribution of TFP to the growth pick-up in the 2000s was more modest than in other regions.
- In Sub-Saharan Africa (SSA), the end of armed conflicts and improved macroeconomic conditions in many LICs led to a *turnaround in TFP performance* and *greater capital deepening* in the 2000s from the lackluster growth of the previous decade.



10. **Economic structure.** Growth decompositions based on economic structures provide some insights into the heterogeneity of country experiences. The combined effect of higher skills and the technology component of manufacturing production and its positive backward and forward linkages with the rest of the economy typically leads to high productivity spillovers and greater incentives for capital improvement. Similarly, greater diversification leads to exports concentrated in sectors characterized by technology spillovers and product quality upgrading (Papageorgiou and Spatafora, 2012). Indeed, growth rates in economies with a high manufacturing share (e.g., China, Hungary, Malaysia) and a more diversified export base (mostly non-commodity exporters) were underpinned not only by a significantly higher average contribution from capital deepening but also larger TFP gains.

11. **Closing convergence gaps.** Rapid growth during the past few decades has translated into lower convergence gaps for many EMDEs relative to the United States—the country whose production efficiency defines the global technology frontier. However, income differentials (in level terms), as measured by the ratio of per capita income to that in the United States, remain large, and have even widened or stagnated in some countries (Figure 4), reflecting shortfalls in factor inputs and especially TFP levels (Figure 5, also see Annex 1).⁴



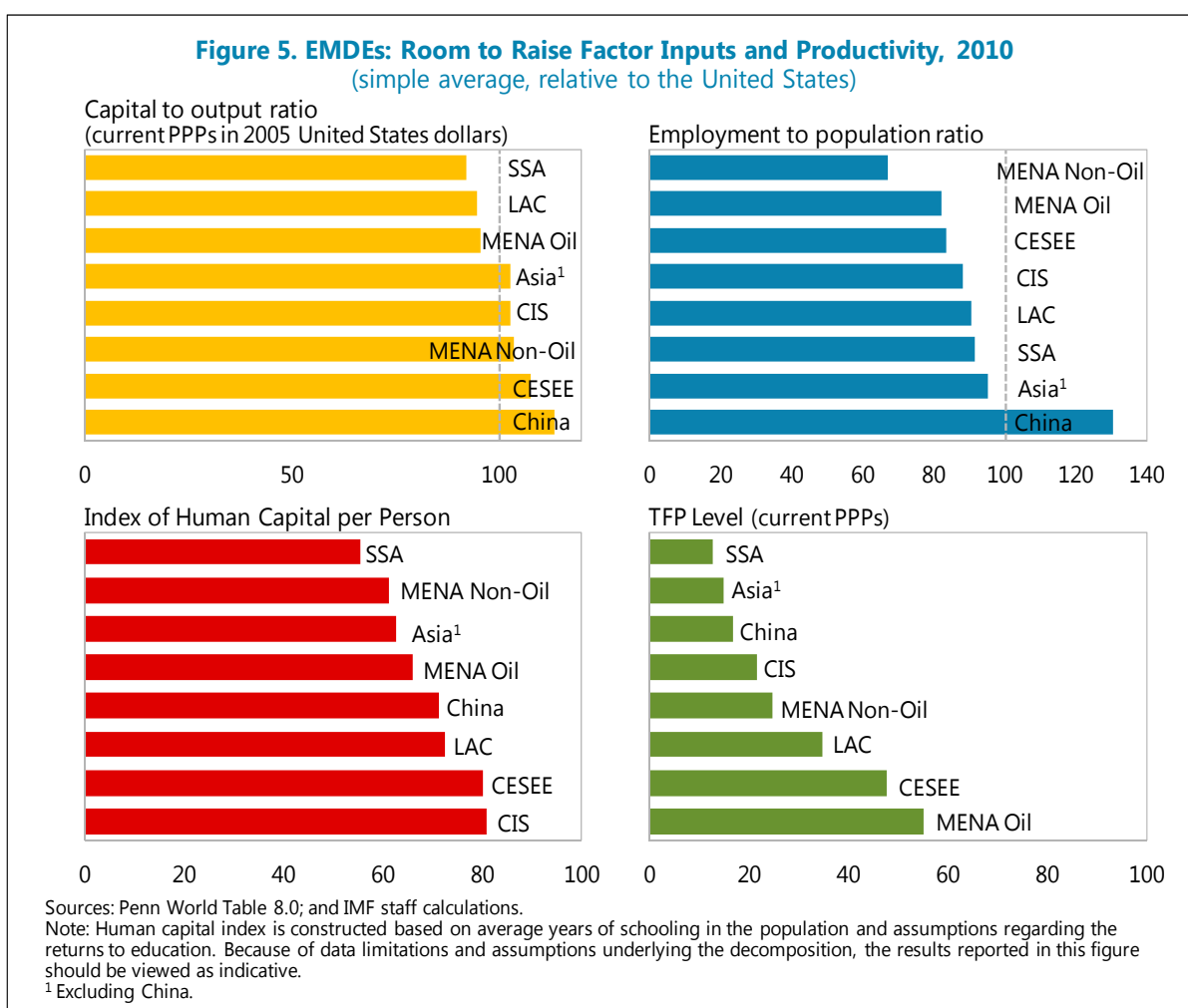
- As of 2010, the capital-to-output ratios in some EMDE regions (e.g. LAC, SSA) are still lower than that in the United States, suggesting that for some countries **investment in physical and ICT capital** will continue to be an important factor behind future catch-up.
- Employment-to-population ratios are also lower in some regions (e.g., CESEE, CIS, and MENA), partly reflecting higher unemployment rates (high rates of youth or structural unemployment) but also lower labor force participation rates among certain groups (e.g., women).⁵ This suggests that measures to boost **labor force participation** in these countries could be a priority.
- The stock of human capital, as measured by the average years of schooling across the population is considerably lower in EMDEs. To a large extent this gap reflects differences in the age-education structure of the population, which is expected to close provided educational

⁴ Productivity growth in the United States has also displayed a number of phases, most notably the acceleration in growth following the ICT revolution in the 1990s (Collecia, 2002), which could have altered the nature of the catch-up process because diffusion of ICT tends to be more sensitive to domestic policies and institutions and the quality of human capital.

⁵ The prevalence of non-wage employment (self-employment or agricultural work) in SSA LICs and the high degree of informality in many EMs often renders an analysis of labor market developments in these countries challenging. The figures reported here adjust for self-employment and include the informal sector in total employment.

attainment is sustained at current rates. But gaps in education quality remain equally pressing,⁶ suggesting that there could be a significant payoff from **investments in high quality education services**.

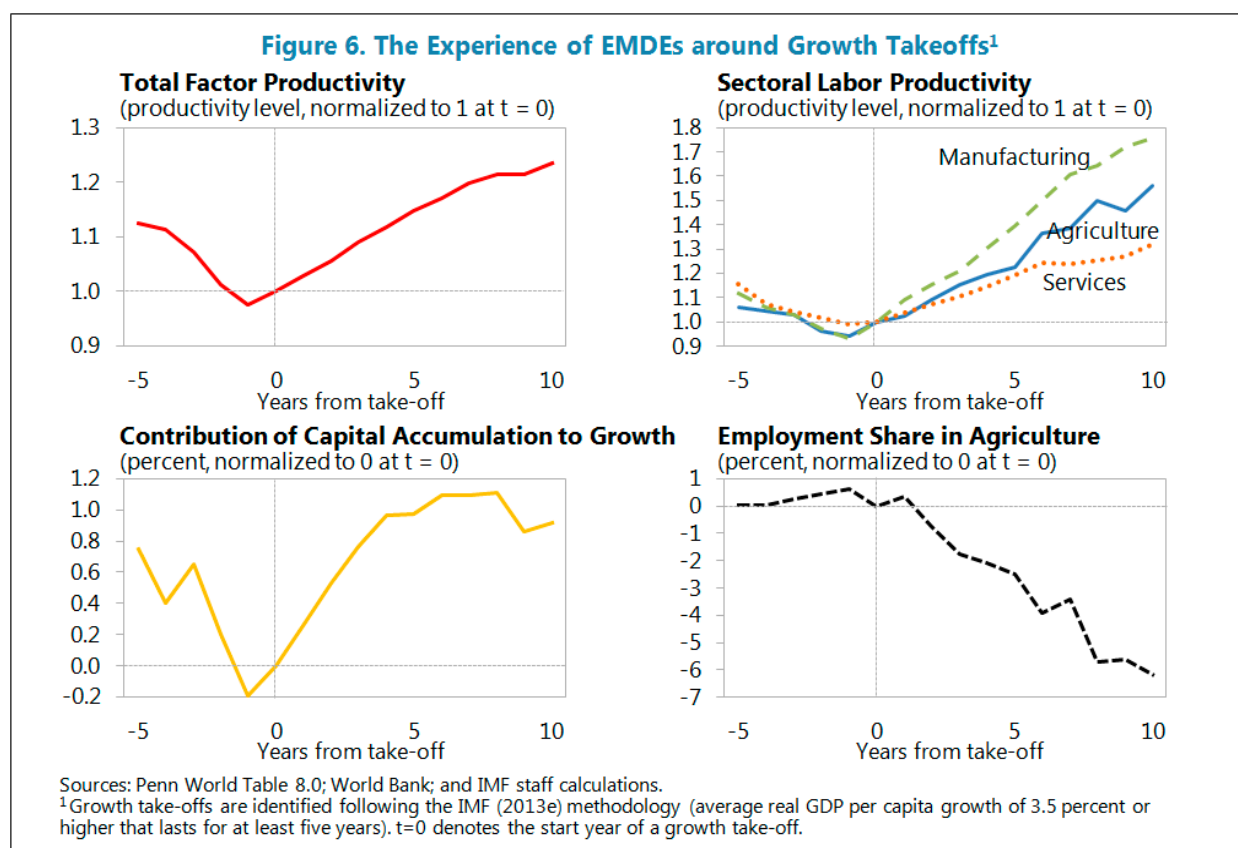
- TFP levels are well below those in advanced countries (ranging from 12 percent of U.S. level in SSA to 55 percent in MENA oil), suggesting a significant source of catch-up potential. This is consistent with findings in the development accounting literature that TFP gaps account for the bulk of income and labor productivity differences across countries. Thus, **technological diffusion and efficiency gains** are potentially a key source of future productivity growth in EMDEs.



⁶ For example, OECD PISA scores (in reading, mathematics, and science) show large gaps between developing countries and advanced economies. See Glewwe and Kramer (2006).

B. Sectoral Patterns of Productivity Growth

12. **Sectoral perspective.** As highlighted above, labor productivity gains at the aggregate level—stemming from capital deepening and improvements in TFP—have been a major force underpinning output growth in many EMDEs in recent decades.⁷ These gains can be indicative of a better utilization of resources, capital deepening and technology catch-up within broad sectors of the economy (agriculture, industry, and services). But productivity gains can also accrue from structural transformation—the reallocation of resources from low- to high-productivity sectors and activities. Both the within-sector and inter-sectoral margins can be sources of catch-up convergence (Caselli and Tenreyro, 2006); therefore examining EMDEs’ recent growth record along these dimensions can provide an assessment of their future growth and convergence prospects. An event study analysis of 79 episodes of past growth take-offs—defined as a significant and persistent up-tick in real GDP per capita growth—across a broad spectrum of EMDEs since the 1970s confirms that these episodes were associated with a strong pick-up in productivity growth across sectors, and an increasing pace of labor shifting out of agriculture (Figure 6).



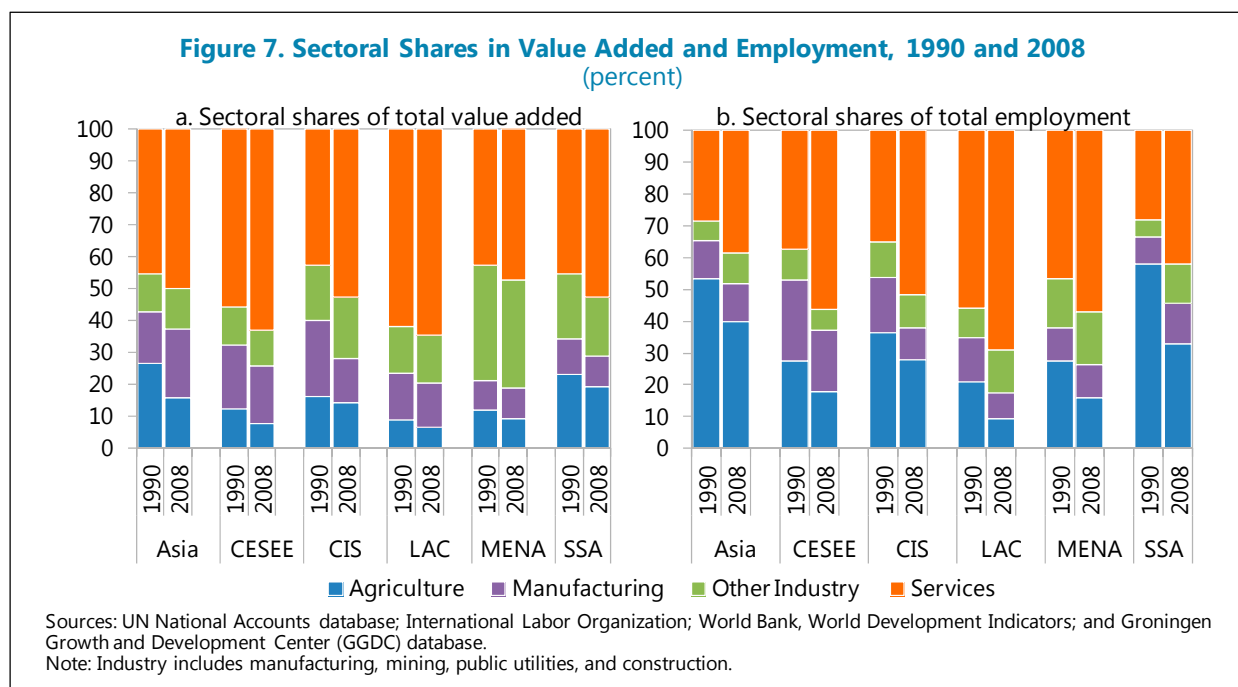
⁷ This section focuses on average labor productivity (output per worker) rather than TFP, because of limited data available on sectoral capital stocks. Employment data in many LICs are of low-quality and coverage across countries is uneven, suggesting that sectoral productivity growth in LICs should be interpreted with caution.

13. **Structural change.** The relative weight of different sectors in the economy is determined by technological progress within industries and firms, as well as by market demand and nonmarket forces.⁸ When there is an expansion of the most productive sectors, aggregate productivity increases. Indeed, reallocation of labor from low-productivity agriculture to high-productivity sectors (initially manufacturing and subsequently services) has been a primary channel through which advanced economies have increased their national income (Dabla-Norris and others, 2013).

14. **Sectoral shares and shifts.** An analysis of employment and value added shares across sectors and the underlying shifts between 1990 and 2008 points to a number of commonalities across EMDE regions (Figure 7). First, most regions have experienced a reallocation of resources away from agriculture, but the magnitudes of such shifts have varied. Second, in marked contrast to the past experience of advanced economies, services account for a growing share of employment and value added, even at low levels of development. Services, however, generally tend to exhibit lower average productivity than manufacturing (Duarte and Restuccia, 2010). But important regional differences have also shaped economic structures and underpinned observed differences in aggregate productivity and growth performance.

- Structural changes in CESEE and CIS have reflected their economic transition from central planning, with significant labor shedding in agriculture, and a shift of resources toward the previously underdeveloped services sector (World Bank, 2008).
- Developing Asia stands out as having experienced a rapid decline in the employment share of agriculture and labor shifts into industry (notably manufacturing) and services, although the share of employment in the agricultural sector remains large. Moreover, on average, manufacturing continues to account for a higher share in value added compared with other regions (IMF, 2006).
- In LAC, where structural changes took place earlier than in other regions, a striking feature is the high and growing share of the services sector in employment and value added.
- In MENA, the industrial sector share in value added and in total employment has remained largely unchanged from 1990 to 2008, although there has been a shift of sectoral shares away from agriculture toward services over the same period.
- In many SSA countries, especially in LICs, agriculture remains the largest employer, and industry's share of value added has remained stagnant (IMF 2012c).
- In countries in which growth has been driven by non-renewable natural resources (countries in SSA, LAC, CIS, oil-exporting MENA), the mining industry accounts for a relatively high share of industry value added, and the economic structure remains undiversified. But the capital intensive nature of the sector offers limited employment opportunities to workers exiting sectors with lower average productivity.

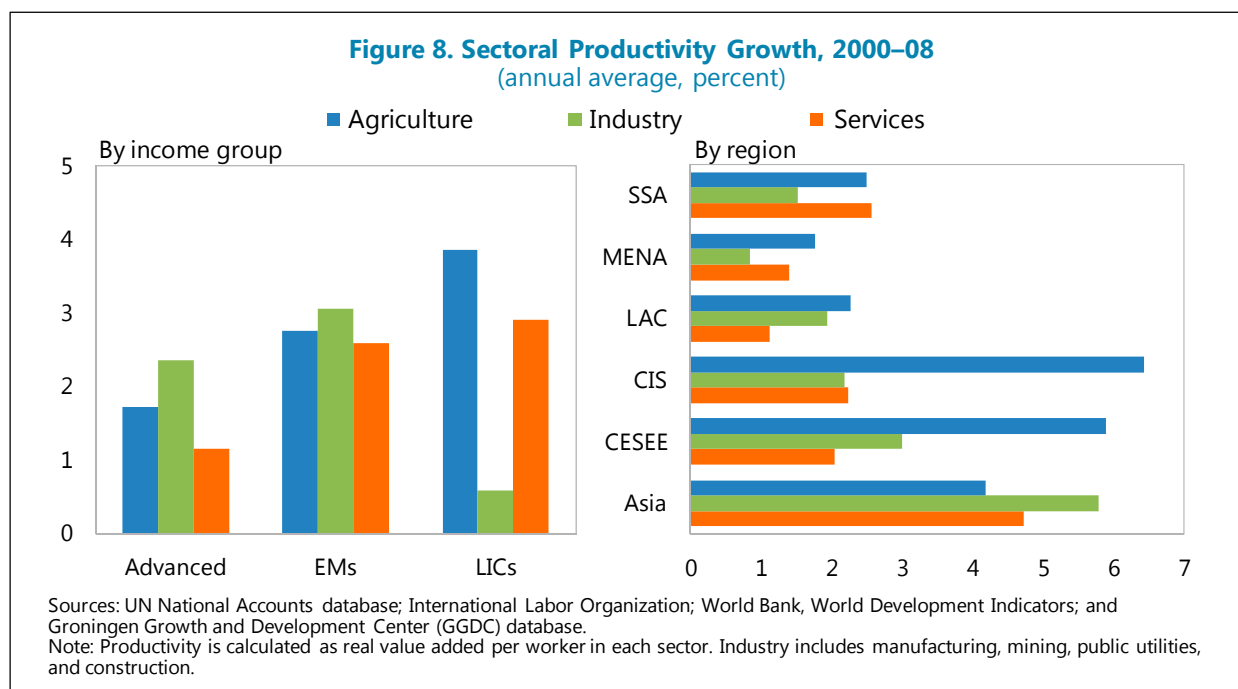
⁸ In particular, technological change within industries and changes in domestic demand and international trade patterns can drive a process of structural transformation in which labor, capital, and intermediate inputs are dynamically reallocated between firms and sectors (Kuznets, 1966; Hsieh, and Klenow, 2009).



15. **Productivity growth by sector.** In general, productivity growth in the tradable sectors (broadly industry and agriculture) in EMs has exceeded that in services during the past decade (Figure 8). LICs, however, experienced more significant productivity growth in the agriculture and services sectors.⁹ Fast-growing regions that were integrated into global and regional supply chains (developing Asia,¹⁰ CESEE), exhibited higher productivity growth in industry, particularly manufacturing, compared with other regions that saw limited integration. In regions with relatively slower growth (MENA and LAC), productivity growth was highest in agriculture, but the sector's contribution to aggregate productivity growth was limited given its low share in value added (Figure 7). Furthermore, productivity growth in LAC's vast largely non-tradable services sector notably lagged that in other regions.

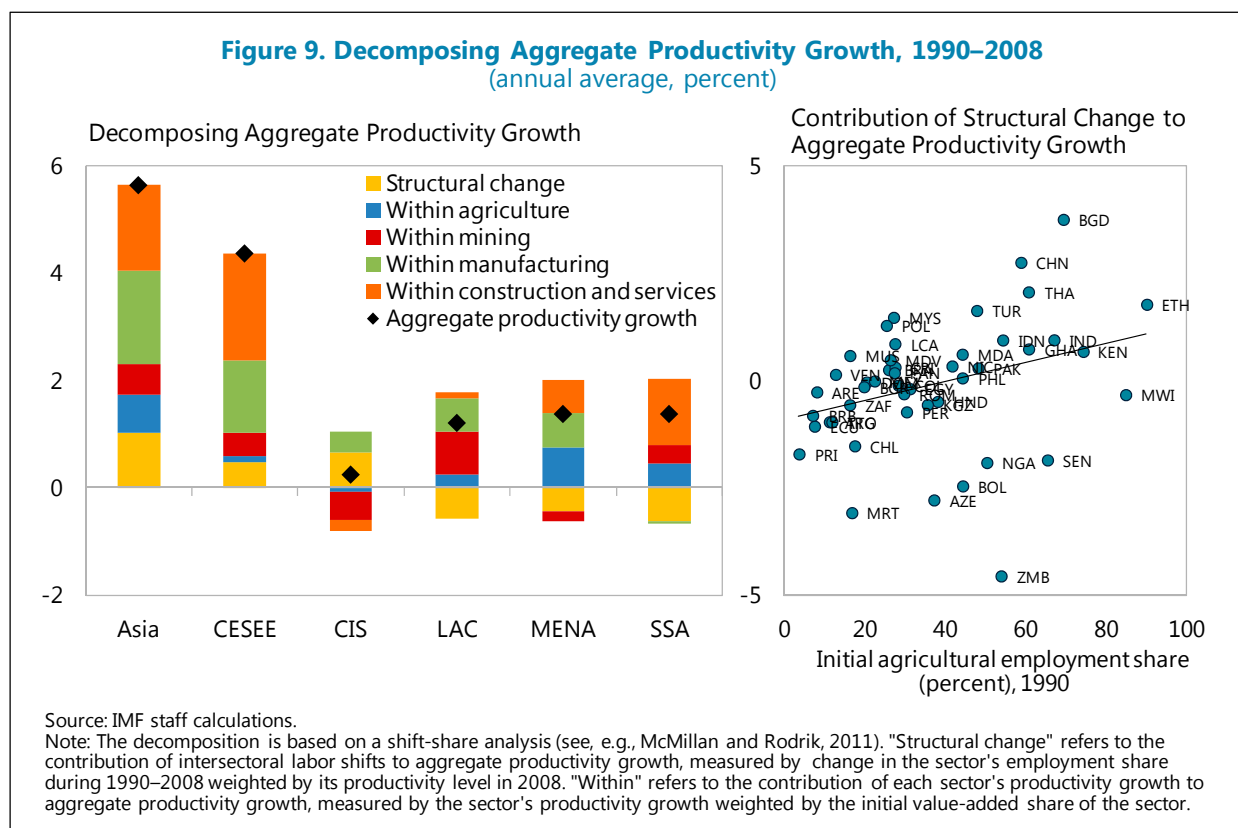
⁹ In some LICs in SSA, this has reflected technology leapfrogging and rapid growth of ICT services (particularly telecommunications).

¹⁰ India was an exception, as productivity grew most rapidly in services, spurred by off-shoring in ICT services (Kochhar and others, 2006).



16. **Within-sector or structural change effects?** Seen against the broad sweep of developments since the 1990s, differential patterns of sectoral shifts across EMDEs have translated into varying contributions of structural change to aggregate productivity growth. This variation is confirmed by a decomposition of average labor productivity into a within-sector component and a structural change component (the inter-sectoral shift effect) (Figure 9). The results suggest that the bulk of the surge in labor productivity growth in EMDEs between 1990 and 2008 was driven by within-sector productivity growth.¹¹ Reallocation of labor across sectors has been an important driver of economy-wide productivity gains in fast-growing regions (Asia, CESEE, CIS) and countries (e.g., China, Turkey, Poland, Bangladesh) that experienced significant employment shifts out of agriculture (Figure 7), and has accounted for a large share of the variation in regional growth rates. By contrast, structural change, on average, has been productivity-reducing in LAC, MENA, and SSA, suggesting that labor in these regions was absorbed by lower-productivity activities. Furthermore, on average, productivity growth in the mining sector in the CIS and MENA has been low as compared with other regions, weighing down aggregate productivity growth.

¹¹ This decomposition is applied to seven broad sectors (agriculture, manufacturing, mining, construction, trade, transport and communication services, and other services). The structural change component can be large when labor productivity varies greatly across different parts of the economy (McMillan and Rodrik, 2011).

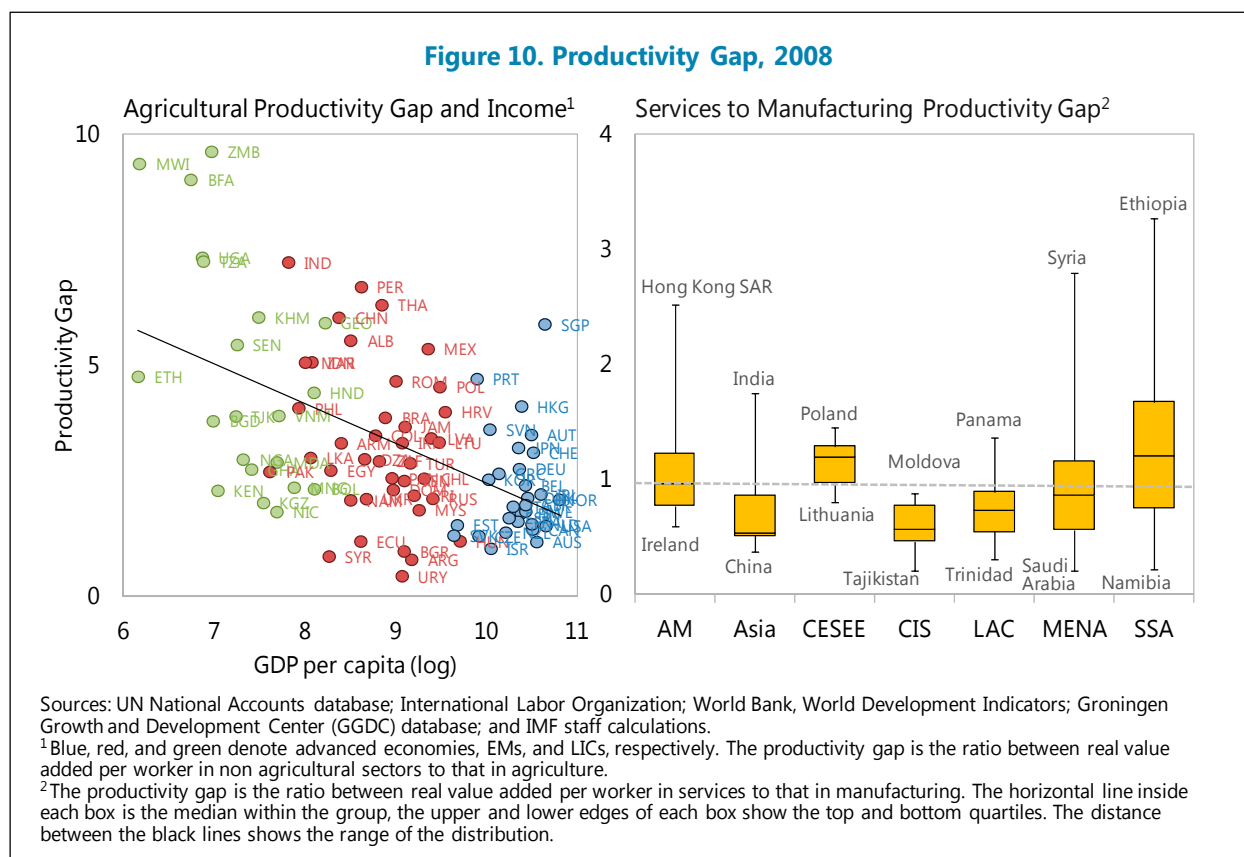


17. **Scope for further structural change.** The contribution of structural change to aggregate productivity growth depends on differences in intersectoral productivity levels (e.g., between agriculture and non-agricultural sectors or between activities in agriculture, services and manufacturing). These differentials remain high in many EMDEs, and are much larger than in advanced economies, pointing to potential growth benefits from further structural transformation (Figure 10).

- *Reducing agriculture productivity gaps.* For the world as whole, labor productivity in nonagricultural sectors is two to three times higher than in agriculture; in many EMDEs this differential is even larger (Gollin, Lagakos, and Waugh 2012). The agricultural productivity gap is most pronounced in LICs and in some EMs (India, Peru, Thailand), pointing to a potential misallocation of labor across sectors. Evidence suggests that this misallocation accounts for a significant share of some countries' income and TFP differences with advanced economies (Vollrath, 2009). This implies that raising agricultural productivity growth could have an important policy role, alongside shifting resources toward higher-productivity sectors and activities, in boosting aggregate productivity growth.
- *Moving to higher value-added activities.* In many EMs, given structural changes that have already taken place, the scope for future economy-wide productivity gains accruing from labor shifts away from agriculture are more limited. In these countries, strong aggregate productivity growth will depend in part on "climbing the technology ladder." Thus, shifting resources toward higher value added manufacturing and agricultural activities, and modern services activities (e.g.,

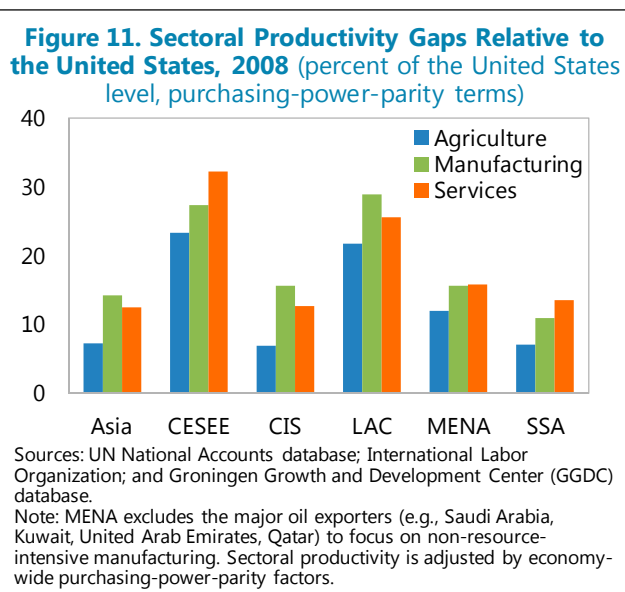
transportation, distribution, and ICT services) and increased use of ICT by other sectors will remain a necessary condition for sustained economic growth.¹²

18. **Boosting services productivity.** As countries develop, manufacturing becomes more capital intensive and economies more services-based. But with services generally tending to be less productive than manufacturing, the growing importance of the sector in EMDEs, in the absence of productivity-enhancing measures, could be a drag on potential growth. This overall picture, however, masks considerable heterogeneity across regions, with the median country in the CESEE and SSA exhibiting higher productivity in services compared with manufacturing. Productivity gaps between services and manufacturing sectors, however, remain large in many EMDEs (e.g., in China, Saudi Arabia, Namibia) (Figure 10), suggesting that tackling barriers to productivity growth within the services sector would be especially important for future growth prospects.



¹² Firm and industry-level evidence finds that ICT sectors have relatively high TFP levels and growth rates and are an important input driving productivity growth in other sectors (Collecia, 2002; Pilat, Lee, and van Ark, 2002).

19. **Closing within-sector productivity gaps.** Productivity gaps with respect to advanced economies remain large within sectors (Figure 11), pointing to considerable catch-up potential through capital deepening, improvements in human capital, and TFP gains at the sector level. In many instances, these gaps are indicative of a significant misallocation of productive inputs within sectors. Industry and firm-level evidence confirms the role of resource misallocation in driving aggregate income gaps (Restuccia and Rogerson, 2013).¹³ Policy efforts to improve allocative efficiency within sectors could thus have significant positive consequences for closing aggregate productivity gaps and facilitating income convergence.



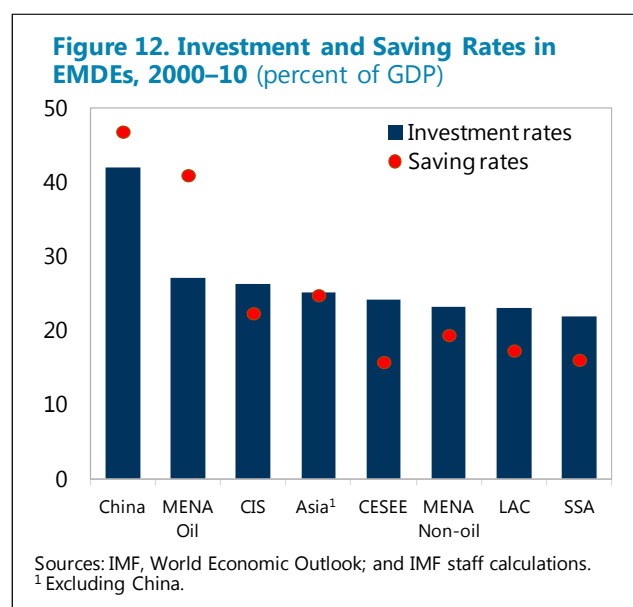
III. LOOKING AHEAD: CHALLENGES AND OPPORTUNITIES

Absent tailwinds, unlocking productivity growth by improving economic efficiency and reallocating existing resources in the economy will be a priority for all countries. Structural reforms that remove growth bottlenecks and alleviate pertinent market and government failures are thus essential elements of continued catch-up.

20. **Sustaining growth.** Given the heterogeneity of recent growth experiences, the underpinnings of sustained growth will vary. For many EMDEs, the sources of economic growth based on capital deepening, fostering human capital accumulation (improvements in the quality of workers), and labor utilization are far from exhausted. The challenge ahead is to bridge gaps in these areas against the backdrop of a less benign external environment and, in some countries, natural constraints imposed by population aging.

¹³ Studies using firm-level data find that if China and India were to reduce resource misallocation in their manufacturing sectors to the level in the United States, manufacturing TFP would increase by as much as 30-60 percent (Hsieh and Klenow, 2009).

- *Capital deepening.* As the growth accounting exercise and sectoral productivity dynamics demonstrate, from a catch-up perspective, achieving robust growth rates will require further capital deepening in some EMDEs, particularly in SSA and LAC. High rates of investment will, therefore, be important in some. For traditionally low-saving countries, higher investment would require the mobilization of higher domestic savings on a sustainable basis, without resorting to excessive reliance on foreign savings (e.g., in SSA, LAC) (Figure 12). Resource-rich countries face the task of channeling savings into funding a portfolio of



productive physical assets instead of consumption. In some countries (e.g., China), potential diminishing returns to capital and concerns about declining investment efficiency cast doubt on the ability to sustain the very high rates of capital deepening experienced in recent years.

- *Human capital.* The productivity benefits from education reforms typically materialize in the longer term, but they are fundamental for enhancing living standards. Improvements in educational quality and attainment would be critical to support long-term growth prospects.
- *Labor utilization.* For some countries, a step up in labor input will be an essential contribution to growth. Boosting labor force participation, including by women, fully mobilizing untapped pools of labor resources in informal sectors to cope with the challenge of an aging population, and addressing high rates of structural unemployment (e.g., in some CESEE countries) by alleviating impediments to job creation would help in this regard. Where skills mismatches are significant, improving educational curricula, and providing in-house training could make a difference.

21. **Enhancing productivity.** Increasing productivity growth will need to remain a priority for all countries if high growth rates are to be maintained. Although the productivity of an economy determines its ability to sustain a high level of income, it is also a central determinant of the rates of return on investment in the economy, at both the aggregate and sector levels. This, in turn, is a key factor explaining an economy's growth potential. Enhancing productivity, however, entails both opportunities and challenges.

- *Opportunities.* Sizeable convergence gaps with respect to advanced economies suggest considerable opportunities for catch-up. The stylized facts presented in previous sections point to three potential sources of productivity growth in EMDEs—catch-up growth from absorbing technology and ideas from advanced countries, structural change into higher-productivity sectors and new activities, and increases to within-sector productivity by improving resource allocation.

- *Challenges.* The challenge is that there is little evidence of catch-up convergence based on differences in initial productivity levels alone. Structural transformation and convergence to higher living standards tend to be conditional on policy, institutional, and reform settings that help alleviate pertinent market and government failures, as well as on the ability of labor and capital to move toward higher-productivity sectors and activities. This challenge underscores the importance of structural reforms for enhancing productivity and sustaining growth prospects.
22. **Looking further ahead.** Looking over a longer horizon, prospects will depend crucially on establishing structural conditions conducive to sustained growth.
- *Fast-growing EMs.* Economic theory suggests that some deceleration in economic growth in fast-growing EMs is inevitable as convergence gaps close and demographic tailwinds fade. Indeed, the experiences of economies that exhibited convergence in the past (Singapore, Israel, euro area periphery countries in the 1970s) suggests that during the transition to higher income levels, catch-up gains from capital deepening, diffusion of foreign technologies, and sectoral reallocation effects diminish, and growth slows. Furthermore, market and institutional rigidities become even more of a detriment to spurring productivity growth and maintaining competitiveness (Aghion and Howitt, 2009). At the same time, the growth of the working-age population is already slowing down in many EMs, and dependency ratios are projected to rise (albeit to varying degrees and at different horizons) which could further dampen growth prospects.
 - *LICs, especially in SSA,* where dependency ratios are projected to decline, face a different challenge—that of taking advantage of demographic dividends to create the preconditions for higher private sector involvement and productive employment opportunities.
 - In all countries, accelerating the pace of reforms—to encourage the diversification of both domestic production and external trade in LICs and resource-rich EMs, and to limit the productivity slowdowns that tend to occur during the transition to higher-income status in fast-growing EMs—will be critical.

IV. WHAT POLICIES WILL ENHANCE PRODUCTIVITY?

Although there is no single reform path, historical experience indicates that real and financial sector reforms can spur productivity growth. Yet these reforms can carry countries only so far and need to be continuously adapted as bottlenecks change. Despite progress in recent decades, further reform efforts are needed to deliver sustained growth and rapid economic convergence. To this effect, implementing a set of targeted and inter-locking reforms that encourage technology transfer, facilitate structural change, and reduce resource misallocation could lift productivity and growth potential. Reform priorities in these areas will vary across countries, depending on the stage of economic development and the specific constraints faced.

23. **Which reforms?** There are clearly many areas in which reforms could have significant productivity impacts, either in the near-term or over the longer term. However, it bears emphasizing that the economic impact of reforms can be limited if they do not address the most binding

impediments to growth within a country (Hausmann, Rodrik, and Velasco, 2008). The attempt here is not to provide an exhaustive list of reforms or to identify precise pay-offs from undertaking them. Instead, the focus is on drawing broad policy lessons from past cross-country experiences with reforms and providing a conceptual framework to assess the types of productivity-enhancing reforms that could be more relevant for countries, depending on income group.

24. **Policy determinants of productivity.** Because economic theory does not reach clear conclusions on the conditions that best support income catch-up, researchers have sought to draw lessons from the experience of a broad segment of countries using cross-country, industry and firm-level evidence (see accompanying technical note). Notwithstanding challenges in assessing the impact of policies on performance, there is a growing consensus that both macro- and micro-economic reforms can lead to improvements in resource allocation, productivity, and growth. In particular, higher quality and quantity of infrastructure and human capital, trade openness, efficient and well-developed financial systems, appropriate tax and expenditure policies, and sound economic institutions (e.g., strong rule of law, and avoidance of overly stringent regulation of product and labor markets) that promote competition, facilitate entry and exit, and encourage entrepreneurship and innovation have been variously found to increase productivity growth. Evidence suggests that many of these reforms can also help alleviate the risk of a further, sustained slowdown down the road in EMDEs (Aiyar and others, 2013).

A. Structural Reform Lessons from the Past

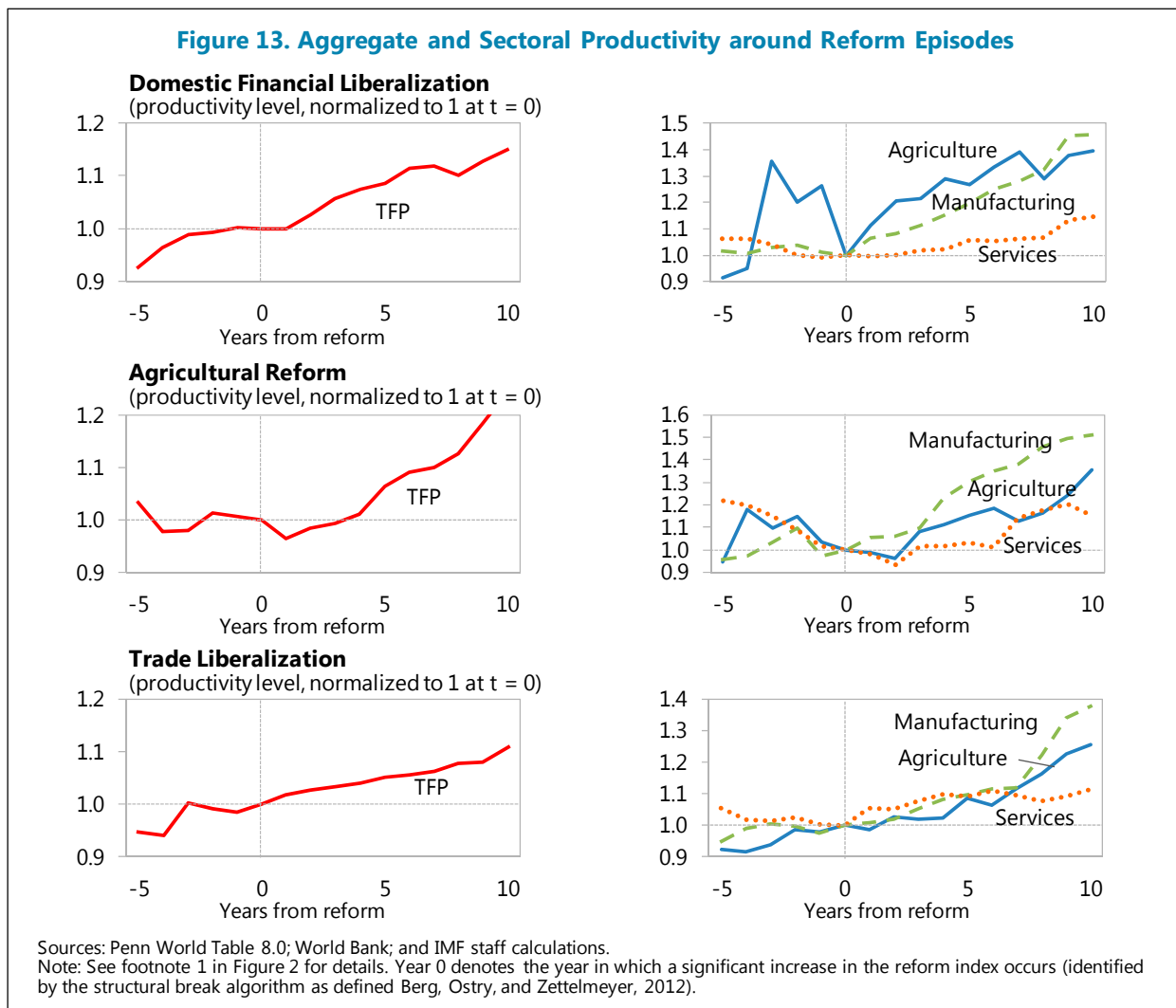
25. **Looking to the past.** Previous IMF work has found that real and financial sector reforms contributed to boosting per capita income growth in EMDEs, with domestic financial sector reforms (especially in banking), trade, and agricultural sector liberalization exerting particularly large effects (IMF, 2008). These three types of illustrative reforms are used to intuit general lessons from previous reform episodes. An event study analysis indicates that these reforms were associated with significant improvements in aggregate TFP and sectoral productivity. Figure 13 shows the increases in average TFP, and sectoral labor productivity for a 15-year window around a significant reform episode (denoted by year 0) in the domestic financial sector, in agriculture, and in trade liberalization.¹⁴

26. **Removing impediments.** Real and financial sector reforms increased productivity by removing distortions, reducing the role of the government in the economy, changing incentives, and boosting allocative efficiency. Financial sector reforms, such as removal of interest ceilings and credit controls, and stronger regulatory and supervisory frameworks, eliminated existing credit market

¹⁴ A “significant reform” is defined as a large increase in the de facto reform index, identified using the structural break algorithm developed by Berg and others (2008). The algorithm identifies 77 episodes of domestic financial sector reforms, 78 episodes of trade reforms and 53 agricultural reforms in EMDEs from 1970 to 2008. This analysis leaves unanswered questions of long-standing interest in the literature, such as whether reforms should be “big bang” or more continuous; or whether a more volatile reform path is, more or less, growth-enhancing than one that is characterized by steady, but moderate reform. In addition, due to the long time window considered, the effects on productivity very far from the reform date should be viewed as indicative, as other factors could also be at play.

imperfections and the resulting misallocation of capital (see Box 1 on Korea’s experience). The dismantling of trade barriers helped facilitate technology transfer, increase product market competition, and induce efficiency improvements, both across and within sectors (Melitz, 2003; Eslava and others, 2013, for Colombia). Similarly, as is well documented for China and Vietnam, liberalization of agricultural sectors facilitated labor mobility to higher productivity sectors.

27. **Beneficial sectoral dynamics.** Economy-wide productivity gains following these reforms were underpinned by both sectoral shifts and higher within-sector productivity growth. The event study analysis suggests that scaling-back government intervention in the agriculture sector was primarily associated with higher manufacturing sector productivity, consistent with recent evidence that points to its role in facilitating structural transformation (Dabla-Norris and others, 2013). Financial sector reforms were associated with higher agricultural and manufacturing productivity growth which underpinned improvements in TFP performance, while higher TFP growth following trade liberalization was buoyed by productivity growth across broad sectors.



28. **Payoffs and horizons.** Although productivity gains associated with reforms can potentially be substantial, the event study analysis indicates that reform benefits can eventually taper off. This outcome is consistent with empirical evidence that finds that the growth effects of domestic financial and trade reforms while persistent, raising growth at a horizon of up to six years, can become insignificant at longer horizons (Christiansen, Schindler, and Tressel, 2013). Moreover, reform payoffs may take time to materialize. Delays in productivity and growth improvements following reforms could reflect implementation and adjustment costs (e.g., time taken from moving resources from one sector to another or delays in investment). For instance, the event study shows that productivity growth in agriculture and manufacturing only significantly picked up six years after a major liberalization of trade. Similarly, reforms may even have negative short-term effects on productivity and output, as evidenced by the initial decline in agricultural sector productivity following the reform episode.

29. **Country-specific circumstances.** Although past experiences are instructive, productivity and growth impacts of reforms depend on a variety of country-specific policy and institutional settings. The impact of individual reforms can depend on various complementary factors, including the rigidity of labor markets, the existing regulatory framework, demographics, and the availability of productive opportunities in the economy. Political economy considerations (e.g., how social consequences of reforms are dealt with) and implementation costs critically influence reform design strategies and effectiveness. Complementarities and sequencing of reforms in different areas are also material for the realization of potential gains (Barkbu and others, 2012; IMF, 2008). For instance, the heterogeneity of the effectiveness of past financial and trade reforms in EMDEs can be explained by the complementarity between economic and institutional reforms: financial and trade reforms were more effective in countries with good protection of property rights (Christiansen, Schindler, and Tressel, 2013). These factors render identifying the causal effects of reforms on productivity and growth challenging, suggesting that there is no single reform path, nor silver bullet.

30. **Adapting reforms over time.** Economic reforms that reduce barriers to efficient factor reallocation, technology adoption, and innovation can lead to productivity gains for some time. But as economies develop against the backdrop of an ever-changing external environment, new constraints can emerge, and the failure to tackle older legacies can create more stringent bottlenecks down the road. For many EMDEs, productivity gains from previous “first-generation reforms” may have already peaked, requiring reform efforts to be reignited to remove existing constraints. Indeed, countries that have successfully kick-started and maintained high productivity growth rates were able to do so by adapting reforms over time. Korea’s case stands out as an illuminating example in this regard (Box 1).

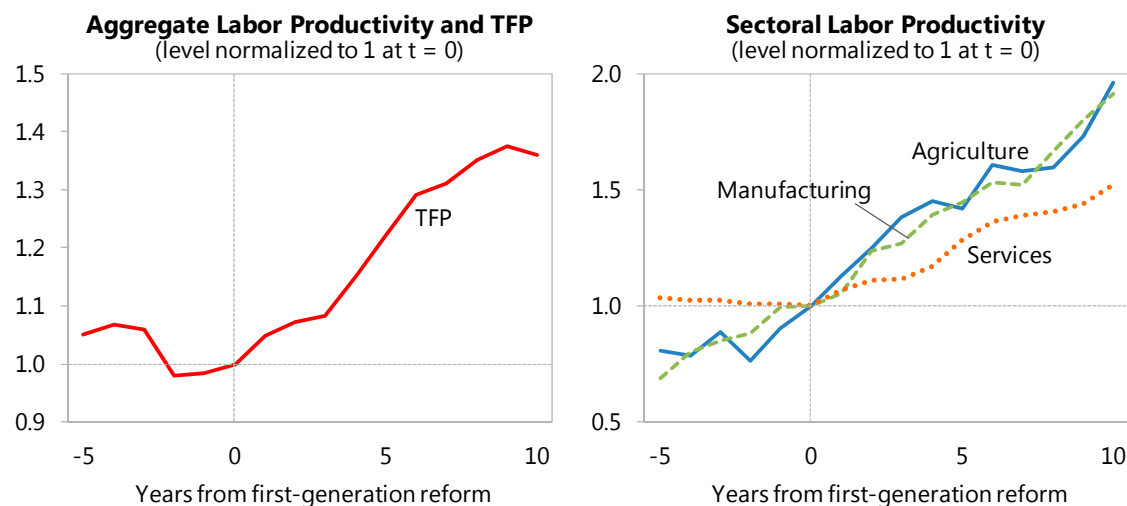
Box 1. Korea's Reform Experience: A Tale of Adaptation

Korea's reform experience provides a good example of how an economy needs to adapt to evolving growth challenges. The country's growth trajectory was not free of recessions and crises, but these hurdles were often turned into opportunities to implement economic reforms that bore subsequent productivity and growth payoffs.

Korea experienced strong growth between 1960 and 1980, aided by high investment rates, booming exports, an emphasis on general education (helped by past education reforms), and a stable macroeconomic environment. In the 1970s, the government embarked on a large-scale program of subsidizing electronics, chemical, and other heavy industries, helping Korea become a leading producer and exporter in these areas. The government-directed investment projects, however, put pressure on the current account—exacerbated by the two oil shocks in the 1970s—which was increasingly financed by external borrowing. The external imbalances, combined with domestic shocks, culminated in the crisis of 1979–80, thus triggering what have been called the “first generation” economic reforms in the early 1980s.

These reforms aimed at revitalizing market functioning through economic liberalization, privatization, and abolition of market entry and exit restrictions. Policies were put in place to maintain external competitiveness and sustain investment productivity; exporters received a variety of incentives; and skills in key sectors were upgraded via vocational and in-plant training. The reform episode was associated with an acceleration in aggregate TFP growth (averaging 3.6 percent per year in the following decade), fostered by higher productivity growth across broad sectors.

Figure 1.1. Korea: Productivity Growth from First-Generation Reforms

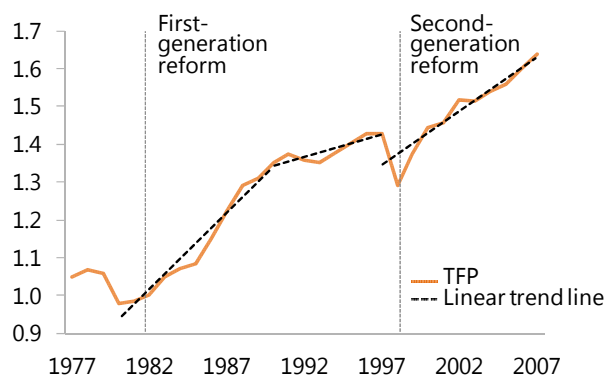


Sources: Penn World Table 8.0; World Bank; and IMF staff calculations.

The sizable productivity gains accruing from these reforms, however, began to taper off by the early 1990s. Rampant distortions in financial markets remained (e.g., directed lending and highly regulated interest rates), many of which were a legacy from the industrial policies of the 1970s. Wide-ranging “second-generation” reforms undertaken in the wake of the Asian crisis of the late 1990s aimed to restructure the business, banking, and public sectors, as well as the labor market.

Reform measures included, for example, extensive corporate and banking system restructuring, requirements to improve management, transparency, competition, and accountability in the business sector, and increased flexibility in the labor market. The restructuring of the financial system sought to restore financial stability through swift resolution of non-performing loans, bank recapitalization, closing down non-viable institutions, and strengthening the institutional framework by bringing prudential regulations and supervision in line with international best practices. Labor training in the export oriented sectors helped sustain growth by moving the manufacturing sector up the value chain. Economic reforms combined with supportive macroeconomic policies, significant growth in the export sector, and high inflows of FDI enabled a swift recovery from the crisis. TFP growth was once again boosted, with the economy growing at an annual rate of 5.3 percent during 2000–08.

Figure 1.2. Korea: Total Factor Productivity
(normalized to 1 in 1982)



Sources: Penn World Table 8.0; and IMF staff calculations.

B. Calibrating Policies to Stage of Development

31. **Policies and distance to the frontier.** The effectiveness of policy and structural reforms in boosting productivity depends on the country's location along the development path. The conceptual framework of "distance to the technology frontier" is employed to empirically assess the relative importance of a range of policy and institutional factors across different income groups (see technical note).¹⁵ The choice of reform variables reflects recent theoretical and empirical findings on aggregate and sectoral productivity determinants as well as data availability. The underlying idea is that as countries get closer to the global technological frontier, the relative importance of innovation compared with technology imitation and adaptation increases (Aghion and Howitt, 2006, 2009). Therefore, the set of policies aimed at sustaining productivity growth and facilitating convergence at earlier stages of development can differ from those that may be required as income gaps close.

32. **Calibrating reforms.** The empirical analysis provides support for the commonality of productivity drivers and for the dissimilarity of their impact across countries. The evidence suggests that advancing a range of inter-locking reforms can substantially lift productivity and growth. Given the nature of statistical relationships, the results should be interpreted as highlighting associations rather than revealing causation. Moreover, they are illustrative of the type of productivity-enhancing

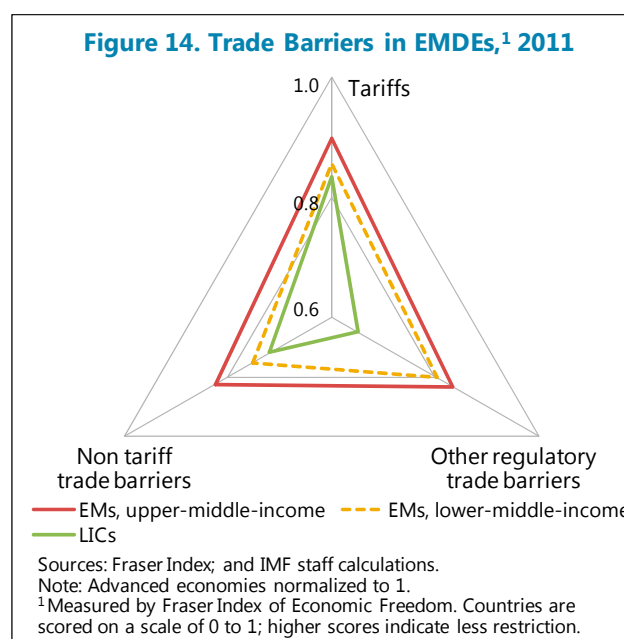
¹⁵ The analysis is based on more than 100 advanced economies and EMDEs, which are grouped into quartiles according to their time-varying "distance to the technological frontier," approximated by the ratio of each country's real per capita GDP to that of the United States. LICs comprise the first quartile, with most EMs falling now into the second (e.g., China, India and other lower-middle income countries) or third quartiles (e.g., Chile, Poland, and other upper-middle income countries). The effects of a wide range of structural, policy, and institutional factors are estimated for each income group. For further details, see technical note.

reforms that would be more effective given income levels, and are not intended to suggest that these specific reforms should be implemented by all countries in the group. Granularity is necessary, as there is no one-size-fits-all strategy.

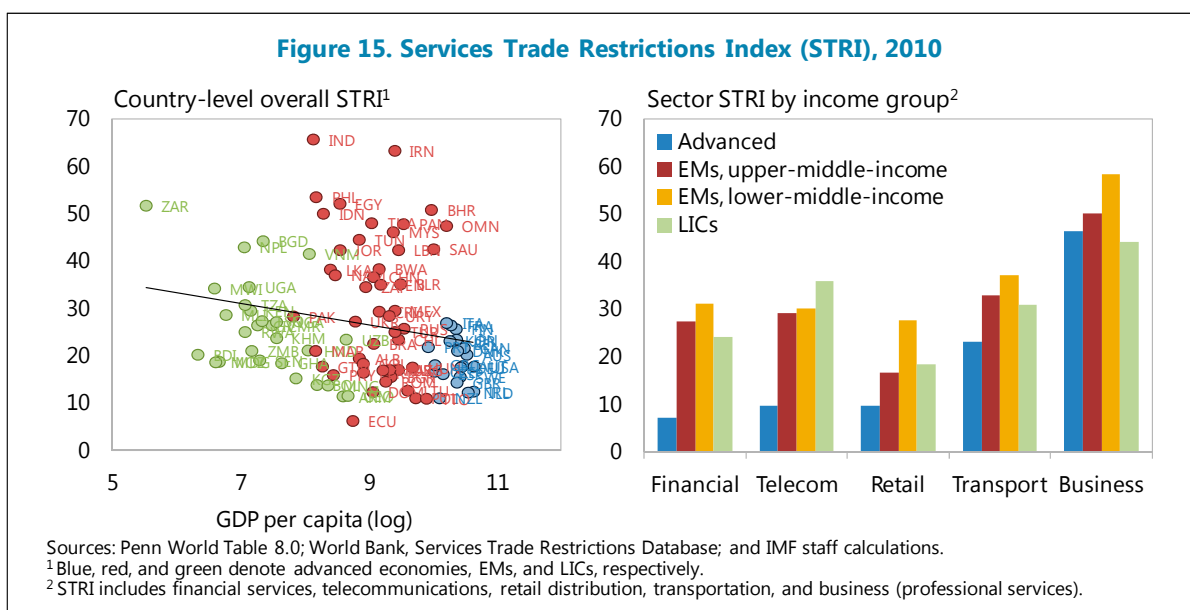
Real Sector Reforms

33. **Lowering barriers to trade and investment.** Barriers to international trade and foreign investment can be detrimental to productivity growth, with an extensive literature showing that more open economies with lower barriers, and greater integration into supply chains, have experienced higher growth.

- Reducing trade barriers.* Despite progress during recent decades, tariff and non-tariff barriers to foreign trade persist in many EMDEs (Figure 14). The empirical results suggest that by encouraging a more efficient allocation of resources and technology transfer, lower trade barriers are associated with higher productivity growth in LICs. Reducing trade barriers could also help open up new markets, facilitate export diversification, and improve agricultural efficiency, including through better market access, cheaper imported inputs, and greater competition. This move is especially relevant for LICs in SSA, where nontariff barriers stymie regional integration and agricultural productivity gaps remain wide. Further improvement in trade facilitation and logistics (e.g., information technology, infrastructure, port efficiency and customs regimes) could also help deepen the gains from trade openness. But advanced economies also have a role to play by rationalizing their agricultural tariffs and subsidies (IMF, 2007).
- Liberalizing FDI.* Middle-income countries can boost productivity growth in both the tradable and non-tradable sectors and secure economy-wide productivity gains by further liberalization of FDI flows. Regulations limiting entry can hinder the adoption of existing technologies by reducing competitive pressures, preventing technology spillovers, and hampering the entry of new high technology firms. Services barriers in EMs (e.g., China, India, Indonesia, Iran), in particular, are substantially higher than in advanced countries, even in comparison with LICs (Figure 15). These barriers are most restrictive in telecommunications, transportation, retail and business sectors, which tend to exhibit higher productivity than other services. Empirical evidence has linked open services markets and FDI in services with the performance of domestic firms, including services exports. Country experiences further indicate that the dismantling of entry barriers and regulatory restrictions for FDI in the services sector tend to be associated with higher productivity in downstream manufacturing sectors. Given the growing role of services in



EMs, and large existing productivity gaps within the sector, further liberalization of FDI complemented with goods market reforms to boost competition would confer important growth benefits.

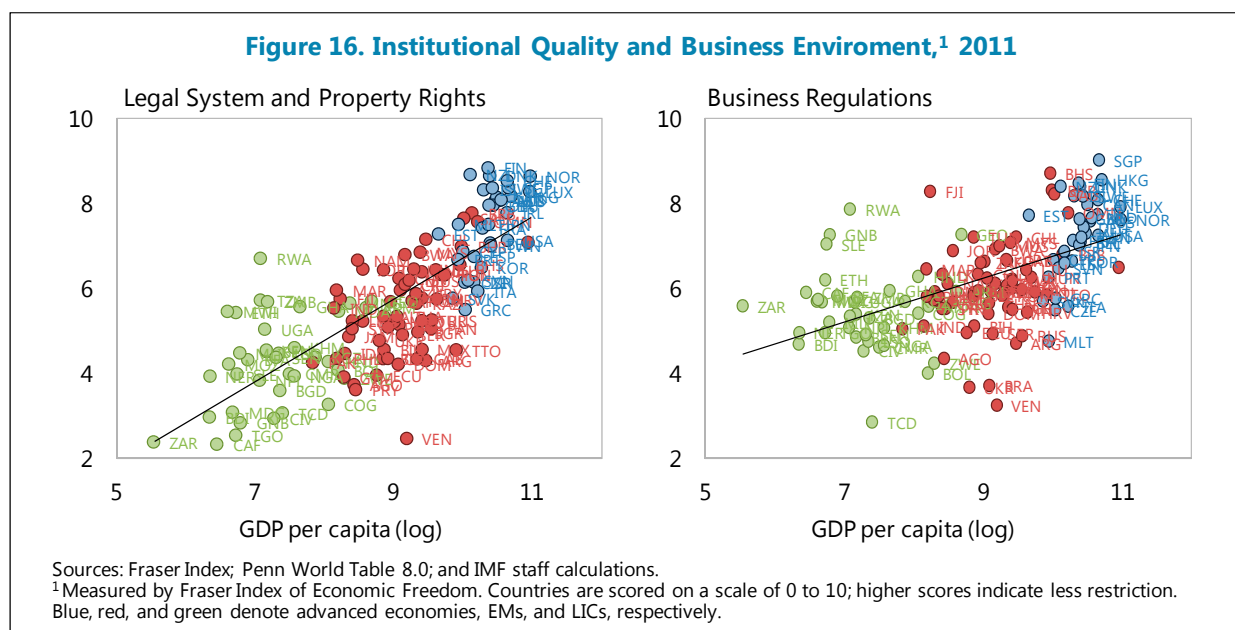


34. **Boosting agricultural productivity.** The empirical results suggest that agricultural sector reforms are associated with higher productivity growth in *low- and lower-middle income countries*. In *LICs*, they are also associated with higher manufacturing sector productivity. This implies that efforts to scale back excessive government intervention and boost within-sector productivity (e.g., through appropriate land reforms and tenancy restrictions, improvements in physical infrastructure and crop yields) can yield economy-wide productivity gains, including by facilitating structural transformation in economies with still high shares of agricultural employment.

35. **Improving the business environment.** Most EMDEs would benefit from further reforms toward a more business-friendly environment. Heavy regulatory burdens often discourage international participation, sharply limit a country's ability to benefit from knowledge transfers and economies of scale, and hamper resource allocation to fast-growing and new sectors. The empirical results suggest that reforms focused on reducing administrative burdens, simplifying regulations, strengthening competition, and cutting red-tape are positively associated with higher manufacturing productivity growth in *low-income countries* and aggregate productivity growth for *middle-income countries*. Given large existing gaps in this area for most EMDEs (Figure 16), and low manufacturing productivity in *LICs*, further efforts to improve the investment climate could create an environment more conducive to investment and help facilitate catch-up.

36. **Strengthening contracting institutions.** EMDEs can reap productivity gains by further improving the quality of their institutional frameworks that protect property rights, including intellectual property, and facilitate private contracting (Figure 16). However, it is in *low-income countries*, where productivity and growth benefits from strengthening institutions are likely to be

most pronounced. Property rights and the ability to enforce contracts—two critical elements of a country’s institutional and legal framework—which help create the pre-conditions for market-based economic activity, tend to be weaker in these economies. Further strengthening institutions could help promote private investment and entrepreneurship, and foster financial sector development in these countries.



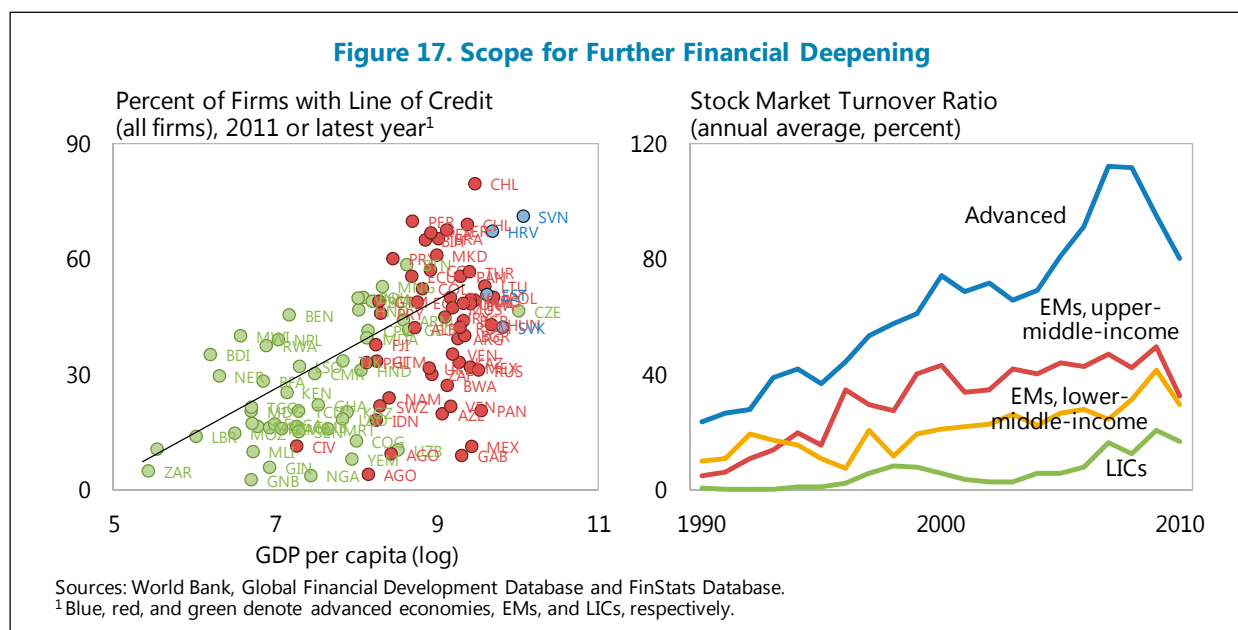
37. **Enhancing labor market flexibility.** The empirical results suggest that reforms aimed at reducing excessive labor market rigidities and the resulting dualism in labor markets are associated with higher aggregate and sectoral productivity growth in countries *closer to the technology frontier*, but the payoffs from such reforms are likely to be more limited in *LICs*.

- *Implications of excessive regulation.* In many EMs, the combination of rigid hiring and firing and employment protection regulations and weak income protection systems often encourages informality and makes it costly for labor to move to more productive sectors. Firm-level evidence indicates that industries with more stringent employment protection tend to exhibit weaker productivity growth. Country experiences further suggest that excessive regulation can also slow down job creation in global value chains, causing countries to miss out on jobs supporting agglomeration effects and knowledge spillovers.
- *No one-size-fits-all reform recipe.* The sheer diversity of institutions, underlying distortions, and misallocations in labor markets across countries, however, renders a one-size-fits-all reform recipe unsuitable. Country experiences indicate that complementary reforms in labor, capital, and product markets and a more efficient use of human capital (e.g., reducing labor skills mismatches and shortages) can be helpful in reducing informality, facilitating the movement of labor to more productive sectors, and fostering expansion of new firms and sectors.

Financial Sector Reforms

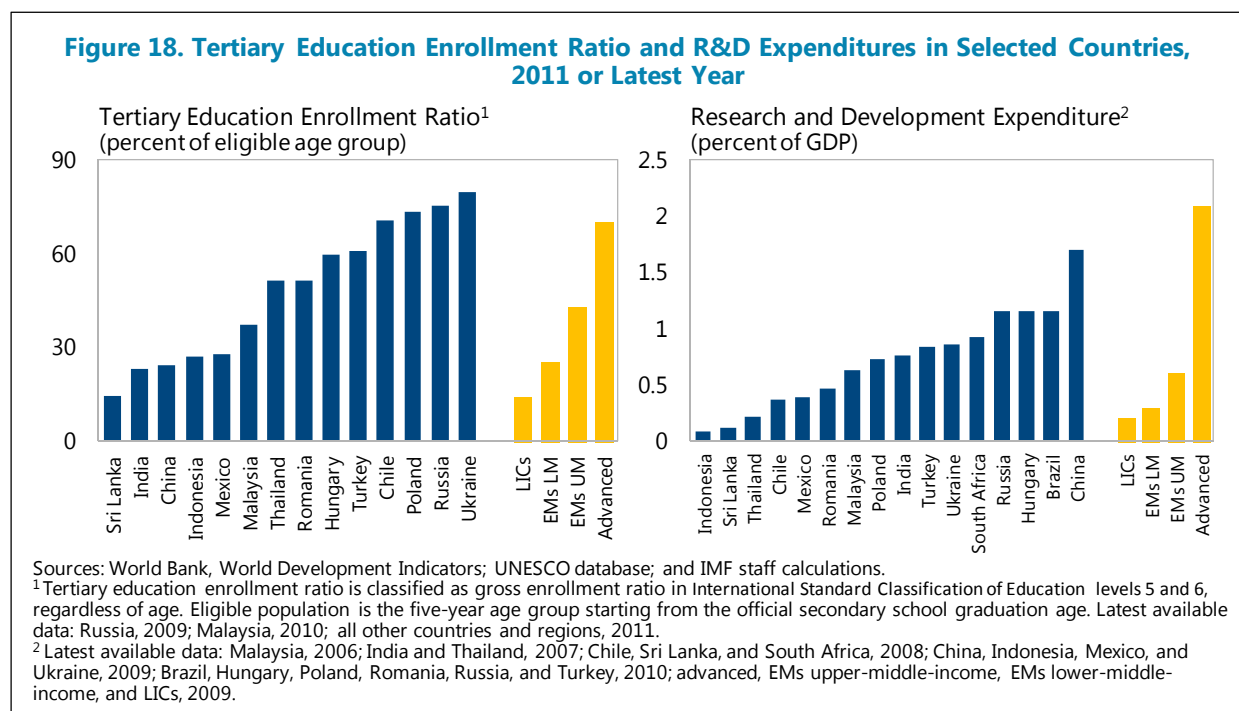
38. **Building strong domestic financial systems.** Continued progress on financial sector reforms will remain key to sustaining growth performance (Figure 17). Financial system deepening can help raise investment, spur innovation, facilitate technology transfer, and can lead to a more efficient allocation of capital across sectors. The importance of financial sector reforms for increasing productivity growth, however, varies across income groups.

- *Banking sector reforms.* Although productivity payoffs from undertaking banking system reforms accrue for all countries, *lower-middle-income countries*, which tend to have more bank-based financial systems, could benefit most from further banking system reforms. Measures to mobilize domestic saving, lower the cost of and improve the access to credit, and ensure that financial resources are allocated to the most productive sectors can support greater investment and efficiency in productive tradable and non-tradable sectors. These measures need to be complemented by prudential policies to prevent excessive risk taking. Reducing financial repression (e.g., restrictions on the price or quantity of credit), which continues to persist in some EMDEs, could also help spur the movement of resources to their more productive uses, both across and within sectors.
- *Capital market development.* *Upper-middle -income countries* can reap significant productivity gains from further deepening capital markets and from policies that encourage the formation and development of equity, bonds, and securities markets. These measures can be particularly effective for increasing productivity by lowering the cost of capital, and facilitating the financing of new capital and innovation. In many large EMs, the menu of available financial instruments has expanded, market infrastructure has been reformed and strengthened, and a diversified investor base has been built. However, capital markets continue to lag behind those in advanced economies in size, turnover, liquidity and the development of institutional investors (Goyal and others, 2011). Building long-term domestic capital markets and establishing institutional investors to support long-term investment (including in infrastructure) will thus be a priority for financial market deepening in these countries, especially in light of potentially scarcer external funding.



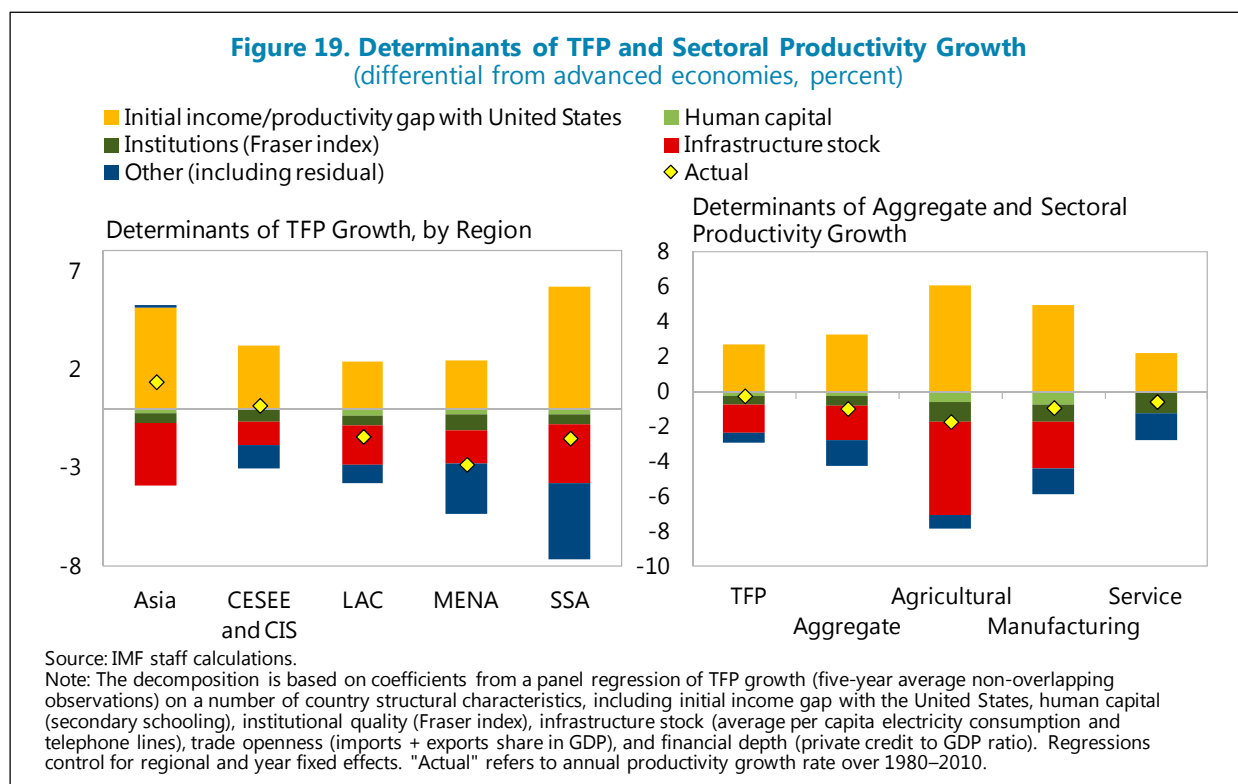
Boosting productive capacity

39. **Accumulating human capital and fostering innovation.** Accumulation of human capital can help foster the development of skills-intensive industries and new technologies, facilitate technological diffusion between firms, and enable economic diversification (Bal-Gunduz, Dabla-Norris, and Intal, forthcoming). Evidence suggests that primary and secondary education matters more for a country's ability to imitate frontier technology, while tertiary education has a larger impact on a country's possibility of innovating (Aghion and Howitt, 2006). LICs will thus need to increase the quality and coverage of education to facilitate the shift of labor into higher-productivity industries and services. Many EMs have successfully exploited a model of high volume, low value-added assembly operations, mainly through adoption of existing technologies. For these countries, sustaining growth and income convergence will increasingly depend on their ability to promote innovation in various sectors and to move up the value chains. This progression will require upgrading skills, improving tertiary education attainment, building a modern and reliable knowledge infrastructure (e.g., policies to foster ICT), and raising spending on research and development, which still lags behind advanced economies (Figure 18).



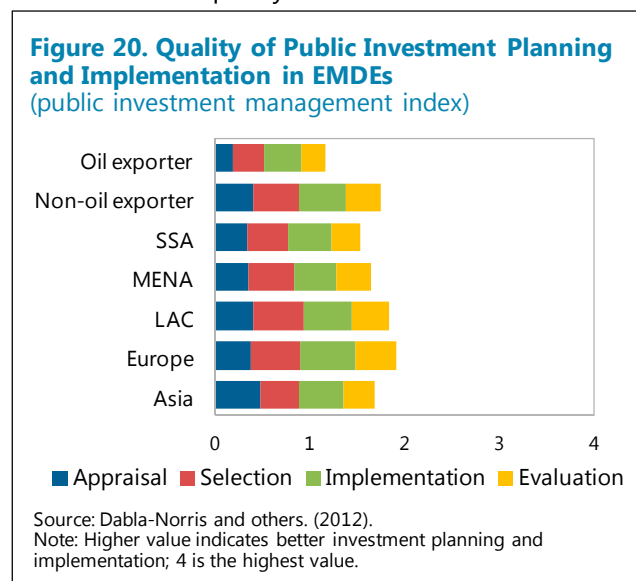
40. **Alleviating infrastructure bottlenecks.** Investment in infrastructure sectors can have a positive impact on long-term income levels that goes beyond the effect of increases in the capital stock, resulting from economies of scale, the existence of network externalities, and competition-enhancing mechanisms. Despite impressive progress in some areas (e.g., telecommunications), many EMDEs suffer from large infrastructure deficits, manifested in deficient transportation and communications networks and low energy-generating capacity to meet rising demand. Empirical evidence done for this note indicates that insufficient physical infrastructure serves as a major drag on productivity growth in EMDEs relative to that in advanced economies (Figure 19). Not surprisingly, these effects are most pronounced for LICs in SSA, where infrastructure gaps are the widest.¹⁶ Moreover, inadequate infrastructure is a key determinant of low productivity growth in the agriculture and manufacturing sectors relative to advanced economies. Improving connectivity to markets, domestic and foreign, could boost prospects for labor-intensive manufacturing and agriculture, and thus could have significant economy-wide productivity and growth impacts. Reforming the regulatory environment for infrastructure, and promoting public-private partnerships would help attract private investment.

¹⁶ The empirical evidence also suggests that initial income gaps vis-à-vis advanced economies—reflecting catch-up potential—are generally higher in SSA and Asia than in other regions. Furthermore, in line with the earlier discussion, convergence gaps are highest in agriculture compared with other sectors.



41. **Improving infrastructure quality.** Improvements in the quality of investment in

infrastructure are just as essential because inefficiencies in public investment management and weak governance often distort the impact of public spending on capital accumulation in EMDEs. Indeed, an index of public investment management practices suggests that the quality of planning, appraisal, selection, implementation, and evaluation of projects within government investment portfolios could be improved in most countries (Figure 20) (Dabla-Norris and others, 2012). This is particularly pertinent for many resource-rich developing countries, where public investment rates have increased during the recent resource boom, but investment quality suffers from relatively weak capacity in comparison with other countries.



42. **Enhancing fiscal policy efficiency.** Although not explicitly included in the empirical analysis, fiscal reforms could help ensure that provision of public services in education and training and in infrastructure are more efficient and well-targeted, thereby fostering productivity growth. In general, the composition and quality of taxation and public spending—what and how to tax, what to spend public money on and how to spend it—can have significant productivity, growth, and labor

market impacts (IMF, 2013c; IMF, 2012d). Tax policies can affect productivity by creating disincentives for firms to engage in innovative activities (e.g., corporate taxes) or distorting the capital-labor allocation (e.g., social security contributions). For many EMDEs, the challenge is to mobilize adequate revenues, taking into account potential trade-offs between alternative revenue-raising measures and tax incentives (a common practice to attract FDI and promote research and development). Cutting-back spending in non-productive areas (e.g., distortionary and poorly targeted energy subsidies), addressing budgetary rigidities, and improving the efficiency of public spending in priority areas, including by strengthening public financial management, could yield productivity gains.

V. FINAL REMARKS

43. **Closing convergence gaps.** Structural reforms need to be implemented if EMDEs are to maintain a dynamic growth trajectory and improve living standards. Sizeable convergence gaps with advanced economies remain, indicative of a significant misallocation of resources both across and within sectors. Decisive progress in advancing productivity-enhancing structural reforms that encourage technology transfer, facilitate structural change, and reduce resource misallocation would go a long way toward fostering more sustainable growth and ensuring continued convergence to higher income levels. The considerable heterogeneity in the sources of recent growth performance in EMDEs, and the uneven pace of convergence, however, point to differing priorities for bridging convergence gaps.

44. **Calibrating reforms.** Despite progress in recent decades, the scope for structural reforms remains considerable in most EMDEs, and recommendations tailored to the country's position along the development path can help focus attention to areas in which potential productivity payoffs are likely to be larger. Empirical evidence shows that advancing a targeted and context-specific set of inter-locking reforms can substantially lift productivity and growth. For LICs, strengthening economic institutions needed for market-based economic activity, reducing trade barriers, reforming agricultural and banking sectors, improving the quality and coverage of education, and investment in infrastructure would help spur productivity growth. EMs will need to advance the second generation reform agenda to boost productivity and foster innovation by upgrading institutions and markets. The required mix of reforms will vary across countries, but productivity gains will depend on deepening financial markets and moving to market-driven allocation of finance, adopting more competitive product and labor market regulations, reducing barriers to FDI for a more vibrant services sector, improving the quality of human capital, alleviating pertinent infrastructure bottlenecks, and investing in research and development and new technologies.

ANNEX I. THEORETICAL FRAMEWORK

Cross-country variation in the levels of output per capita can be decomposed following the methodology of Hall and Jones (1999). In particular, a standard aggregate Cobb-Douglas production function with physical capital, human capital, and labor as production factors and labor-augmenting technological progress is assumed:

$$Y_t = K_t^\alpha (A_t H_t)^{1-\alpha} = K_t^\alpha (A_t h_t L_t)^{1-\alpha}$$

where Y , K , H , h , L , and A stand for output, physical capital, effective labor input, human capital per worker, employment, and total factor productivity (TFP) respectively.

This can be rewritten as:

$$\frac{Y_t}{L_t} = A_t h_t \left(\frac{K_t}{L_t} \right)^{\alpha/(1-\alpha)}$$

Subsequently, GDP per capita can be written as:

$$\frac{Y_t}{POP_t} = \left(\frac{Y_t}{L_t} \right) \left(\frac{L_t}{POP_t} \right) = A_t h_t \left(\frac{L_t}{POP_t} \right) \left(\frac{K_t}{Y_t} \right)^{\alpha/(1-\alpha)}$$

where POP stands for population.

Data on PPP-adjusted output, physical and human capital stocks, population, and employment are taken from Penn World Tables 8.0. Assuming a capital share α of $\frac{1}{3}$, consistent with the literature, TFP can be derived as:

$$A_t = \frac{\left(\frac{Y_t}{POP_t} \right)}{\left[h_t \left(\frac{L_t}{POP_t} \right) \left(\frac{K_t}{Y_t} \right)^{\frac{\alpha}{1-\alpha}} \right]}$$

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