

3. Private Investment to Rejuvenate Growth

Private investment in sub-Saharan Africa is low compared with other countries with similar levels of economic development. The low level of private investment is constraining the region’s efforts to improve social outcomes by holding back labor productivity and the resulting gains in real wages and households’ income. In general, there appears to be a negative association between investment and poverty rates (Figure 3.1). The benefits from increasing investment are well recognized in the region. For example, many countries have engaged in major public investment programs to close large infrastructure gaps with a view to catalyzing private investment. But such a strategy can only be sustained for a limited amount of time, particularly if the private sector growth response is weak. With debt levels high and rising in many countries in the region, there is an increased focus on other options. Countries are participating in external investment initiatives such as the Group of Twenty’s (G20) Compact with Africa, which coordinates efforts to facilitate private investment and increase the provision of infrastructure, and China’s Belt and Road Initiative, which aims to help the region better integrate into global value chains. These initiatives aim to spur private and public investment by improving the business environment and by increasing the availability of financing. These efforts could improve the availability and allocation of resources for investment, and thus have the potential to raise medium-term growth prospects and living standards.

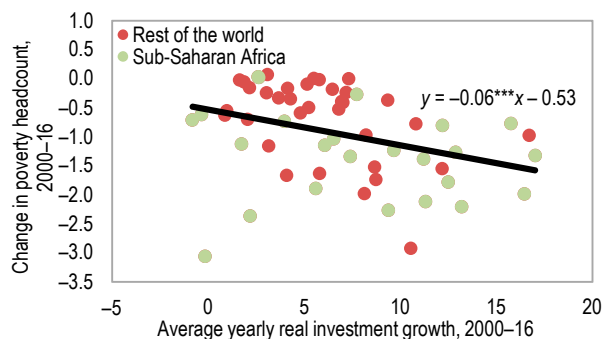
Against this backdrop, this chapter aims to shed light on what influences the level of private investment in sub-Saharan Africa. It does so by following a two-pronged approach that (1) uses econometric techniques to study the importance of the traditional determinants of private investment in a sample of emerging market and developing economies; and (2) examines the role of additional options, such as public-private partnerships (PPPs),

foreign direct investment (FDI), and special economic zones (SEZs), that have been implemented in some countries in an attempt to promote private investment.¹

The main findings of the chapter are the following:

- Sub-Saharan Africa is the region with the lowest private-investment-to-GDP ratio among developing regions. Within sub-Saharan Africa, however, there is some heterogeneity, with private investment ratios averaging about 14 percent in oil-exporting countries, 17 percent in other resource-intensive countries, and 15 percent in non-resource-intensive countries during 2010–16.
- Sub-Saharan African countries that have experienced sustained increases in private investment benefited from macroeconomic stability, stronger institutions, the discovery of natural resources, and the resolution of long-standing conflicts.

Figure 3.1. Poverty Headcount Ratio at \$2 a Day in Purchasing Power Parity Terms and Real Private Investment Growth, 2000–16 (Percent of population and percent)



Source: World Bank, World Development Indicators database.

Note: The regression line is estimated using observations for sub-Saharan Africa and the rest of the world. To control for the effect of outliers, observations below the 5th percentile and above the 95th percentile were eliminated for each variable.

* $p < .10$; ** $p < .05$; *** $p < .01$.

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¹ Throughout the chapter we use data for investment, private and public, available in the World Economic Outlook database and supplemented with data from the UN National Accounts database. Given the state of development of statistical systems in many countries in sub-Saharan Africa it is possible that some public investment ends up classified as private investment, especially in the case of investment undertaken by nonfinancial public sector entities not included in the central government accounts.

- Much as in advanced and emerging market economies, strong current and prospective economic activity is needed for firms to invest in new capital (IMF 2015c). Furthermore, such investment tends to be larger if it takes place in an environment with a strong regulatory and insolvency framework, efficient public infrastructure, greater trade openness, and deeper financial systems.
- Public investment can support private investment, for example, by providing better infrastructure. Policymakers need to be mindful, however, that public investment may crowd out private investment. This could happen when public investment competes with private investment (either for funding or in activities) in an environment with scarce financial resources or potentially binding supply bottlenecks. While this risk could be mitigated by promoting alternative sources of financing for both public and private investment—including through PPPs and deepening of domestic financial markets—it would be imperative to ensure that the associated risks are well managed. Attracting FDI and setting up SEZs could help, although the experience with the latter has been mixed.

The remainder of the chapter is organized as follows. The first section describes recent trends in private investment. The second section presents the empirical determinants of private investment. The third section zooms in on the various ways

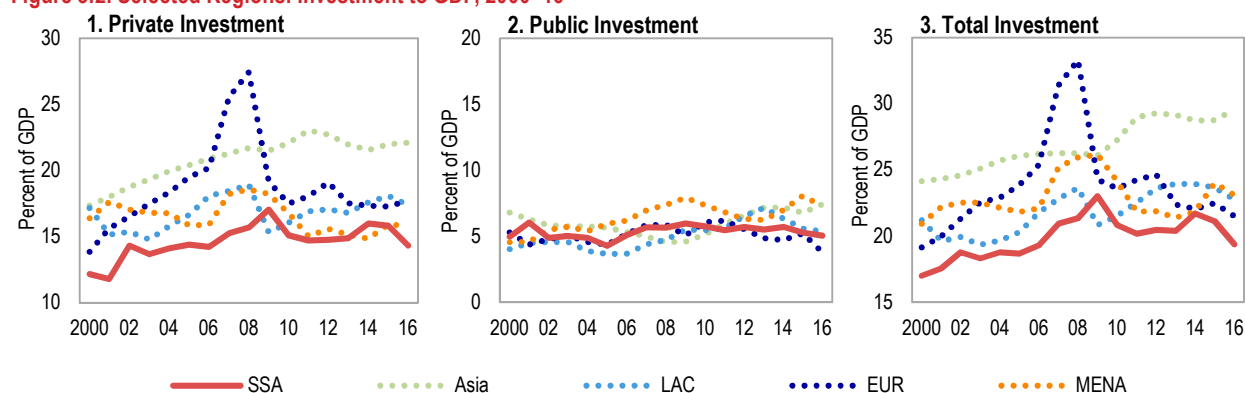
to alleviate the constraints to private investment, including financial deepening, new financial technologies (known as “fintech”), PPPs, FDI, and SEZs.

PRIVATE INVESTMENT TRENDS

While public investment has been on par with other regions, private investment across countries in sub-Saharan Africa is, on average, 2 percent of GDP lower than in other developing economies (Figure 3.2). It averaged 15 percent of GDP during 2010–16, compared with 22 percent for developing economies in Asia, 18 percent in Europe, 17 percent in Latin America, and 16 percent in the Middle East and North Africa (MENA). This difference has, however, fallen by half since the early 2000s, due to a decade of rapid growth in sub-Saharan Africa, when private investment grew at an average rate of 14 percent a year. Since 2010, however, private investment has slowed, growing on average at 5 percent a year through 2014 and contracting during 2015–16 (Figure 3.3).² There are reasons to believe that both global and domestic factors were at play in explaining this slowdown.

Indeed, the slowdown happened more gradually in sub-Saharan Africa than in other emerging market and developing economies, which also experienced a weakening of investment in the aftermath of the global financial crisis. Empirical studies attribute this general slowdown of investment to weaknesses in economic prospects in the United States and the

Figure 3.2. Selected Regions: Investment to GDP, 2000–16

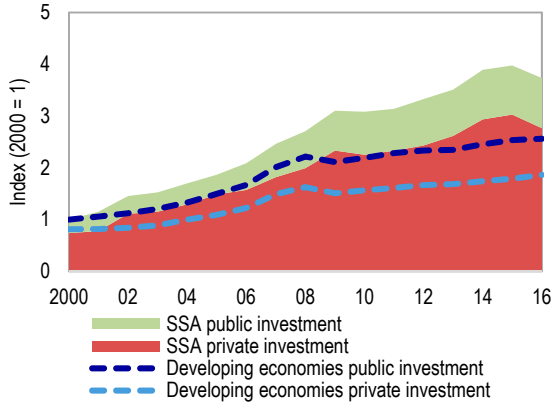


Source: IMF, World Economic Outlook database.

Note: In the figure and throughout the chapter, investment refers to gross fixed capital formation. EUR = Europe; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

² Annex 3.1 explains the construction of these averages and the index shown in Figure 3.3, both of which use weights based on purchasing power parity GDP for the regional aggregation.

Figure 3.3. Sub-Saharan Africa and Developing Economies: Real Investment Index, 2000–16



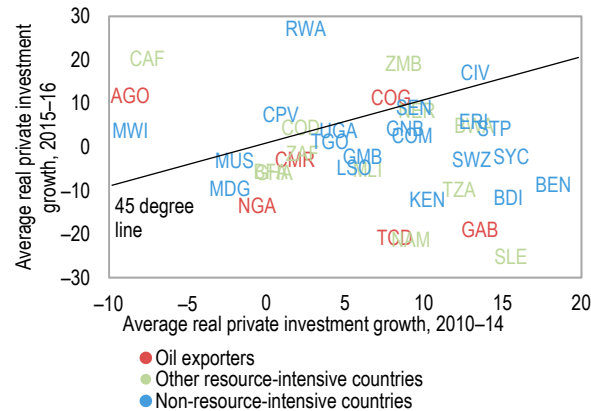
Source: IMF, World Economic Outlook database.

euro area, the rebalancing of the Chinese economy toward domestic consumption, and a surge in the volatility of capital flows (World Bank 2017).

The slowdown in investment in sub-Saharan African countries was less pronounced during 2010–14, owing in part to elevated commodity prices, robust growth prospects in non-resource-intensive countries, and resilient FDI inflows. But since 2015, investment in the region has weakened more than in other developing economies, contracting by 4 percent each year on average in 2015–16.

The decline has been generalized across sub-Saharan Africa, as private investment slowed in two-thirds of the countries and fell in half of them (Figure 3.4). The reasons for the decline

Figure 3.4. Sub-Saharan Africa: Average Growth of Real Private Investment, 2010–14 and 2015–16



Source: IMF, World Economic Outlook database.

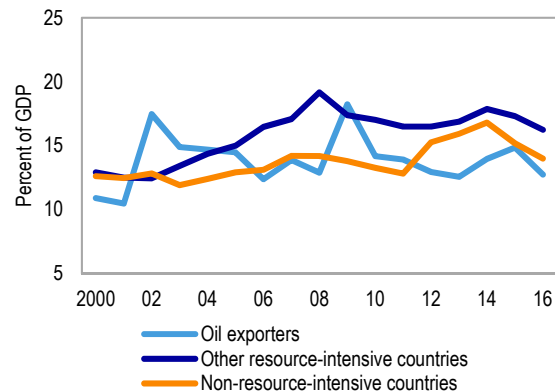
Note: See page 90 for country groupings and page 91 for country abbreviations tables.

differ across countries, and include the collapse of commodity prices, adverse spillovers from large economies in the region, and various idiosyncratic shocks. In particular,

- The sharp fall in commodity prices reduced investment in commodity-exporting countries, especially the oil exporters (Cameroon, Gabon, Nigeria).
- Policy and political uncertainty seem to have played a role in weakening investment in South Africa.
- The attendant slowdown in economic activity in large countries such as Angola, Nigeria, and South Africa (with a combined GDP weight of about 50 percent of the region) has likely had adverse spillovers to the rest of the region, contributing to the investment slowdown.
- Other countries experienced idiosyncratic shocks. In Kenya, a sharp slowdown in credit growth weighed on private investment, while in Namibia investment slowed following the completion of a large mining project.

In general, oil exporters have the lowest levels of private investment to GDP, averaging 14 percent over 2010–16, compared with 17 percent in other resource-intensive countries and 15 percent in non-resource-intensive countries (Figure 3.5).³

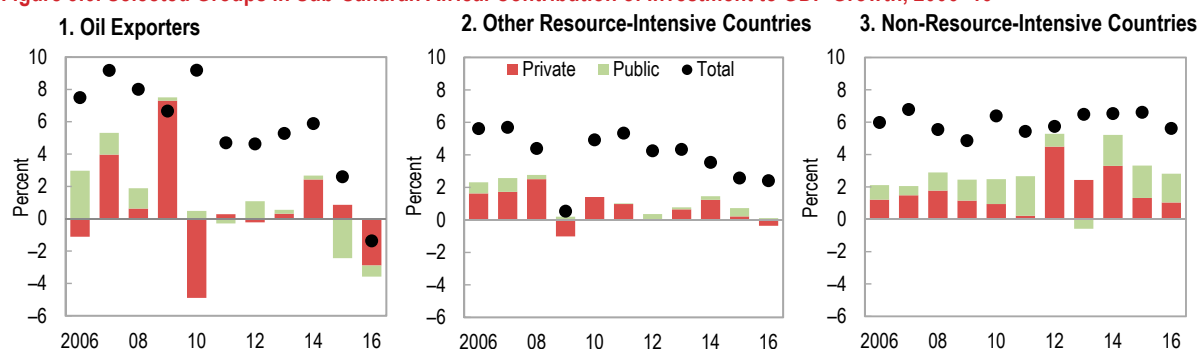
Figure 3.5. Selected Groups in Sub-Saharan Africa: Private Investment to GDP Ratios, 2000–16



Source: IMF, World Economic Outlook database.

Note: See page 90 for country groupings table.

³ For the list of countries considered in each group, see the Statistical Appendix.

Figure 3.6. Selected Groups in Sub-Saharan Africa: Contribution of Investment to GDP Growth, 2006–16

Source: IMF, World Economic Outlook database.

Note: See page 90 for country groupings table.

Weaker investment has weighed on GDP growth. In oil-exporting countries, the negative impact of declining private investment on growth was compounded by sharp cuts in public investment. In other countries, weaker private investment was in part offset by more public investment, but it is unclear how long this can continue, as high debt levels and rising debt servicing costs are constraining fiscal space (Figure 3.6).

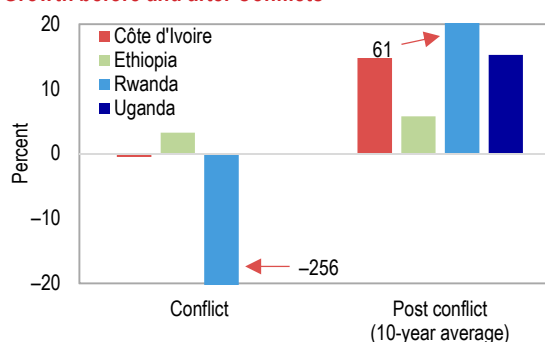
DETERMINANTS OF PRIVATE INVESTMENT RATIOS

Country experiences in sub-Saharan Africa provide some insights on the potential drivers of private investment. They show that surges in private investment have been associated with various factors, some of which were exogenous, such as conflicts and increases in commodity prices.

- **Commodity prices:** Private investment rose markedly in Nigeria during 2007–14 amid elevated oil prices and favorable global financial conditions, while other sub-Saharan African countries benefited from discoveries of natural resources (Equatorial Guinea, Ghana). At the same time, there were instances where commodity importers benefited from a fall in commodity prices that created space to finance more investment, both public and private (Rwanda).
- **Resolution of long-standing conflicts:** The end of conflicts in Côte d'Ivoire, Ethiopia, Rwanda, and Uganda was followed by marked increases in private investment following the end of conflicts (Figure 3.7).

However, these events were generally not enough to sustain the momentum in private investment, especially when they were not supported by macroeconomic stability and a sound institutional environment. Some countries upgraded their institutional environment, which helped sustain private investment growth. (See Box 3.1 for an analysis of the relationship between policy reforms and private investment growth.)

While these country experiences point to an association between private investment and exogenous and institutional factors, they are not sufficient to identify the determinants of private investment. For that purpose, the chapter follows existing literature and estimates the historical relationship between private investment to GDP and its traditional determinants (such as real GDP growth, public investment as a share of GDP, the level of GDP per capita in purchasing power parity, the relative price of

Figure 3.7. Selected Countries: Real Private Investment Growth before and after Conflicts

Source: IMF, World Economic Outlook database.

Note: Private investment growth is computed as private gross fixed capital formation, current prices, deflated by GDP deflator. Conflict episodes: Côte d'Ivoire (2002–05), Ethiopia (1974–91), Rwanda (1990–94), and Uganda (1979–86).

capital, and the real interest rate).⁴ The regressions also consider several structural and institutional variables, including the quality of the business environment, trade openness, financial development, and capital account openness (Annex 3.2).

The selected variables are expected to affect private investment as follows. Strong economic activity captured by real GDP growth provides opportunities for firms to sell more goods and services and make profits, and thus is expected to prompt firms to invest in new capital (the accelerator effect).⁵ The effect of public investment is ambiguous and depends on whether public investment complements or crowds out private investment. Private investment is expected to fall as the cost of capital (proxied here by the fixed capital formation deflator to the GDP deflator ratio and the real interest rate) increases. Finally, because investment ratios tend to show persistence, the regressions include the lagged value of the private-investment-to-GDP ratio.⁶ The estimation sample is composed of an unbalanced panel of 101 emerging market and developing economies covering 1980–2015.⁷

Strong Economic Activity Is Key for Private Investment to Expand

Private investment increases when economic activity is strong—that is, when real GDP growth is high. This result is consistent with an accelerator effect (a similar result is found in IMF 2005).

Interestingly, the impact of GDP growth is nonlinear. Private investment increases with real GDP growth when the latter is high (above the country historical average), but not when it is low (below the country historical average). This possibly reflects a wait-and-see attitude of firms during periods when the economy is rebounding from subdued activity, or when there is idle productive capacity (economic slack).⁸

A Sound Business Environment, Well-Developed Infrastructure, Trade Openness, and Financial Development Strengthen the Effect of Growth on Investment

The empirical estimates also suggest that the effects of economic activity on investment strengthen with countries' institutional and structural characteristics. These include the regulatory quality, the insolvency and resolution framework, the importance of public infrastructure, trade openness, and financial development. More specifically,

- Regulatory quality and resolution frameworks: Private investment reacts more strongly to economic growth if regulatory quality is better and the cost of resolving insolvencies is lower.⁹
- Infrastructure: The private sector invests more in new capital when improved economic activity is supported by better public

⁴ The analysis focuses on private investment ratios (rather than on investment growth) as the interest is in the factors that can increase the provision of capital for a given output. In the run-up to the global financial crisis and the commodity price shock, strong investment growth indeed occurred in parallel with strong output growth, implying that economies in the region have not become more capital-intensive. For an analysis of the growth of total investment (public and private) in emerging market and developing economies, see World Bank (2017).

⁵ According to the accelerator model of investment, firms adjust their capital stock gradually toward a level that is proportional to output so that investment should react positively to changes in GDP. Jorgenson and Siebert (1968) provided a theoretical derivation of the accelerator model.

⁶ To deal with possible endogeneity between the variables included, the estimations are performed using the system generalized method of moments (system GMM) estimator (see Annex 3.2 for details).

⁷ Given that we are interested in the effects on investment of institutional characteristics (some of which do not vary much over time), the sample includes emerging market and developing economies other than those in sub-Saharan Africa to ensure enough variability in those characteristics. In addition, the econometric method requires a sufficiently large number of countries. As recommended by Roodman (2009), the number of countries should be at least equal to or larger than the number of instruments used in the system GMM method. Even in the baseline models the number of instruments is larger than the number of sub-Saharan African countries.

⁸ The relative price of investment is also found to reduce private investment ratios, but neither the level of GDP per capita nor the real interest rate is significant. Several other control variables have been considered in the regressions and are either generally not significant or do not materially alter the main results presented here.

⁹ The Regulatory Quality Index in the World Bank's Worldwide Governance Indicators covers product markets, labor markets, taxation, and other factors that affect the ease of starting and running a business. Business creation can be hampered by excessive regulations, so the entry of new firms and private investment may be limited even in times of rising demand.

infrastructure, as measured by the larger proportion of paved roads as a share of total roads or greater access to electricity as a share of the population.¹⁰

- **Trade openness:** Firms are likely to invest more in response to strong economic activity in more open economies, perhaps reflecting the incentive to expand production for exporting purposes.
- **Capital account openness:**¹¹ The impact of GDP growth on investment is stronger in countries with less open capital accounts. While this result has been found in other studies, the arguments are not obvious. Some studies attribute it to differences in the returns to capital (higher abroad) or to the fact that greater capital account openness could be associated with a higher occurrence of financial crises.
- **Financial deepening:** There are indications that a very low level of financial development can be a significant constraint to private investment, even when the economic climate is favorable. Indeed, the empirical estimates show that in countries with very low levels of financial development, firms do not invest in new capital in response to stronger demand.¹²

The incremental gains from better structural and institutional characteristics are economically significant. Table 3.1 shows, for example, that with each percentage point increase in GDP growth, countries with weak regulatory quality (typically the case of

Table 3.1. Economic Impact on the Private Investment Ratio of a 1 Percentage Point Increase in GDP Growth, Depending on Institutional and Structural Characteristics

| | Effect on private investment ratio of a 1 pp increase in GDP growth (pps) |
|--|---|
| Whole Sample | 0.21 |
| Low Regulatory Quality (SSA average) – High Regulatory Quality (non-SSA EMDEs average) | 0.29 – 0.48 |
| High Insolvency Cost (SSA average) – Low Insolvency Cost (non-SSA EMDEs average) | 0.02 – 0.24 |
| Higher Proportion of Paved Roads | 0.28 |
| Higher Access to Electricity | 0.33 |
| Higher Trade Openness | 0.26 |
| Lower Capital Account Openness | 0.33 |
| Higher Financial Development | 0.47 |

Source: Authors' calculations based on regression results in Annex 3.2.

Note: EMDEs = emerging market and developing economies; pp = percentage point; SSA = sub-Saharan Africa.

the average sub-Saharan African economy) experience an increase in their investment ratio of less than $\frac{1}{3}$ of a percentage point. On the other hand, countries with stronger regulatory quality experience an increase in their investment ratio of $\frac{1}{2}$ percentage point. Similarly, for each percentage point increase in GDP growth, the private investment ratio increases by about $\frac{1}{3}$ percentage point for countries with more developed infrastructure (roads or access to electricity) and trade openness, and by $\frac{1}{2}$ percentage point for countries with more developed financial systems.¹³ These gains are larger than those estimated for the whole sample of countries—including economies with strong and weak structural and institutional characteristics—which are $\frac{1}{3}$ of 1 percentage point.

¹⁰ In the current context, the priorities for public investment spending in sub-Saharan Africa are (1) maintaining levels compatible with fiscal sustainability, and (2) improving the efficiency of that spending to provide better services. As shown in detail in Box 3.2, there is ample room to improve the efficiency of public investment.

¹¹ Capital account openness is proxied by the Chinn-Ito (2006) indicator.

¹² Considering all these variables together would significantly restrict the estimation sample due to the limited availability of the World Bank's Doing Business and Worldwide Governance Indicators. When trade openness, capital account openness, and financial development are considered simultaneously, financial development appears to be the most significant variable in driving private investment ratios. Also, the interaction between GDP growth and the first component obtained from a principal component analysis of these three normalized variables (that is, a summary measure that contains most of the variance of the three variables) is significantly positive (on top of the coefficient for real GDP growth), indicating that investment benefits more from growth when there is greater trade openness, capital account openness, and financial development.

¹³ Following Servén (2003), countries are classified in groups of high and low levels of infrastructure (proxied by paved roads and access to electricity), trade openness, financial development, and capital account openness based on the country-average value of each of the variables compared with the median value of the whole sample. This allows each group to carry a different coefficient on the GDP growth variable in the regressions.

Public Investment Can Crowd in Private Investment, but Not Always

The impact of public investment on private investment is not clear a priori. On the one hand, public investment could be complementary to private investment, for example, public spending on infrastructure or on goods that raise the productivity of private capital.¹⁴ On the other hand, stronger public investment could crowd out private investment through the following channels:

- By competing for scarce physical and financial resources. For instance, the financing of public investment—through debt issuance, bank credit, higher taxes, or inflation—reduces resources available to the private sector, dampening private investment.
- In cases where public investment is carried out by state enterprises producing output in direct competition with the goods and services provided by the private sector (Erden and Holcombe 2005).
- By discouraging investment due to increased macroeconomic instability when public investment is financed through the accumulation of debt that is unsustainable.

The empirical work presented here identifies the two opposite effects of public investment on private investment depending on the degree of financial development: public investment crowds out private investment when the financial system is less developed and crowds it in when the financial system is more developed. For example, given the levels of financial development currently observed across regions,¹⁵ a 1 percentage point increase in the public investment ratio would lead to a ½ percentage point contraction of the private investment ratio in the average sub-Saharan African country and to a ½ percentage point increase in other emerging market and developing economies included in the sample (which are on average much more financially developed than sub-Saharan African countries). This crowding-out effect of private

investment by public investment has also been found in previous studies (Cavallo and Daude 2011; IMF 2017, Box 1.3; IMF 2014a, Box 1.4).

The ultimate impact of public investment on private investment depends on country-specific factors, such as whether the project is financed domestically or externally or is an efficient infrastructure project. Nevertheless, given the low level of financial development, large infrastructure gaps, scarce resources in sub-Saharan Africa, and constraints on availability of foreign financing (or the ability to service the attendant debt) there is a real danger that public investment could crowd out private investment. The region may thus benefit from promoting alternative ways of financing investment (both public and private), including deepening financial markets, engaging in PPPs, and mobilizing more domestic fiscal revenue (Chapter 2 and IMF 2017, Box 1.3). Beyond these measures, there are additional levers that could support higher private investment in sub-Saharan Africa, notably FDI, SEZs, and global initiatives. These possibilities are explored below.

ALLEVIATING CONSTRAINTS TO PRIVATE INVESTMENT

Deepening Financial Systems

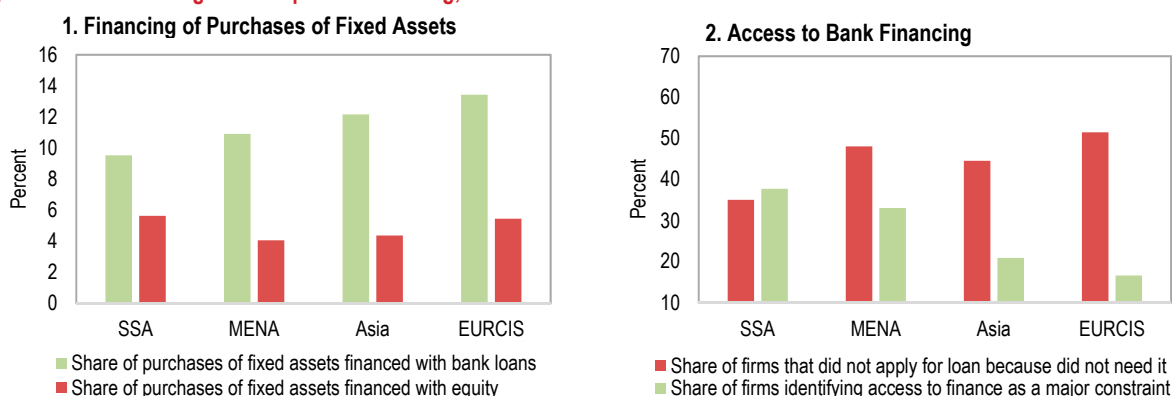
Beyond the evidence presented above on the impact of financial development on private investment, there are various reasons to believe that the availability of and access to credit are a major constraint in sub-Saharan Africa. First, when compared with other regions, bank financing of investment in sub-Saharan Africa is the lowest, while equity financing is the highest. Second, sub-Saharan Africa has both the lowest share of firms that do not need a bank loan and the highest number of firms that identify access to credit as a major constraint (Figure 3.8). Finally, small and medium-sized firms, which account for most firms in the region, typically face greater obstacles to obtaining financing than larger firms (Beck and Cull 2014).

The financial landscape in most of sub-Saharan Africa is largely dominated by banks. Other financial institutions such as stock exchanges and

¹⁴ The positive effects of paved roads and access to electricity on private investment identified here also lend support to the idea that public investment contributes positively to private investment in the long run through the buildup of infrastructure.

¹⁵ Proxied by the Financial Development Index detailed in Svirydzenka (2016).

Figure 3.8. Selected Regions: Corporate Financing, 2011–14



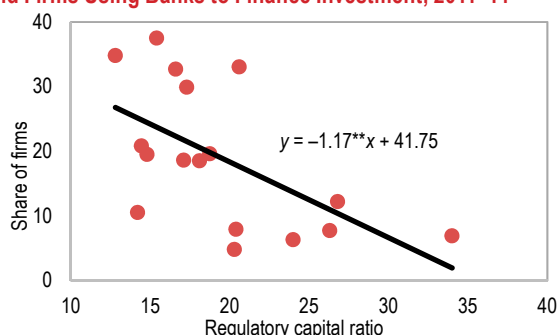
Source: World Bank, Global Financial Development database.

Note: EURCIS = Europe and Commonwealth of Independent States; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

bond markets remain underdeveloped, but have been expanding rapidly in recent years (Sy 2015). Banks are the primary source of financing for private investment, followed by equity financing. Banking systems in sub-Saharan Africa are characterized by relatively high capital ratios compared with other regions.

Typically, higher capital ratios are found in financial systems that are relatively more unstable, as banks accumulate buffers to cover future losses (Beck and others 2011). But while increases in capital ratios may make banking systems more resilient and help to maintain the provision of credit in difficult times (Kapan and Minoiu 2013), they can also hamper the provision of credit in other periods (Bernanke, Lown, and Friedman 1991).¹⁶ In sub-Saharan Africa, it seems that there

Figure 3.9. Sub-Saharan Africa: Regulatory Capital Ratios and Firms Using Banks to Finance Investment, 2011–14



Source: World Bank, Global Financial Development database.

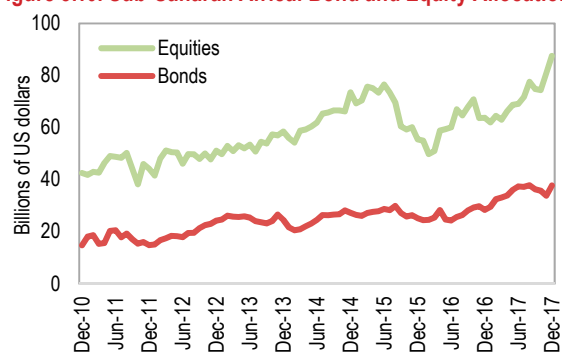
Note: * $p < .10$; ** $p < .05$; *** $p < .01$.

¹⁶ Higher capital ratios could also be driven by and excessive presence of sovereign assets in the banks' balance sheets, which usually have low risk weights. However, the Basel framework includes regulations that set bounds to large exposures, which should limit this effect.

is a negative association between capital ratios and credit availability to firms (Figure 3.9).

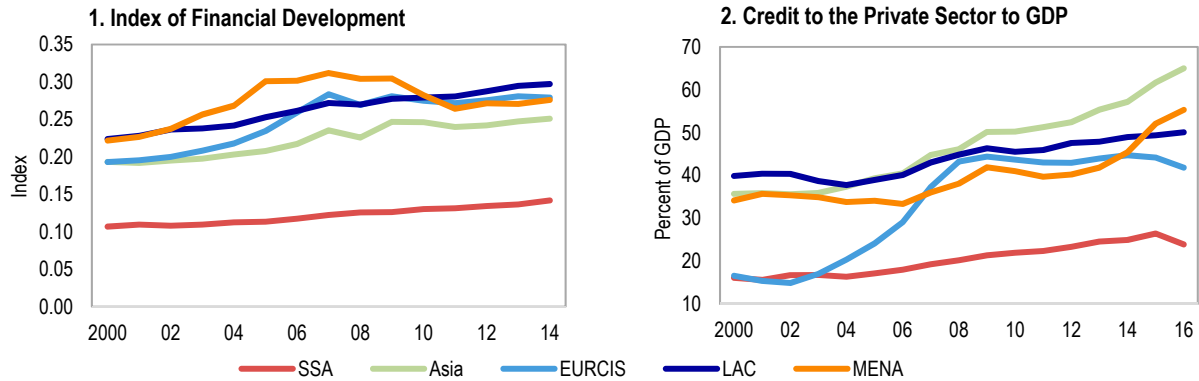
Further developing financial markets, including the quickly expanding bond and equity markets (Figure 3.10), would provide additional means of financing investment. Compared with other regions, there is ample room for further deepening financial markets in sub-Saharan Africa (Figure 3.11). But doing so would require improving the judicial system's independence, strengthening investor protection and auditing standards, and reducing key constraints in financial market infrastructures (IMF 2016, Chapter 3). Developing bond markets, in particular, would require an appropriate technical and regulatory infrastructure (for example, registries to give legal titles to instruments, central depositories, and clearing and settlement systems); a large and

Figure 3.10. Sub-Saharan Africa: Bond and Equity Allocations



Source: Haver Analytics.

Figure 3.11. Selected Regions: Financial Development



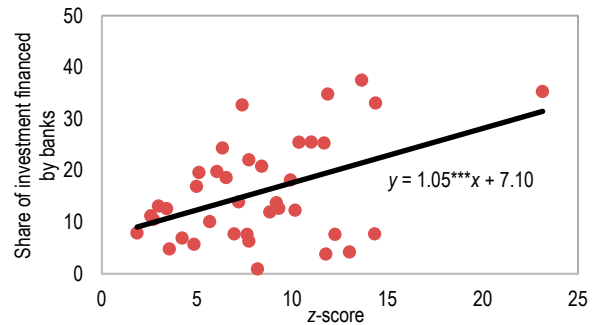
Sources: Sviryzdenka (2016); and World Bank, World Development Indicators database.
 Note: EURCIS = Europe and Commonwealth of Independent States; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

heterogeneous investor base to ensure a strong and stable demand for securities; a sound banking system as banks play a key role as final investors or intermediaries in bond markets; and market-determined interest rates (Box 3.3). For equity markets, regional integration of individual countries' stock exchanges would help enhance liquidity and efficiency and bring about economies of scale.

However, financial deepening would need to proceed cautiously to reduce risks of financial instability, which could discourage private investment. Indeed, empirical studies show that stressed financial systems supply less credit to the private sector (Freixas, Laeven, and Peydró 2015).

In sub-Saharan Africa, several countries have suffered from banking crises that have hampered their capacity to finance investment (Beck and others 2011). There also appears to be a positive relationship between the strength of the financial system and the provision of private credit. For example, the *z*-score—a widely used indicator of the level of safety and soundness of the financial system, with lower values indicating a situation closer to default (Figure 3.12)¹⁷—is positively related to various indicators of credit to the private sector. In sum, promoting private investment would require deepening financial markets while ensuring financial stability. This, in turn, would entail further strengthening institutions and promoting

Figure 3.12: Sub-Saharan Africa: Safety and Soundness of Banking System and Financing of Investment



Source: World Bank, Global Financial Development database.
 Note: **p* < .10; ***p* < .05; ****p* < .01.

sound judicial and regulatory and supervisory frameworks.¹⁸ At the same time, fintech could provide a leapfrogging opportunity for greater financial industry efficiency, with positive effects on financial depth and inclusion (Box 3.4).

Public-Private Partnerships

In theory, PPPs could help improve the quality of much-needed infrastructure in sub-Saharan Africa, bring in private sector expertise to enhance the efficiency of infrastructure, and alleviate some of the financial constraints to investment. But in practice, the global experience with PPPs does not support the notion that they provide infrastructure more efficiently than public procurement. Furthermore, PPPs imply complex arrangements for which it

¹⁷The *z*-score indicators for banks is calculated as the ratio of the sum of the return on assets (ROA) and equity over assets, divided by the standard deviation of the ROA: $Z = (ROA + (\text{equity}/\text{assets})) / (\text{ROA standard deviation})$ (Čihák and others 2012).

¹⁸There are other market frictions, such as interest rate caps, that could affect negatively the supply of credit in sub-Saharan Africa and are not covered in this chapter (see Maimbo and Henriquez-Gallegos 2014).

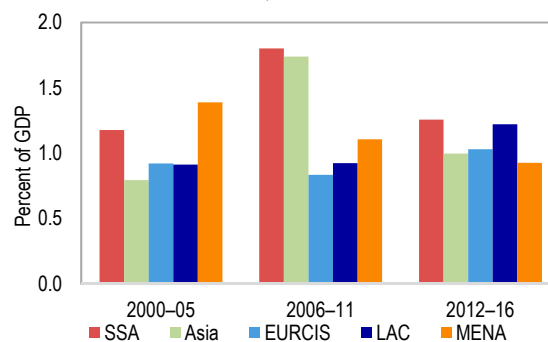
is difficult to evaluate the fiscal risks involved (IMF 2015a). PPPs require the adoption of institutional and legal frameworks to quantify, assess, and control the risks associated with large and complex projects that can potentially entail sizable contingent liabilities and fiscal risks. Thus, PPPs should be considered carefully.

Broadly defined, PPPs are long-term contracts between a private party and a government entity to provide a public asset or service in which the private sector carries a significant portion of the risks involved and for which its payment is in the form of future income streams. Typically, the private party provides financing, designs the project, builds and operates the asset for the life of the contract, and receives fees charged for the services provided or payments from the government. As the private party is responsible for identifying investors and developing the finance structure for the project, PPPs help to expand the options for private investment and the provision of infrastructure services.¹⁹

Sub-Saharan Africa is the region with the highest average ratio of PPP projects to GDP in the world. Its average ratio since 2000 has been 1.4 percent, compared with 1 percent of GDP in other regions. This relatively large ratio in sub-Saharan Africa reflects the substantial need for infrastructure (Figure 3.13).²⁰

The distribution of PPPs is not uniform within sub-Saharan Africa. Measured by the average ratio of PPP projects as a share of GDP over 2000–16, PPP projects are most relevant in non-resource-intensive countries. On average, since 2000 these projects have represented 2¼ percent of GDP in non-resource-intensive countries, 1¾ percent of

Figure 3.13. Selected Regions: Public-Private Partnership Investment as Share of GDP, 2000–16



Source: World Bank, Private Participation in Infrastructure Project database.

Note: EURCIS = Europe and Commonwealth of Independent States; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

GDP in non-oil resource-intensive countries, and 1¼ percent in oil-exporting countries (Figure 3.14).

PPPs are mainly concentrated in the energy and transportation sectors. Much of the progress in involving the private sector in the development of infrastructure in the region has been in the energy sector (electricity and natural gas) and the transportation sector (airports, railroads, seaports, and toll roads). In the last five years, projects in the energy sector represent the largest share of total PPPs. The low share of projects related to information and communication technology (ICT) is explained by the fact that these projects have been developed under modalities that are not strictly PPPs, in the sense that they do not involve risk sharing between the private and public sectors (Figure 3.15).²¹

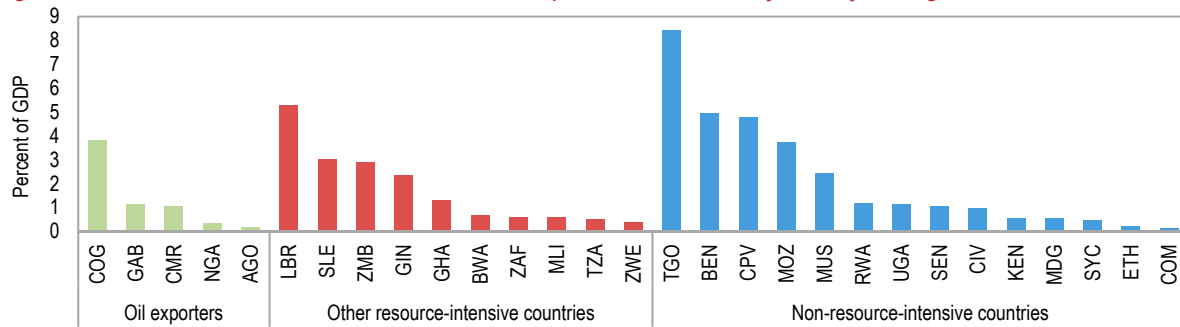
There have been successful PPPs in sub-Saharan Africa. One example is South Africa, although it should be noted that it has greater capacity to

¹⁹ The analysis focuses on greenfield and brownfield projects, including build, lease, transfer projects; build, operate, transfer projects; build, operate, own projects; rehabilitate, operate, transfer projects; rehabilitate, rent, transfer projects; and build, rehabilitate, operate, transfer projects. Other types of projects that are not directly related to the expansion or enhancement of assets with involvement of the public sector are not included in the analysis, such as merchants (the private sector builds a new facility, and the government provides no revenue or payment guarantees); private sector rentals (private investors place, own, and operate a new facility at their own risk); divestures (private investors buy an equity stake in a state-owned enterprise through an asset sale, public offering, or privatization program); management and lease contracts for existing assets; and management contracts of existing assets.

²⁰ For each year, the average of the ratios of the value of PPP projects to GDP across countries is calculated for each region. The average ratio for 2000–16 for each region is then calculated over those years. We excluded from the sample the data points corresponding to São Tomé and Príncipe and Liberia in 2004 and 2009, respectively, as they show extreme values resulting from large PPP projects in comparison to GDP.

²¹ Projects in the ICT sector shown Figure 3.15 are mainly related to hard infrastructure such as cable assets (fiber optic networks and other types of broadband networks), where the government is involved either as a contracting authority by means of a concession agreement or as the owner of the assets, or where there is some other form of government involvement.

Figure 3.14. Sub-Saharan Africa: Public-Private Partnership Investment to GDP by Country, Average 2000–16



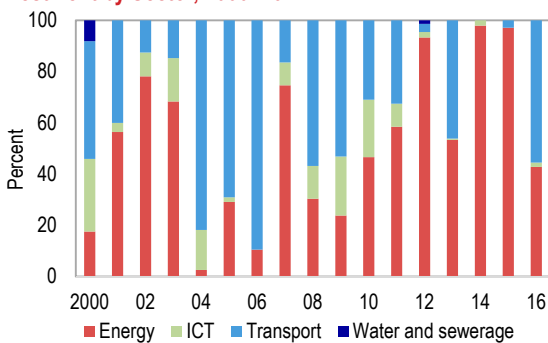
Source: World Bank, Private Participation in Infrastructure Project database.
 Note: See page 90 for country groupings and page 91 for country abbreviations tables.

manage these projects than other countries in the region. There, the power purchase agreements were the most successful, with 60 projects over three years, for a total commitment of 118 billion rand (about 2½ percent of 2017 GDP). This benefited from strong competition from the private sector, which drove down costs, and a steady pipeline of projects to attract investors. The transport sector has also seen successful PPPs. In particular, the South African National Roads Agency Limited (SANRAL) has concessioned 1,288 km of its 19,700-km-wide road network under long-term PPP-type concessions for the design, building, financing, and operation of the roads before their transfer back to SANRAL. The Western Cape Chapman’s Peak Toll Road is considered an engineering success, given very difficult geological

conditions, and the Gautrain Rapid Rail System ensures good transport services for commuters between Pretoria and Johannesburg.

Nevertheless, sub-Saharan African countries need to improve their capacity to manage PPPs.²² Since 2006, the value of disputed projects in sub-Saharan Africa as a share of countries’ GDP has averaged ¾ percent of GDP, which is the highest ratio among emerging market and developing economies. At the same time, there is evidence that higher rates of disputed contracts and lower quality in the selection of PPP projects are related to weaker institutions involved in the management of public investment (Figures 3.16 and 3.17). Thus, disputes could be reduced with improvements in the quality of public investment management and budget transparency (Nose 2017).

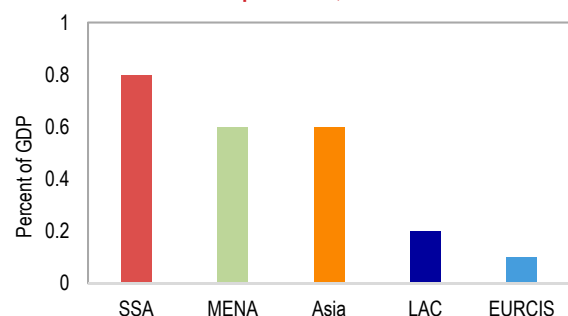
Figure 3.15. Sub-Saharan Africa: Public-Private Partnership Investment by Sector, 2000–16



Source: World Bank, Private Participation in Infrastructure Project database.
 Note: ICT = information and communication technology.

²² In Figure 3.16, the benchmarking exercise for MENA covers only nine countries, and two of them are fragile countries with very low benchmarking scores (Afghanistan and Iraq), while other regions have larger samples. This helps to explain why the benchmarking score for MENA is the lowest, since without those two countries the average for MENA would be higher than that for sub-Saharan Africa. The sample of benchmarking scores for sub-Saharan Africa covers 20 countries.

²³ By institutional framework we mean a variety of elements necessary for the management of PPPs, such as the legal and regulatory context, the governance guidelines and public investment practices, and monitoring and reporting mechanisms.

Figure 3.16. Selected Regions: Disputed and Cancelled Public-Private Partnerships to GDP, 2006–16

Source: World Bank, Private Participation in Infrastructure Project database.

Note: EURCIS = Europe and Commonwealth of Independent States; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

the commitment to realize payments for many years and thus introduce rigidity in future budgets (IMF 2014b, Chapter 3).

There are various instruments for managing fiscal risks related to PPPs. The IMF and the World Bank have developed a specialized tool to assess fiscal risks related to PPP projects.

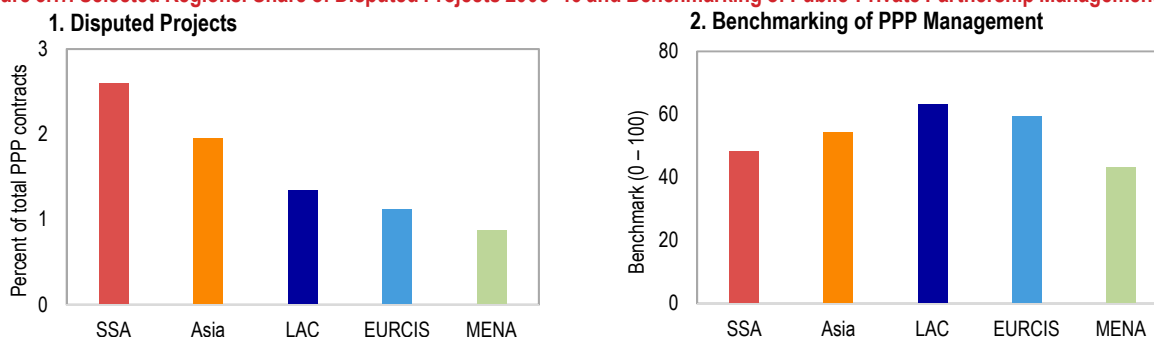
The PPP Fiscal Risk Assessment Model (P-FRAM) is aimed at evaluating the potential fiscal costs and risks arising from PPP projects, including a sensitivity analysis under alternative assumptions for macro variables and contract termination (IMF and WB 2016). The goal of the P-FRAM is to help authorities develop a strategy to mitigate risks. To date, P-FRAM pilots have been conducted in three sub-Saharan African countries: Côte d'Ivoire, Mauritius, and Niger.

In addition, Public Investment Management Assessments (PIMA) performed by the IMF and the World Bank help identify key weaknesses in public investment practices and provide country-tailored solutions (IMF 2015a). This tool is not focused on PPPs, but some components are related to them. To date, PIMA evaluations have been conducted in the following sub-Saharan African countries: Botswana, Burkina Faso, Cameroon, Côte D'Ivoire, Ghana, Liberia, Madagascar, Mauritius, Mozambique, Togo, and Zambia.

Foreign Direct Investment

FDI is another useful lever to raise private investment.²⁴ The benefits of FDI do not come only in the form of expanded resources for investment, but also through the transfer of knowledge and technology. In the past decade, sub-Saharan Africa has been the main recipient of FDI in percent of GDP among emerging market and developing regions in the world. Its ratio of FDI to GDP over the past decade has averaged slightly above 5 percent, higher than Latin America and the Caribbean, while other regions show ratios ranging from 2.5 to 4 percent (Figure 3.18).

FDI flows relative to GDP tend to be concentrated in some countries in the region, but not just in resource-intensive countries. For instance, Cabo Verde, Mauritius, Mozambique Seychelles, São Tomé and Príncipe, and The Gambia, have shown ratios since 2000 well above the regional average of about 4 percent. On the other hand, several countries have not been very successful in

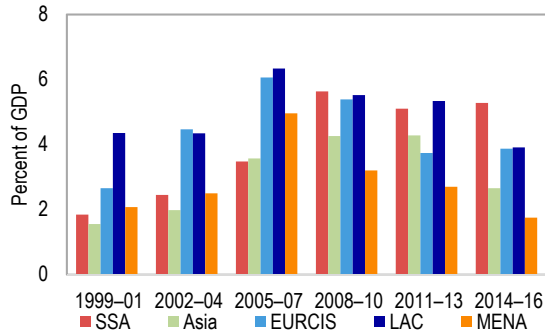
Figure 3.17. Selected Regions: Share of Disputed Projects 2006–16 and Benchmarking of Public-Private Partnership Management 2016

Source: World Bank, Private Participation in Infrastructure Project database; and World Bank (2016).

Note: EURCIS = Europe and Commonwealth of Independent States; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

²⁴ This section focuses on foreign direct investment net inflows which complement domestic resources. On the other hand, net outward outflows, which are significantly smaller in sub-Saharan Africa, reduce available resources for domestic private investment.

Figure 3.18. Selected Regions: Foreign Direct Investment (Three-year averages)



Source: IMF, World Economic Outlook database.
 Note: EURCIS = Europe and Commonwealth of Independent States; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

attracting FDI—two-thirds of the countries in the region show ratios below the regional average (Figure 3.19).²⁵

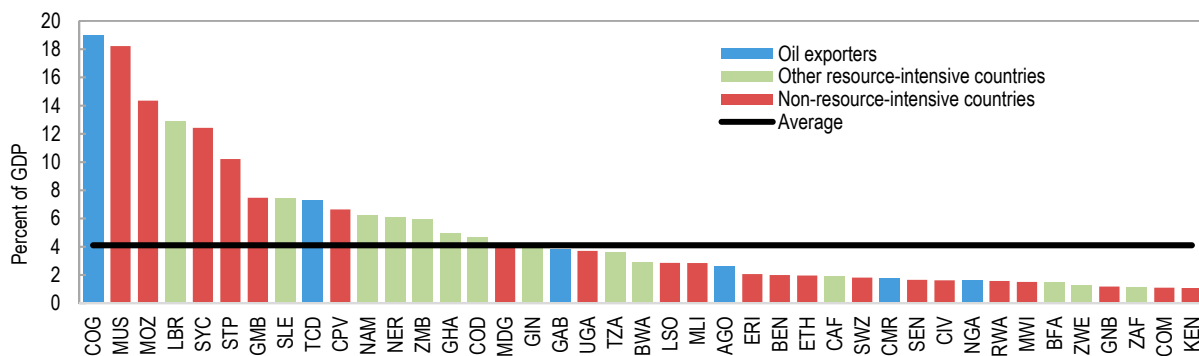
The literature on the determinants of FDI indicates that the following factors help attract these flows: large domestic markets and natural resources, the provision of infrastructure, the level of education of the labor force, openness to trade, macroeconomic and political stability, and the quality of institutions (Asiedu 2002, 2006; Dupasquier and Osakwe 2006). This suggests that policymakers could foster even stronger FDI inflows into sub-Saharan Africa by improving macroeconomic and political stability, providing better infrastructure services and a more skilled labor force, and improving the institutional environment.

Special Economic Zones

Closely related to FDI is the development of SEZs, which are second-best solutions compared with economy-wide reforms (IMF 2011), but can have a catalytic role in promoting structural transformation. China’s economic transition since the 1980s is often cited as an example of how to increase FDI through SEZs (UNDP 2015). However, in sub-Saharan Africa, the experience with SEZs during the past two decades has been mixed at best, as most of them have either had an unsuccessful record or have fallen short of expectations (IMF 2011; Farole and Moberg 2017). One reason might be that SEZs in sub-Saharan Africa have relied primarily on corporate tax holidays, with little else offered in terms of nontax incentives and regulations. And when it comes to investment location decisions, there is evidence that taxes are not the only factor considered (IMF 2015b).

Nonetheless, in recent years, some countries have adjusted their approach to developing SEZs, with better results, as in the case of Rwanda (Steenbergen and Javorcik 2017). Other countries, such as Ethiopia, have been more successful in attracting investors. The more positive recent experiences are related to the focus on developing clusters to create more dynamic export sectors by fostering competition and quality improvements, and relying more on the countries’ comparative advantages.

Figure 3.19. Sub-Saharan Africa: Foreign Direct Investment by Country, Average 2000–16



Source: IMF, World Economic Outlook database.
 Note: EURCIS = Europe and Commonwealth of Independent States; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa. See page 90 for country groupings and page 91 for country abbreviations tables.

²⁵ It should be noted that some countries have other important sources of financial flows (portfolio and loans), including Kenya, Senegal, and South Africa.

Many SEZs in sub-Saharan Africa focus on the apparel, textile, and agroprocessing industries, where these economies typically have a competitive edge (Ethiopia, Ghana, Kenya, Madagascar, Malawi, Mauritius, Seychelles, Zimbabwe). Only a few economies (Mozambique, Namibia, Nigeria, South Africa, Zambia) have been able to establish SEZs in more capital-intensive industries, for instance, automotive and aluminum (UNDP 2015).

Potential ways to increase the effectiveness of SEZs in the region include better integrating SEZ programs into national and regional development strategies; promoting investments that can be better linked to domestic firms; encouraging stronger ownership by foreign investors; improving the provision of infrastructure and energy; promoting relationships and joint ventures of local corporations with foreign investors; developing training and education aligned with the labor requirements of SEZs; and improving compliance with global production and environmental standards (Farole and Moberg 2017; Zeng 2015). Long-term success will also depend on the capacity of SEZs to catalyze the transformation of the broader economy.

International Initiatives to Support Private Investment in Sub-Saharan Africa

There are various international initiatives to support private investment in sub-Saharan Africa, notably the Belt and Road Initiative and the G20 Compact with Africa (CwA).

The Chinese initiative unveiled in 2013 to form the Silk Road Economic Belt and the 21st Century Maritime Silk Road is a framework to connect China with south, central, and west Asia, Europe, and Africa through trade, infrastructure, investment, and finance. This initiative aims to build a land bridge by developing five major economic corridors as well as maritime transport routes that connect major seaports. It is expected to raise up to \$1 trillion in financing from China over 10 years, mainly for infrastructure development. Specific plans involving sub-Saharan African countries include developing transport and energy infrastructure as well as more SEZs. So far, Kenya (maritime ports and railways) has been the focus. But Ethiopia, Mozambique, South Africa, and Tanzania, are also seeking active involvement, and

coverage is likely to be expanded over time. It is also worth noting that, two years after the Belt and Road Initiative was introduced, China more than doubled its pledges (\$60 billion) in both project finance and technical assistance to support Africa's development during the last Forum on China-Africa Cooperation (FOCAC) in 2015.

The CwA is an international initiative to foster private investment in the region that may bring new momentum for FDI flows. It was launched in early 2017 and involves the cooperation of the G20, African Development Bank, IMF, World Bank, and participating countries. The focus is on coordinating the efforts of the parties involved to facilitate projects for private investment (IMF, African Development Bank, and World Bank 2017).

With the support of the IMF and the World Bank, the G20 is setting up a monitoring mechanism for the CwA that will support continuity and ensure consistency as well as initiate benchmarking and peer-learning processes. In general terms, the monitoring mechanism will involve assessing progress on meeting the commitments made under the three frameworks that are the pillars of the CwA: the macroeconomic framework, which focuses on maintaining macroeconomic stability while providing for adequate investment in infrastructure; the business framework, which lays out how to make countries more attractive for private investors; and the financing framework, which aims to increase the availability of financing with reduced costs and risks.

Eight countries in sub-Saharan Africa have joined the CwA initiative: Benin, Côte d'Ivoire, Ethiopia, Ghana, Guinea, Rwanda, Senegal, and Togo (and three more in the rest of Africa). Progress on actual reforms is still mixed, as participating countries are at various stages of the process, and some have joined only recently.

In Ghana, the measures catalyzed under the CwA focus on renewable energy and energy efficiency and target the promotion of private investment, complemented with training and improved access to appropriate financing. Meanwhile, the government is actively engaged in structural reform of the energy sector, including the restructuring of its debt, and privatization plans. This has been

complemented by an in-depth assessment of the main opportunities and constraints for private sector development (IFC 2017).

In Côte d'Ivoire, the priorities are promoting private activity and employment and increasing the capacity of the electricity sector while maintaining its financial sustainability. There are also projects underway to support value addition in the cocoa industry.

Rwanda has three focus areas: ensuring an investor-friendly tax regime without eroding the tax base, strengthening the responsiveness of government to private sector concerns, and establishing instruments to ease access to finance for private investors in specific sectors. Related measures include improving coordination between national development authorities, establishing a quarterly investor roundtable, and putting in place an investor response mechanism to provide faster private sector feedback to the authorities.

In Senegal, the authorities plan to use a specific approach that involves developing regional development poles with special economic development zones. The IMF, World Bank, and other international institutions are supporting efforts by the Senegalese authorities to promote the acceleration of reforms aimed at creating a sustainable export-oriented industry and thereby jobs for unemployed young people and women in these regional development poles.

Ethiopia is focusing on aligning its participation in the CwA with implementation of its own plan for growth and transformation. The main priorities are further development of targeted export-oriented industrialization, development of industrial parks, and creation of so-called plug-and-play business environments.

Togo recently joined the CwA after the preparation of its policy matrix and investment prospectus, with the aim of improving the conditions for private investment.

Benin and Guinea are in the process of developing their policy matrices containing the main policy lines and setting up the requirements for their implementation. The involvement of bilateral G20 partners is under preparation.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Sub-Saharan Africa needs to increase private investment to achieve its social and development objectives. While private investment has increased since 2000, private-investment-to-GDP ratios in sub-Saharan Africa remain the lowest compared with other countries at similar levels of economic development.

Increasing private investment sustainably would require a favorable macroeconomic and institutional environment. On the macroeconomic side, this would mean ensuring macroeconomic stability, improving current and prospective economic activity, opening to trade, deepening financial systems, and building efficient public infrastructure. On the institutional side, what is needed is strengthening judicial, regulatory, and insolvency frameworks. Country experiences also show that the resolution of long-standing conflicts is typically followed by increases in private investment.

Many countries in the region have engaged in large public infrastructure projects given the substantial infrastructure gaps in the region. While this type of public investment can support private investment, policymakers need to be mindful that public investment can, in specific circumstances, crowd out private investment. Mitigating this risk would require promoting alternative sources of financing for both public and private investment, including deepening domestic financial markets and PPPs, while ensuring that the associated risks are well managed. At the same time, promoting FDI could help foster private investment, while recent experiences with SEZs in attracting investment have been promising.

Box 3.1. Policy Reform and Private Investment Growth

This box describes the analytical framework used to assess the relationship between policy reform and private investment. The main findings are that strong and sustained improvements in public debt, inflation, and strengthened institutions are associated with an increase in private investment growth. Policy setbacks are generally associated with reductions in private investment growth, as risk-averse investors anticipate a slowdown or reversals in reforms.

The analysis in this box extends the World Bank (2017) framework on the causes, implications, and policy responses to weakness in investment growth. The focus is on private investment growth, as opposed to total investment, and on the impact of macroeconomic stability and policy reforms. Three definitions of a “spurt” and “setback” are used:

- Spurts and setbacks in governance are defined in the same way as in World Bank (2017).
- For the macroeconomic variables, a spurt (setback) is defined as a two-year decrease (increase) that is bigger (smaller) than the mean minus (plus) one standard deviation in the public-debt-to-GDP ratio or inflation.

Episodes in which there were improvements in one measure and simultaneous setbacks in another are excluded. The sample spans 97 emerging market and developing economies over 1996–2015, and excludes those with populations of less than 3 million.¹

A panel regression is run in which the dependent variable is real private investment growth. The regressors are dummy variables for spurts (t) and setbacks (s) over the $([t-2, t+2] [s-1, s+2])$ window around these episodes, for which the leads and lags are determined considering statistical significance and degrees of freedom. All estimates include time fixed effects to control for global common shocks and country fixed effects to control for time-invariant heterogeneity at the country level. Significant robust standard error estimates are identified with asterisks.

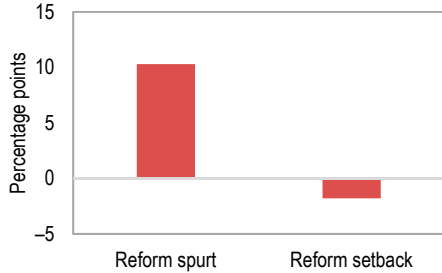
The key finding is that private investment increases after key improvements in public debt, inflation, and the quality of institutions (Figures 3.1.1 and 3.1.2; Table 3.1.1). Typically, setbacks tend to be anticipated by investors, who curtail investments. Economic growth and per capita income growth are also controlled for, but their coefficients tend to be statistically insignificant, and the main findings are unchanged. Similarly, policy spurts and setbacks remain statistically significant even after removing time effects.

This box was prepared by Nkunde Mwase based on Mwase (forthcoming).

¹ The sample set is as follows: sub-Saharan Africa: Angola, Burundi, Benin, Burkina Faso, Chad, Côte d’Ivoire, Republic of Congo, Ethiopia, Ghana, Guinea, Kenya, Liberia, Madagascar, Malawi, Mali, Mozambique, Niger, Nigeria, Senegal, Sierra Leone, Tanzania, Togo, Uganda, Zambia, Zimbabwe. Other emerging market and developing economies: Afghanistan, Algeria, Argentina, Azerbaijan, Bangladesh, Belarus, Bolivia, Bosnia and Herzegovina, Brazil, Bulgaria, Cambodia, Chile, China, Colombia, Costa Rica, Croatia, Dominican Republic, Ecuador, Egypt, El Salvador, Eritrea, Georgia, Guatemala, Haiti, Honduras, Hungary, India, Indonesia, Iran, Iraq, Jordan, Kazakhstan, Kosovo, Kuwait, Kyrgyz Republic, Lao P.D.R., Lebanon, Libya, Malaysia, Mauritania, Mexico, Moldova, Morocco, Myanmar, Nepal, Nicaragua, Oman, Pakistan, Panama, Papua New Guinea, Paraguay, Peru, Philippines, Poland, Romania, Russia, Saudi Arabia, Serbia, Sri Lanka, Sudan, Tajikistan, Thailand, Tunisia, Turkey, Ukraine, United Arab Emirates, Uruguay, Venezuela, Vietnam.

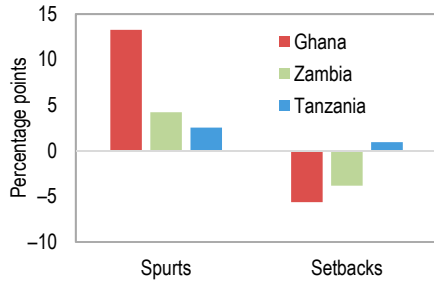
Box 3.1. (continued)

Figure 3.1.1. Selected Sub-Saharan African Countries: Private Investment Growth Differentials during Reform Spurts and Setbacks



Source: IMF, World Economic Outlook database.
 Note: The columns show the average private investment growth differential of the 27 sub-Saharan African economies in the panel regression sample during a reform spurt or setback episode, relative to periods with neither spurts nor setbacks.

Figure 3.1.2. Selected Sub-Saharan African Countries: Private Investment Growth Differentials during Public Debt Reform Spurts and Setbacks



Source: IMF, World Economic Outlook database.
 Note: The columns show the average private investment growth differential of economies during a public debt reform spurt or setback episode, relative to periods with neither spurts nor setbacks.

Table 3.1.1. Event Study: Policy Reform and Private Investment Growth Episode

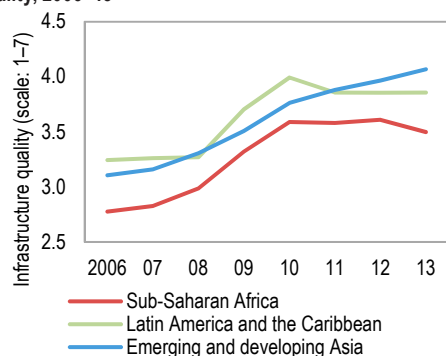
| Dependent Variable: Private Investment Growth | Coefficient | Robust Standard Errors |
|---|-------------|------------------------|
| Period $t - 1$ of reform spurt | 1.15 | 1.35 |
| Period t of reform spurt | 1.46 | 1.23 |
| Period $t + 1$ of reform spurt | 2.42 | 1.29 * |
| Period $s - 1$ of reform setback | -3.99 | 1.25 *** |
| Period s of reform setback | -1.51 | 1.15 |
| Period $s + 1$ of reform setback | 1.89 | 1.23 |
| Period $s + 2$ of reform setback | -0.01 | 1.10 |
| Number of observations | | 1582 |
| R-squared | | 0.135 |

Source: IMF staff calculations.
 Note: The regression includes country and time fixed effects. t indicates the period of the significant spurt, s the period of the significant setback as defined in World Bank (2017). Robust standard errors coefficients in bold are significant at *** $p < 0.01$; ** $p < 0.05$; or * $p < 0.1$.

Box 3.2. Public Investment Efficiency in Sub-Saharan Africa

Improving the efficiency of public investment could contribute to more solid economic growth and help achieve desired social priorities and development goals. Public investment efficiency in sub-Saharan Africa compares unfavorably with other regions and could be improved by about 35 percent. Doing so would require improving the quality of institutions in the region. This in turn would require strengthening the planning and selection of public-private partnerships (PPPs), the credibility of multiyear budgeting, the effectiveness of project appraisal and selection, the monitoring of projects during implementation, and the registration of infrastructure assets.

Figure 3.2.1. Selected Regions: Perception of Infrastructure Quality, 2006–13



Sources: IMF Fiscal Affairs Department, Public Investment Management Assessment database; and IMF staff calculations.

Improving the efficiency of public investment in sub-Saharan Africa is a priority because countries continue to have substantial infrastructure needs and have limited fiscal space. In addition to the infrastructure gap, the region's infrastructure is generally assessed to be of relatively low quality (Figure 3.2.1). For instance, the quality of electricity supply, roads, and railroads is scored below regional peers. The results also show substantial scope for improving efficiency (Table 3.2.1). Based on the three efficiency score indices used, the results suggest that sub-Saharan African countries could increase investment efficiency by about 35 percent.

There is wide variation in the efficiency of public investment across countries. A comparison of the efficiency scores across country groups within sub-Saharan Africa suggests that investment efficiency in resource-intensive countries is

Table 3.2.1. Average Efficiency Score by Regions

| Region | Physical Infrastructure | Quality Infrastructure | Hybrid Indicator |
|--|-------------------------|------------------------|------------------|
| Commonwealth of Independent States | 0.935 | 0.716 | 0.788 |
| Emerging and Developing Asia | 0.501 | 0.788 | 0.659 |
| Emerging and Developing Europe | 0.753 | 0.708 | 0.727 |
| Latin America and the Caribbean | 0.580 | 0.769 | 0.709 |
| Middle East, North Africa, Afghanistan, and Pakistan | 0.472 | 0.791 | 0.676 |
| Sub-Saharan Africa | 0.460 | 0.803 | 0.642 |
| Advanced Economies | 0.733 | 0.888 | 0.880 |

Sources: IMF Fiscal Affairs Department, Public Investment Management Assessment database; and IMF staff calculations.

Table 3.2.2. Average Efficiency Score by Groups

| Region | Physical Infrastructure | Quality Infrastructure | Hybrid Indicator |
|------------------------------------|-------------------------|------------------------|------------------|
| Sub-Saharan Africa | 0.460 | 0.803 | 0.642 |
| CEMAC | 0.305 | 0.625 | 0.511 |
| EAC | 0.487 | 0.874 | 0.735 |
| WAEMU | 0.369 | 0.814 | 0.619 |
| Oil exporters | 0.196 | 0.594 | 0.269 |
| Non-resource-intensive countries | 0.446 | 0.858 | 0.698 |
| Other resource-intensive countries | 0.602 | 0.813 | 0.656 |

Sources: IMF Fiscal Affairs Department, Public Investment Management Assessment database; and IMF staff calculations.

Note: CEMAC = Central African Economic and Monetary Community; EAC = East African Community; WAEMU = West African Economic and Monetary Union. See page 90 for country groupings table.

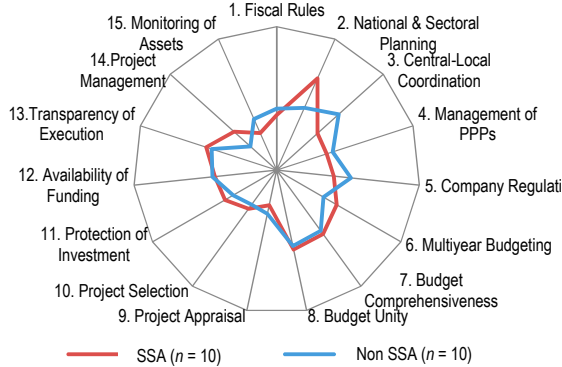
lower than in non-resource-intensive countries. At the same time, countries in the East African Community perform better than those in the Central African Economic and Monetary Community and West African Economic and Monetary Union (Table 3.2.2). Oil exporters perform worse than other resource-intensive countries.

Considering the determinants of public investment efficiency in sub-Saharan African countries, cross-country regressions suggest that the quality of institutions is the most important factor. These regressions cover the period 2000–15, and the efficiency scores are a function of a set of explanatory variables, including (1) the quality of institutions as measured by two World Economic Forum indicators (control of corruption and regulatory quality), (2) official development assistance, (3) the percentage of urban population, and (4) dependence on natural resources, represented by a dummy variable for countries rich in nonrenewable natural resources.

This box was prepared by Karim Barhoumi based on Barhoumi and others (forthcoming).

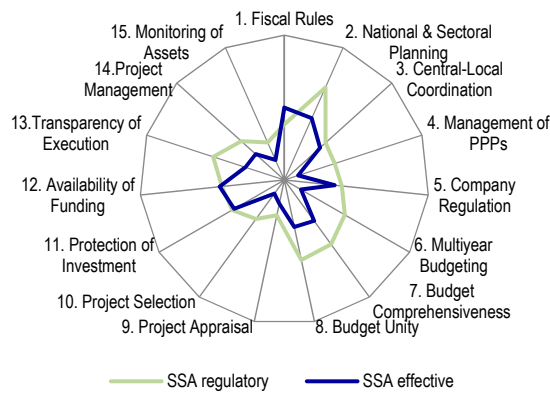
Box 3.2. (continued)

Figure 3.2.2: Sub-Saharan Africa: PIMA Scores Regulatory Framework



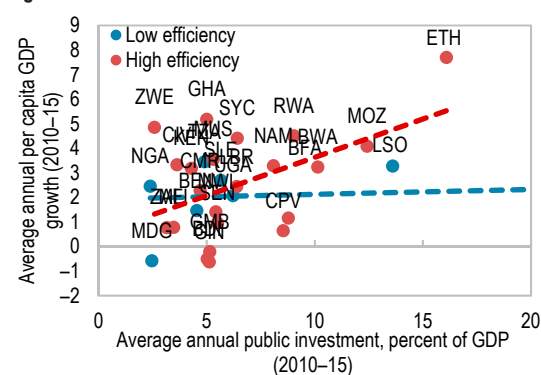
Sources: IMF Fiscal Affairs Department, Public Investment Management Assessment database; and IMF staff calculations.
 Note: PIMA = public investment management assessment.

Figure 3.2.3: Sub-Saharan Africa: PIMA Scores Regulatory Framework and Effectiveness



Sources: IMF Fiscal Affairs Department, Public Investment Management Assessment database; and IMF staff calculations.
 Note: PIMA = public investment management assessment.

Figure 3.2.4: Sub-Saharan Africa: Investment and Growth



Sources: IMF Fiscal Affairs Department, Public Investment Management Assessment database; IMF, World Economic Outlook database; and IMF staff calculations.
 Note: See page 91 for country abbreviations table.

Overall, the estimates show a positive correlation between public investment efficiency and the quality of institutions and a negative association between dependence on natural resources and public investment efficiency.

The initial Public Investment Management Assessment results (for 21 pilot countries) show that sub-Saharan African countries have generally similar regulatory frameworks compared with the average in other regions. Figure 3.2.2 shows the average scores for regulatory frameworks for sub-Saharan Africa and emerging market and developing economies. Sub-Saharan Africa has slightly better frameworks in the areas of national and sectoral planning, multiyear budgeting, and project management. However, the region has weaker regulations in the areas of central-local coordination, management of PPPs, regulation of firms, and monitoring of assets. In addition, Figure 3.2.3 shows that in the areas of management of PPPs, multiyear budgeting, project appraisal and selection, project management, and monitoring of assets, certain regulations exist but are not used effectively to achieve public investment efficiency.

The efficiency of public investment has important implications for growth. As shown in Figure 3.2.4, which splits sub-Saharan African countries into “high-efficiency” countries (red dots) and “low-efficiency” countries (blue dots) relative to the median efficiency scores estimated, the relationship between investment and growth is stronger for the high-efficiency than for the low-efficiency countries.

Strengthening institutions could help improve the efficiency of public investment in sub-Saharan Africa. Specifically, a 10 percent increase in the Control of Corruption Index or the Regulatory Quality Index could lead to a reduction in the efficiency gap in sub-Saharan African countries of about 12 percent. For more detailed results, see Barhoumi and others (forthcoming).

In sum, there is potential for strengthening a wide range of public investment management areas in sub-Saharan African countries, which in turn would increase public investment efficiency. This could be done by strengthening the planning and selection of PPPs, the credibility of multiyear budgeting, the effectiveness of project appraisal and selection, the monitoring of projects during implementation, and the registration of infrastructure assets.

Box 3.3. Developing Domestic Debt Markets in Sub-Saharan Africa

The development of domestic government bond markets in Africa has attracted growing interest among policymakers, investors, and analysts in recent years. Governments have been induced, or felt compelled, to finance their growing budgetary deficits through domestic issuance. Factors pushing in that direction include the limitations of direct banking sector financing; limited availability of foreign aid and/or concessional foreign loans from the official sector (foreign governments and multilateral institutions); and increasing awareness of the risks associated with borrowing abroad and in foreign currencies. More positively, developing the domestic bond market may contribute to overall financial deepening.

Several African countries have extended maturities on their domestic debt, a result of developing their government bond markets. For example, Côte d'Ivoire, Namibia, and Uganda have more than doubled issuance of local currency government bonds, with the stock of local currency bonds in these countries now equivalent to 8.5 percent of GDP on average. The maturity of bonds issued rose on average from 1.5 years to 6.4 years, with some countries, such as Ghana, Kenya, Namibia, Nigeria, and Tanzania, issuing local currency bonds at maturities of or over 15 years.

To develop a sustainable bond market, the following would be required:

- A stable political environment for credible policymaking. The political environment should be secure, and the government should be a credible policymaker.
- A suitable environment for domestic issuance and an effective framework for coordination of debt management and monetary policy.
- A legal and regulatory framework that facilitates the operations of primary and secondary markets of both government and corporate instruments. A clear, modern legal framework for government securities is essential in defining the authority to borrow, and for market transactions and the settlement system.
- Adherence to sound debt management policies and practice that promotes the development of a broader domestic bond market. The existence of a medium-term debt management strategy and a publicly available annual borrowing plan provide the transparency and predictability that allow for the wider market to develop.
- A commitment from the government to pay market interest rates. The market cannot develop if the government creates a captive investor base by compelling some institutions to buy debt instruments using regulations, or if it regularly intervenes in the issuance process to manage the yields at which it issues.
- A sound financial system. Banks are typically the initial investors in any domestic government bond market. Their soundness also ensures that bank failures do not increase the government's financing burden.
- A market infrastructure to support trading, transparency, and financial stability. Adequate clearing, settlement, and custody frameworks should be established for government and corporate securities.
- A diversified investor base. A large and heterogeneous investor base with varied risk preferences, investment horizons, and trading motives can ensure demand for government debt securities across a range of market conditions, as well as support secondary market liquidity.
- Availability of sufficient resources for bond market development. Resource constraints, particularly in terms of staff and capacity in the debt management office, central banks, regulators, and the private sector, can be a constraining factor. Moreover, the authorities will have to bear some costs during the start-up phase, for example, in terms of higher yields and greater rollover risk.

This box was prepared by Thordur Jonasson and James Knight.

Box 3.3. (continued)

Developing domestic debt markets can bring several benefits. Domestic bond issuance (corporate or public) complements funding from external sources and banks. It can help support the implementation of monetary policy, strengthen financial markets, reduce foreign exchange risks, enable the market for private savings, and facilitate the availability of longer-term financing for infrastructure. In addition, developing debt markets should be part of a broader strategy to mobilize domestic finance.

Developing domestic sources of financing would also help mitigate some of the risks from existing Eurobonds. First, Eurobond issuances have surged during a prolonged period of low interest rates since the global financial crisis. Currently, global interest rates are starting to move higher, and capital flow reversals could coincide with the initial wave of Eurobonds reaching maturity. Refinancing risk could become acute, particularly for countries with macroeconomic imbalances; in this context, domestic markets could become even more important.

But developing domestic bond markets can have financial stability implications. A more dynamic market, which may possibly attract international investors, will be helpful in diversifying the investor base and possibly extending maturities. Foreign capital inflows may be most valuable to a country without large nonbank financial institutions with ongoing demand for securities. Foreign investor demand may also reduce crowding out. However, external capital flows may be especially sensitive to risk and relative returns, making national markets susceptible to slight changes in global interest rates and resulting in booms and busts in asset price and credit flows. This is particularly relevant for some sub-Saharan African countries where domestic debt markets have become a destination for foreign investment. For example, nonresidents hold about 40 percent of domestic government bonds in South Africa and about 50 percent of domestic government debt in Ghana. This compares with an average of 25 percent for emerging market economies.

Box 3.4. Fintech in Sub-Saharan Africa

Fintech (the development of financial technology based on innovations of processes, applications, products, and business models) can promote efficiency in the financial industry by transforming the delivery of core financial sector functions, such as the settling of payments, borrowing and saving, risk sharing, and the allocation of capital.

How Can Fintech Support Private Investment?

Fintech could support private investment in sub-Saharan Africa using existing mobile platforms to reduce frictions in the intermediation of funds between savers and investors. Even though the surge in mobile payments in sub-Saharan Africa is not directly related to financial intermediation services, mobile-payment providers have started to leverage their experience, mature technological platform, and large customer base to also provide financial intermediation services. For instance, M-Pesa offers the mobile banking services M-Kesho and M-Shwari to provide access to savings accounts and microcredit products in Kenya. Other examples are Zoono and EasyEquities in South Africa. Zoono has partnered with a crowd-lending platform to offer funding services to entrepreneurs, while EasyEquities enables investment in share in a variety of products (equities, exchange-traded funds, exchange-traded notes, etc.). In this regard, the successful emergence of mobile payments in the region provides a good starting point. Even though financial inclusion ratios are still low compared with other regions, sub-Saharan Africa is a world leader in mobile money payments, with some very successful mobile payment systems, such as M-Pesa in Kenya, Tanzania, and other countries (Figure 3.4.1). The success of these services is most probably the result of several factors, including a large unfulfilled demand for payment services in a market with a relatively developed mobile infrastructure; an appropriate pricing structure to attract customers; and adequate regulation of central banks that provide M-Pesa with space to enter in the market.

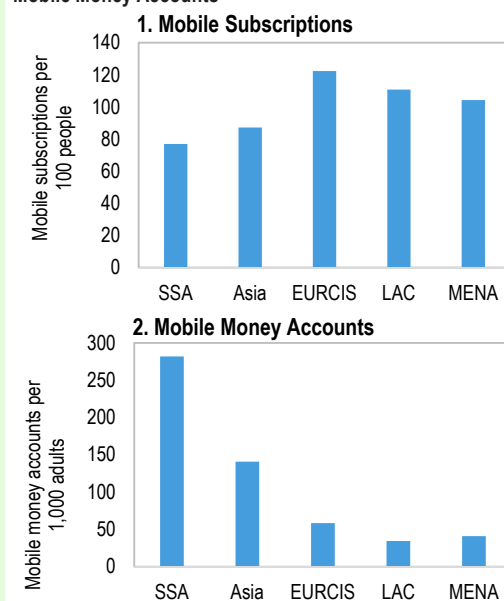
Fintech can also support the region's investment growth by helping improve efficiency in the infrastructure of financial markets, including payment, settlement, and clearing systems—all of which are underdeveloped in sub-Saharan Africa compared with other regions. Since infrastructure helps reduce various sources of financial risks, such as systemic, credit, and liquidity risks (BIS 2012), its development can promote the growth of financial markets such as derivatives, bond, or money markets. This could have positive spillovers on the financing of investment in sub-Saharan Africa. For instance, central counterparties can improve the functioning of derivatives markets, which can help banks more efficiently transfer the credit risk from their loan portfolio. Also, riskless settlement securities systems reduce trading frictions in bond markets, which can facilitate the issuance of corporate bonds to finance investment projects. The use of distributed ledger technologies is also being explored because of potential efficiency gains.

Balancing the Safety-Efficiency Trade-off

Overall, it is important to stress that efficiency gains from the emergence of fintech are not free of social costs. Fintech may exacerbate some of the well-known vulnerabilities of financial systems or create new weaknesses (BCBS 2017). For instance, a proliferation of innovative products and services may increase the complexity of financial services delivery, making it more difficult to manage and control operational risk. Fintech can also increase difficulties in meeting compliance requirements, obligations concerning money laundering and combating the financing of terrorism, and the effective management of cyber-risks.

This box was prepared by Hector Perez-Saiz based on Maino and others (forthcoming).

Figure 3.4.1. Selected Regions: Mobile Subscriptions and Mobile Money Accounts



Sources: World Bank, Global Financial Inclusion; and World Bank, World Development Indicators database.

Note: EURCIS = Europe and Commonwealth of Independent States; LAC = Latin America and the Caribbean; MENA = Middle East and North Africa; SSA = sub-Saharan Africa.

Annex 3.1. Calculation of the Real Investment Index and Regional Growth Rates

This annex describes how the Real Investment Index in Figure 3.3 in the main text is computed. First, for each country j , total annual real investment growth is decomposed into the contributions of private and public components:

$$g_{j,t} = \alpha_{j,t-1}g_{j,t}^{pr} + (1 - \alpha_{j,t-1})g_{j,t}^{pu} = c_{j,t}^{pr} + c_{j,t}^{pu}, \quad (\text{A3.1.1})$$

In which $\alpha_{j,t-1}$ is the share of private investment over total investment in country j , and $g_{j,t}^{pr}$ and $g_{j,t}^{pu}$ are the rates of growth of private and public investment, respectively. Then, the weighted average across countries using purchasing-power-parity GDP weights of each component is computed, such that the regional total investment growth rate can be decomposed as $g_t = c_t^{pr} + c_t^{pu}$. Finally, the Real Investment Index i_t is computed recursively using $i_t = i_{t-1}c_t^{pr} + i_{t-1}c_t^{pu}$, starting from $i_{1999} = 1$, and $c_{2000}^{pr} = \alpha_{2000}$ and $c_{2000}^{pu} = 1 - \alpha_{2000}$, in which

$$\alpha_t = \frac{\sum_j (\alpha_{j,t} \omega_{j,t})}{\sum_j \omega_{j,t}} \quad (\text{A3.1.2})$$

is the purchasing-power-parity GDP-weighted average of the share of private investment across countries.

To control for the effect of extreme values, and to be consistent with the decomposition presented above, the regional private and public investment growth rates for each year are computed as follows:

$$\begin{aligned} \hat{g}_t^{pr} &= \frac{c_t^{pr}}{\alpha_{t-1}} \\ \hat{g}_t^{pu} &= \frac{c_t^{pu}}{1 - \alpha_{t-1}}, \end{aligned} \quad (\text{A3.1.3})$$

such that the regional total investment growth rate can be expressed as a weighted average between the private and public component growth rates:

$$g_t = \alpha_{t-1}\hat{g}_t^{pr} + (1 - \alpha_{t-1})\hat{g}_t^{pu}. \quad (\text{A3.1.4})$$

Annex 3.2. Determinants of Private Fixed Investment Ratios in Emerging Market and Developing Economies

This annex presents the empirical approach for the analysis of the institutional drivers of private fixed investment ratios in emerging market and developing economies. It provides details on the econometric methodology, data, and estimation results.

Baseline Regressions

In the baseline regressions, the ratio of private investment to GDP is explained by its lagged value and by traditional determinants of investment identified in the literature (including Servén 2003; IMF 2005; Cavallo and Daude 2011; Lim 2014; World Bank 2017) using the dynamic fixed-effects panel data equation:

$$\left(\frac{I}{Y}\right)_{i,t} = \beta_0 + \beta_1 \left(\frac{I}{Y}\right)_{i,t-1} + \beta_2 \left(\frac{IG}{Y}\right)_{i,t} + \beta_3 \ln(Ypc_{i,t}) + \beta_4 \left(\frac{PI}{PY}\right)_{i,t} + \beta_5 IR_{i,t} + \beta_6 g_{i,t} + \eta_i + \gamma_t + \varepsilon_{i,t}, \quad (A3.2.1)$$

in which I/Y is the private-fixed-investment-to-GDP ratio, IG/Y is the public-fixed-investment-to-GDP ratio, Ypc is the real GDP per capita in purchasing power parity, PI/PY is the ratio of the deflator of gross fixed investment to the GDP deflator (the relative price of capital), IR is the real interest rate, g is the real GDP growth, η_i and γ_t denote country and year fixed effects (to control for unobserved cross-country heterogeneity and for global shocks, respectively), and $\varepsilon_{i,t}$ is the error term. The final estimation sample is composed of 101 emerging market and developing economies over the years 1980 to 2015.¹ Data sources are presented in Annex Table 3.2.3.

The estimation uses the system generalized methods of moments (GMM) estimator (Arellano and Bover 1995; Blundell and Bond 1998) to address the Nickell (1981) bias arising from the lagged dependent variable and possible endogeneity issues between the variables.²

Results reported in Annex Table 3.2.1 confirm the persistence of the private investment ratio. In line with a crowding-out effect of public investment on private investment (Cavallo and Daude 2011; IMF 2017), the coefficient on the public-investment-to-GDP ratio is significant with the expected negative sign. However, this crowding-out effect is mitigated if the availability of financing in the economy increases, as implied by a higher degree of financial development (column (2)). Real GDP growth is also significant, both statistically and economically: a 1 standard deviation increase in real GDP growth (+6.2 percent) translates into a 1.3 percentage point increase in the investment ratio. The relative price of investment reduces private investment ratios, while neither the level of GDP per capita nor the real interest rate is significant.³

¹ Countries are Algeria, Angola, Antigua and Barbuda, Argentina, Armenia, Azerbaijan, The Bahamas, Bahrain, Bangladesh, Barbados, Belarus, Belize, Benin, Bhutan, Bolivia, Bosnia and Herzegovina, Botswana, Brazil, Bulgaria, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Chile, China, Colombia, Comoros, Democratic Republic of the Congo, Republic of Congo, Costa Rica, Côte d'Ivoire, Croatia, Djibouti, Dominica, Dominican Republic, Ecuador, Egypt, Equatorial Guinea, Ethiopia, Gabon, The Gambia, Ghana, Grenada, Guatemala, Guinea, Guinea-Bissau, Haiti, Honduras, Hungary, India, Indonesia, Iran, Jordan, Kenya, Kuwait, Kyrgyz Republic, Lebanon, Lesotho, Malaysia, Mauritius, Mexico, Moldova, Mongolia, Montenegro, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nicaragua, Niger, Oman, Panama, Peru, Poland, Romania, Russia, Rwanda, São Tomé and Príncipe, Senegal, Serbia, Seychelles, Sierra Leone, South Africa, Sri Lanka, St. Lucia, St. Vincent and the Grenadines, Suriname, Swaziland, Tanzania, Thailand, Togo, Tunisia, Uganda, Ukraine, Uruguay, Venezuela, Yemen, Zambia.

² The null hypothesis of the Im-Pesaran-Shin test that all panels of the sample have a unit root is rejected at less than 0.1 percent significance level. GMM regressions are performed using the two-step procedure with the Windmeijer's finite-sample correction. The lagged dependent variable is treated as predetermined and instrumented with one to two lags. The other regressors are treated as endogenous variables and are instrumented with two lags and more, while fixed effects and some institutional variables, such as regulatory quality or the cost of resolving insolvencies, are treated as exogenous. The validity of the instruments is tested using the Hansen test, with the number of instruments being lower than the number of countries to limit a weakening of the Hansen test, as suggested by Roodman (2009). The absence of serial correlation of residuals is tested using the AR(2), test while in all regressions, the AR(1) test is rejected, suggesting, as expected, a first-order serial correlation of the differenced error term.

³ Other control variables considered include inflation, a real effective exchange rate index to control for competitiveness, the terms of trade, oil prices interacted with a dummy variable for oil exporters, foreign direct investment, estimates of the stocks of public and private capital, public consumption as a share of GDP, public external debt, and the current account as a share of GDP. None of these variables are significant, and their inclusion does not modify the results presented here.

Decomposing the effect of GDP growth between low and high levels of growth indicates the presence of a nonlinear effect (column (3)).⁴ Finally, the regressions also include structural variables such as the World Bank's Doing Business, Worldwide Governance, and *International Country Risk Guide* indicators; variables for infrastructure like paved roads as a proportion of total roads, or access to electricity in percent of the population (results not reported); financial development, measured by the IMF's Financial Development Index (Svirydzenka 2016); capital account openness (proxied by the Chinn-Ito index); and trade openness. However, none of these variables have a significant direct effect on private investment (columns (5)–(7)). The effect of real GDP growth on investment is significant only in the richer countries of the sample (that is, those countries with an average level of GDP per capita above the median of the sample, which is \$5,072 in 2011 purchasing-power-parity terms). This probably reflects better institutions in these economies (column (4)). Thus, the next section investigates whether the institutional environment matters for the relationship between growth and investment.

Interactions of GDP Growth with Institutions and GDP Growth Effects by Country Groups

The baseline regressions are extended by adding interactions between real GDP growth and some of the above-mentioned structural variables or by classifying countries by groups according to their structural characteristics. Annex Table 3.2.2 reports results of the regressions. Considering the interaction effects with the World Bank's Doing Business, Worldwide Governance, and *International Country Risk Guide* indicators, only a few variables are significant, although the findings should be interpreted with caution, since these indicators are available only from the end of the 1990s or from the mid-2000s, implying a significant reduction in the size of the sample. In particular, the effect of GDP growth on investment is larger when regulatory quality is higher and when the cost of resolving insolvency (as a percent of the real estate property value of the firm) is lower (columns (1) and (2)).⁵

Following Servén (2003), countries are classified into groups with high and low infrastructure (paved roads and access to electricity), trade openness, financial development, or capital account openness according to whether the country-average level of each structural variable is above or below the sample median, allowing each group to carry a different coefficient on the GDP growth variable in the regressions.⁶ Results indicate a positive effect of GDP growth in the groups of countries with high levels of paved roads, access to electricity, and trade openness (columns (3)–(5)), low capital account openness (column (6)), and a high level of financial development (column (7)).

⁴ For each country, real GDP growth is considered high (low) if it is above (below) the country-specific historical mean measured over the estimation period.

⁵ As defined by the Worldwide Governance Indicators “regulatory quality captures perceptions of the ability of the government to formulate and implement sound policies” and “regulations that permit and promote private sector development.” Regulatory quality covers product markets, labor markets (for example, “How problematic are labor regulations for the growth of your business?”), taxation, and other aspects affecting the ease of starting and running a business. Because this indicator is based mainly on a survey of perceptions rather than on objective information, results obtained with this indicator should be interpreted with caution.

⁶ Regressions also include the square of real GDP growth to control for the possibility that countries with better institutions might also show higher levels of growth, and therefore higher investment ratios. However, including this variable does not alter the significance of the coefficients of interactions with structural variables.

Annex Table 3.2.1. Determinants of Private Investment Ratios in Emerging Market and Developing Economies: Baseline Regressions

| Dependent Variable: Private-Investment-to-GDP Ratio | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---------------------|---------------------|---------------------|----------------------|---------------------|----------------------|---------------------|
| Private-investment-to-GDP ratio, one-year lagged | 0.793*** (10.58) | 0.764*** (8.88) | 0.800*** (9.69) | 0.811*** (11.23) | 0.781*** (10.43) | 0.858*** (14.30) | 0.775*** (10.03) |
| Public-investment-to-GDP ratio | -0.557** (-2.45) | -1.362** (-2.37) | -0.546** (-2.48) | -0.521** (-2.36) | -0.625** (-2.03) | -0.514*** (-2.76) | -0.471** (-2.53) |
| Real GDP per capita in logs | 2.885 (0.96) | -0.406 (-0.13) | 0.691 (0.30) | 1.777 (0.55) | 1.689 (0.81) | 1.821 (1.15) | 2.071 (0.48) |
| Relative price of investment in logs | -1.516** (-2.39) | -0.999 (-1.32) | -1.273** (-2.07) | -1.751*** (-2.70) | -1.219* (-1.82) | -0.761 (-1.23) | -1.354** (-2.00) |
| Real interest rate | -0.034 (-1.01) | -0.022 (-0.72) | -0.037 (-0.86) | -0.025 (-0.89) | -0.013 (-0.44) | 0.045 (0.72) | -0.031 (-1.06) |
| Real GDP growth | 0.209* (1.86) | 0.239* (1.91) | | | 0.181* (1.83) | 0.190*** (2.86) | 0.209* (1.87) |
| Low real GDP growth | | | 0.372 (1.25) | | | | |
| High real GDP growth | | | 0.228* (1.90) | | | | |
| Financial development × public investment ratio | | 5.946** (2.02) | | | | | |
| Financial Development Index | | -25.888 (-1.52) | | | | | 0.232 (0.02) |
| Real GDP growth × low income country ¹ | | | | -0.263 (-0.87) | | | |
| Real GDP growth × high income country ¹ | | | | 0.321*** (3.50) | | | |
| Trade openness | | | | | 0.027 (1.13) | | |
| Capital account openness | | | | | | 0.096 (0.29) | |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 2,194 | 2,185 | 2,194 | 2,194 | 2,194 | 2,143 | 2,185 |
| Number of countries | 101 | 100 | 101 | 101 | 101 | 99 | 100 |
| Number of instruments | 51 | 58 | 54 | 54 | 50 | 69 | 54 |
| AR(2) test <i>p</i> -value | 0.693 | 0.544 | 0.603 | 0.687 | 0.835 | 0.994 | 0.662 |
| Hansen test <i>p</i> -value | 0.303 | 0.305 | 0.347 | 0.237 | 0.097 | 0.146 | 0.17 |

Source: IMF staff calculations.

Note: Estimates using the Arellano and Bond system—generalized method of moments estimator. Constant term included but not reported. Real GDP per capita in purchasing power parity terms. Robust *z*-statistics in parentheses. **p* < .10; ***p* < .05; ****p* < .01.

¹ Lower and higher than the median country, respectively, following Sérven (2003).

Annex Table 3.2.2. Determinants of Private Investment Ratios in Emerging Market and Developing Economies: Interaction Effects with GDP Growth and GDP Growth Effects by Country Groups

| Dependent Variable: Private-Investment-to-GDP Ratio | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|--|---------------------|----------------------|----------------------|---------------------|---------------------|---------------------|---------------------|
| Private investment-to-GDP ratio, one-year lagged | 0.878*** (14.11) | 0.877*** (7.78) | 0.824*** (9.92) | 0.879*** (14.53) | 0.867*** (11.52) | 0.880*** (12.97) | 0.873*** (11.98) |
| Public-investment-to-GDP ratio | -0.508** (-1.84) | -0.414** (-2.28) | -0.528*** (-2.70) | -0.546** (-2.33) | -0.488** (-2.17) | -0.340* (-1.76) | -0.471** (-2.14) |
| Real GDP per capita in logs | 1.465 (1.63) | -0.480 (-0.18) | 1.324 (0.52) | 3.017 (0.85) | 1.458 (0.98) | 0.767 (0.29) | 3.665 (0.92) |
| Relative price of investment in logs | 0.193 (0.12) | -1.127 (-1.41) | -1.322 (-1.41) | -1.203 (-1.57) | -1.001 (-1.43) | -0.530 (-0.78) | -1.219 (-1.37) |
| Real interest rate | 0.211 (2.14) | 0.036 (0.19) | -0.059* (-1.66) | -0.001 (-0.01) | -0.008 (-0.25) | 0.028 (0.59) | 0.008 (0.24) |
| Real GDP growth | 0.542* (1.67) | 0.692** (2.00) | | | | | |
| Regulatory quality | -3.566 (-1.37) | | | | | | |
| Real GDP growth × regulatory quality | 0.425** (2.39) | | | | | | |
| Cost of resolving insolvency (% of estate) | | 0.026 (0.27) | | | | | |
| Real GDP growth × cost of resolving insolvency | | -0.030*** (-3.35) | | | | | |
| High-paved-roads country | | | 4.840 (1.09) | | | | |
| Real GDP growth × low-paved-roads country ¹ | | | 0.215 (1.29) | | | | |
| Real GDP growth × high-paved-roads country ¹ | | | 0.281* (1.93) | | | | |
| High-access-to-electricity country | | | | -2.936 (-0.64) | | | |
| Real GDP growth × low-access-to-electricity country ¹ | | | | 0.107 (0.46) | | | |
| Real GDP growth × high-access-to-electricity country ¹ | | | | 0.332** (1.99) | | | |
| Trade openness | | | | | 0.017 (1.01) | | |
| Real GDP growth × low-trade-openness country ¹ | | | | | 0.262 (1.09) | | |
| Real GDP growth × high-trade-openness country ¹ | | | | | 0.257* (1.78) | | |
| Capital account openness | | | | | | 0.111 (0.21) | |
| Real GDP growth × low-capital-account-openness country ¹ | | | | | | 0.331* (1.77) | |
| Real GDP growth × high-capital-account-openness country ¹ | | | | | | 0.217 (1.47) | |
| Financial Development Index | | | | | | | -10.365 (-0.98) |
| Real GDP growth × low-financial-development country ¹ | | | | | | | -0.119 (-0.74) |
| Real GDP growth × high-financial-development country ¹ | | | | | | | 0.465*** (3.28) |
| Real GDP growth, squared | | | -0.011** (-2.18) | -0.001 (-0.70) | -0.002** (-2.09) | -0.003* (-1.95) | 0.000 (0.32) |
| Year fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 1,623 | 778 | 2,113 | 2,194 | 2,194 | 2,143 | 2,185 |
| Number of countries | 100 | 89 | 98 | 101 | 101 | 99 | 100 |
| Number of instruments | 45 | 32 | 59 | 58 | 60 | 58 | 60 |
| AR(2) test <i>p</i> -value | 0.979 | 0.863 | 0.407 | 0.743 | 0.944 | 0.939 | 0.591 |
| Hansen test <i>p</i> -value | 0.425 | 0.402 | 0.364 | 0.210 | 0.696 | 0.216 | 0.392 |

Source: IMF staff calculations.

Notes: Estimates using the Arellano and Bond system-generalized method of moments estimator. Constant term included but not reported. Real GDP per capita in purchasing power parity terms. Robust z-statistics in parentheses.

p* < .10; *p* < .05; ****p* < .01.

¹ Lower and higher than the median country, respectively, following Sérvén (2003).

Annex Table 3.2.3. Definitions of Variables and Sources

| Variable | Source |
|--|--|
| Private fixed gross capital formation (percent of GDP) | IMF, World Economic Outlook database; United Nations National Accounts |
| Public gross fixed capital formation (percent of GDP) | IMF, World Economic Outlook database; United Nations National Accounts |
| Real GDP growth | IMF, World Economic Outlook database; United Nations National Accounts |
| Real GDP per capita, in purchasing power parity | IMF, World Economic Outlook database; United Nations National Accounts |
| Relative price of investment (capital formation price index to GDP deflator) | Penn World Tables 9.0 |
| Real interest rate | World Bank, World Development Indicators |
| Regulatory quality | World Bank, Doing Business Indicator database |
| Cost of resolving insolvency (percentage of business real estate) | World Bank, Worldwide Governance Indicators database |
| Roads paved, percent of total roads | World Bank, World Development Indicators |
| Access to electricity, percent of population | World Bank, World Development Indicators |
| Trade openness ((imports + exports), percent of GDP) | IMF, World Economic Outlook database |
| De jure financial openness (Chinn–Ito Index) | Chinn and Ito (2006), updated July 2017 |
| Financial Development Index | Svirydzenka (2016) |

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