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INFRASTRUCTURE DEVELOPMENT AND FINANCING IN SUB-SAHARAN AFRICA: Toward a framework for capacity enhancement

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This occasional paper shows that infrastructure quality is more important than infrastructure stocks for growth and that capacity constraints of various forms exist in the three countries surveyed (Kenya, Mauritius, and South Africa). Among other recommendations is the need to build infrastructure financing capacity through a deliberate endeavor to create strong and autonomous infrastructure agencies, which can repel political interference and make the public-private partnerships (PPP) process more transparent.

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INFRASTRUCTURE DEVELOPMENT
AND FINANCING IN SUB-SAHARAN
AFRICA:
TOWARD A
FRAMEWORK FOR
CAPACITY
ENHANCEMENT

PREFACE

Infrastructure development plays a major role in promoting growth and reducing poverty. In Africa, however, underdeveloped infrastructure continues to be a binding constraint on sustainable development. Notably, African countries, through the continent's Agenda 2063, recognize that developing infrastructure—transport, energy, water, and e-connectivity—will be critical for the continent to assume a lasting place in the global economic system. The African Capacity Building Foundation (ACBF) has produced this occasional paper under its supported Strategic Studies Group (SSG) to provoke discussion and further investigation of critical capacity challenges to be addressed in developing infrastructure in Africa.

This occasional paper delves into important questions: What is the state of Africa's infrastructure? What is infrastructure's role in Africa's economic performance? What strategies will finance infrastructure in Africa, and how effective are they? How do the various actors develop and finance infrastructure? And more important, what are the capacity imperatives for infrastructure development and financing in Africa?

One key message is that infrastructure quality is more important than infrastructure stocks for economic growth. Emphasis should be placed not on providing infrastructure bulk but on ensuring that public infrastructure can increase the rate of return on private capital.

The three case-study countries (Kenya, Mauritius, and South Africa) show that capacity is lacking for governments to mobilize resources or tap capital markets for financing infrastructure. Similarly, there is a shortage of competent transaction advisors who can structure financing to meet issuers' needs. Public officers lack the skills to interact effectively with private-sector financiers and to prepare and evaluate tenders. Where such systems are being tried, as in Kenya, modern computerized procurement and project-management systems are not being used to make the process more efficient.

It is important to establish autonomous, well-resourced, and technically competent public-private partnership (PPP) departments to streamline PPP management processes.

The ACBF believes that producing knowledge on efficient infrastructure development and financing will enhance the evidence-based policymaking process on the continent, leading to sustainable infrastructure development and subsequent inclusive growth.

Professor Emmanuel Nnadozie
Executive Secretary
The African Capacity Building Foundation

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The paper was produced as part of the African Capacity Building Foundation (ACBF) Strategic Studies Project, which aims to provoke discussions and raise awareness about strategic issues of importance to Africa and its development agenda. Strategic studies topics were selected through a consultative process by members of the Policy Institutes Committee (PIC) and the Strategic Studies Group (SSG). Special thanks to members of both networks. In addition, we thank SSG for its critical review of the manuscript.

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About the African Capacity Building Foundation

The African Capacity Building Foundation (ACBF) is Africa's premier institution for capacity building. Established in February 1991, it builds human and institutional capacity for good governance and economic development in Africa. It has empowered governments, parliaments, civil society, the private sector, and higher education institutions in more than 45 countries and six regional economic communities. And it supports capacity development by way of grants, technical assistance, and knowledge generation across the continent. ACBF's vision is that of an Africa capable of achieving its own development.

About the Strategic Studies Group

The Strategic Studies Group (SSG) is an ACBF network of global development experts and practitioners comprising the ACBF Policy Institutes Committee (PIC), select development partners, international development specialists, and the ACBF-supported training programs and university partners. It assists the Foundation in identifying key policy and emerging issues that require the attention of the Foundation and its stakeholders.

The SSG works with the ACBF to identify research themes and advises the Foundation about strategic and pertinent issues that require special attention. It also serves as a review panel that shapes, examines, and evaluates the Foundation's high-level studies.

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ABBREVIATIONS

ABS	Asset-backed securities
ACBF	African Capacity Building Foundation
AfDB	African Development Bank
DVP	Delivery versus payment
GDP	Gross domestic product
GMM	Generalized method of moments
GPC	GDP per capita
GWh	Gigawatt-hour
HDI	Human Development Index
ICT	Information and communications technology
IT	Information technology
JSE	Johannesburg Securities Exchange
KME	Knowledge, Monitoring and Evaluation [Department]
LRT	Light rail transport
MFA	Municipal Finance Act
NSE	Nairobi Securities Exchange
OECD	Organisation for Economic Co-operation and Development
PFMA	Public Financial Management Act
PIC	Policy Institutes Committee
PIDA	Programme for Infrastructure Development in Africa
PPP	Public–private partnership
SSG	Strategic Studies Group
TOT	Terms of trade
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNICEF	United Nations Children’s Fund
USD	United States dollar
VAT	Value-added tax
WDI	World Development Indicators
WHO	World Health Organization

Unless otherwise indicated, all dollar amounts are U.S. dollars.

EXECUTIVE SUMMARY

Of the world's developing regions, Sub-Saharan Africa has the worst infrastructure deficit, with studies pointing to lost growth opportunities. This study presents in one document information previously dispersed on the region's infrastructure stock and modes of financing. It assesses infrastructure's role in the region's economic growth. It identifies specific capacity constraints that have hindered the private sector's participation in infrastructure financing. And it suggests a framework for advancing institutional and human resource capacities to boost infrastructure financing. The authors first reviewed documents addressing the region's infrastructure. They then conducted case studies of private sector involvement in infrastructure financing in Kenya, Mauritius, and South Africa. And, using the generalized method of moments (GMM), estimated an infrastructure-augmented growth model.

Key findings

From the document review, the study found the following:

- Power is the most deficient infrastructure in the Sub-Saharan region, with spending needs estimated at \$41 billion annually between 2005 and 2015 for operations and maintenance, generating new capacity and rehabilitation of existing transmission and generation.
- The transport sector requires spending of approximately \$18 billion a year, half for maintenance, to build sufficient regional, national, rural, and urban road connectivity, accompanied by adequate rail, port, and airport infrastructure.
- The estimated information and communications technology (ICT) sector annual investment need is \$9 billion, including \$2 billion for maintenance, to service existing demand.
- The water sector's annual funding gap is \$11 billion: the region needs to spend about 0.9 percent of gross domestic product (GDP) a year on sanitation, of which 0.7 percent is for investment and 0.2 percent is for operation and maintenance to meet the Millennium Development Goal target.
- Sub-Saharan Africa loses about \$17 billion annually to various inefficiencies in infrastructure operations and spending. Opportunities for efficiency gains include improving budget execution rates; reallocating existing budgets to subsectors with the highest economic returns, such as power; raising user charges closer to cost-recovery levels; and promoting service quality for all utilities.
- From the case analyses of Kenya, Mauritius, and South Africa, the study makes the following general observations:
 - Institutional investors display sufficient appetite for public debt issues, which has not, however, been sufficiently matched by the supply of public debt. To avoid crowding out the private sector, states have tended to refrain from using domestic bond markets to finance their infrastructure development needs.
 - Governments have the capacity to run PPP projects and to provide guarantees to PPP financiers, but they have not adequately used that capacity because of, for example, poor project planning, cumbersome legislative frameworks, and unwieldy procurement procedures that encourage corrupt practices.
 - Governments can absorb large amounts of money for infrastructure projects, including debt and grants from international financial markets and sources.
 - Human resource capacity has serious shortfalls. Ministerial staff members cannot conduct bankable studies, and they cannot effectively simulate bids and develop reasonable estimates to guide bid solicitation processes.

- Although most governments have, or are in the process of attaining, computerized project and financial management functions, putting those processes in place must be done expeditiously to allow greater efficiency in procuring financing, ensuring transparency in the PPPs' bidding process, and setting up project controls.

From the infrastructure-augmented growth model estimation, this study finds that the quality of infrastructure is more important than infrastructure stocks for economic growth, which suggests that emphasis should be placed not on providing the infrastructure “bulk” but on ensuring that public infrastructure can increase the rate of return on private capital.

Suggested capacity-building interventions

The study demonstrates that issuing infrastructure bonds in domestic capital markets rather than in foreign markets is more cost-effective for governments. But because domestic markets are not developed to levels that can meaningfully support such issues, governments should develop the capacity to formulate policies and provide incentives to spur domestic public debt market development.

African countries with fairly large capital markets should deepen them by creating or incentivizing the engineering of additional securities. In some cases, capital market regulations that govern the issuance of asset-backed securities are either ineffective or inadequate to incentivize the creation of such securities. That is why the regulatory bodies for African capital markets need to build capacity so that they can, in liaison with their governments, go beyond just providing an avenue for securitization. We recommend that governments consider providing guarantees for securities originated (through securitization) by banks from their infrastructure-financing portfolios.

Governments need to develop in-house expertise in project planning and management and to encourage pooling, at the national level, of transaction advisors. Those advisors should provide guidance at all stages of PPP processes and create capacity to engage meaningfully with private sector participants. In that regard, Sub-Saharan governments could consider adopting a policy of jointly developing a pool of human resources for the whole region and sharing those resources as needed to reduce reliance on more expensive expertise from outside the continent.

Governments should fully adopt computerized systems in the infrastructure function and, to deal with human resource constraints in the short term, outsource qualified personnel to run such systems as they build internal capacity for the long run.

Policy recommendations

The study makes policy recommendations for capacity enhancement and lays out a capacity enhancement program for Sub-Saharan Africa. Specifically, governments should undertake the following:

- Formulate policies and incentivize the development of domestic public debt markets.
- Conduct regular training needs assessments, and train those in need through apprenticeships to the technical staff currently hired from abroad or from the private sector; second staff to organizations that typically deal with infrastructure issues; provide regular in-service workshops; and collaborate with training institutions, such as universities.
- Consider providing guarantees for securities originated by banks from their infrastructure financing portfolios (that is, governments should support securitization).

- Establish autonomous, well-resourced, and technically competent PPP departments to streamline PPP management processes at the bid solicitation phase and at post-award and contract management phases.
- Develop in-house expertise in project planning and management, and encourage pooling of transaction advisors, to provide guidance at all stages of the PPP process and to create capacity to engage meaningfully with private sector participants.
- Provide education to both the private and the public sectors about the workings of PPPs, and improve the levels of trust for PPPs by making the process transparent.
- Consider private financing of development and infrastructure through more robust and fairer fiscal and tax systems, borrowing from the Organisation for Economic Co-operation and Development (OECD) initiative on base erosion and profit shifting.

CHAPTER 1. INTRODUCTION AND MOTIVATION

The benefits of infrastructure development cannot be refuted.¹ Broadly speaking, infrastructure provides services that form a part of residents' consumption bundles; it augments capital and labor as an input in the production process (Ayogu 2007). And it drives societal progress by promoting human development and better residents' quality of life through improved productivity and sustainable economic growth (Sanchez-Robles 1998; Egert, Kozluk, and Sutherland 2009; Ajakaiye and Ncube 2010). More specifically, infrastructure eases labor mobility, enhances trade and commerce, and encourages cultural exchanges that can promote national integration and reduce conflict (Mbaku 2013). Research and policy analysis also point to the role of infrastructure provision in reducing poverty and inequality (Ndulu 2006; World Bank 2006).

Background

Indeed, the African Union (2014), in Aspiration 2 of Agenda 2063, seems to recognize research outcomes regarding infrastructure's role in economic development when it states, as follows:

By 2063, the necessary infrastructure will be in place to support Africa's accelerated integration and growth, technological transformation, trade and development. This will include high-speed railway networks, roads, shipping lines, sea and air transport, as well as well-developed ICT and digital economy. A Pan African High Speed Rail network will connect all the major cities/capitals of the continent, with adjacent highways and pipelines for gas, oil, water, as well as ICT Broadband cables and other infrastructure. This will be a catalyst for manufacturing, skills development, technology, research and development, integration and intra-African trade, investments and tourism.

Yet, as of today, infrastructure development is not at an optimal level in the Sub-Saharan region. Indeed, governments and their various development partners recognize the region's colossal infrastructure gap and its resultant adverse impact on development efforts in various economic sectors. The huge infrastructure gap speaks to unexploited productive potential, which could be tapped by upping infrastructure investments. Studies have identified substantial infrastructure needs in the region. In the mid-2000s, estimated annual infrastructure expenditure needs, over a 10-year period, ranged between 9 percent and 13 percent of gross domestic product (GDP) (Sachs et al. 2004; Economic Commission for Africa 2005). At the end of the last decade, annual infrastructure investment needs for Africa as a whole were estimated at \$93 billion, about one-third for operations and maintenance (Foster and Briceño-Garmendia 2009). Because current infrastructure spending is only about \$45 billion a year, the financing gap is clearly sizable (AfDB 2013a).

The poor state of Sub-Saharan Africa's infrastructure has been documented by AfDB (2011a), which states that the region's infrastructure is the most deficient and costly in the developing world. Ascribing the high infrastructure cost to diseconomies of scale and lack of competition,

¹ This paper focuses on physical infrastructure, which refers to "highways and roads, mass-transit and airport facilities, telecommunication facilities, gas and water supply facilities and distribution systems, electricity, education buildings, waste treatment facilities, police, fire service, judiciary and correctional institutions" (Ayogu 2007).

the AfDB report estimates that about \$93 billion (15 percent of GDP) per year will be required to fix the infrastructure gap. About half of that amount would be needed in the power sector, where access to electricity is only 25 percent, compared with 50 percent in South Asia and 80 percent in Latin America. The report notes that mobilizing investments in the power sector is made difficult by financially weak institutions that have an aggregate annual revenue shortfall of approximately \$8 billion. This speaks to institutional capacity, an important element of this study.

The situation is no better in other sectors. According to AfDB (2011b), the provision of water is falling, with approximately 40 percent of rural dwellers in the region lacking access to clean drinking water. The annual funding gap is estimated at \$11 billion, or about 50 percent of total funding needs. The sector is characterized by massive waste, losing about \$1 billion each year to operational inefficiencies of water utilities—another pointer to the region’s capacity issues.

Further to these dismal statistics, empirical investigations within the Sub-Saharan region point to lost growth opportunities as a result of poor infrastructure development. The landlocked nature of many Sub-Saharan African countries puts them at a geographical disadvantage in attracting foreign trade and investments (Behar and Manners 2008) and retards economic growth. Such geographical setbacks may be redressed through adequate development of the telecommunications and transport infrastructure. Country-specific studies—for instance, in Uganda (Reinikka and Svensson 1999) and Ghana (Estache and Vagliasindi 2007)—also provide evidence suggesting that poor infrastructure development may have played a key role in thwarting the region’s economic growth.

Given those observations, a vital task is to examine the challenges that have resulted in deficiencies in infrastructure development and financing in Sub-Saharan Africa and to identify appropriate and effective strategies to address them. AfDB (2013b) attributes the below-par infrastructure performance in Africa to institutional factors and suggests that reforming existing institutions with a view to expanding their capacity and efficiency must be the first step in any attempt to address the infrastructure gap. Thus, researchers must identify specific capacity constraints that have hindered the efficient use of existing infrastructure for residents and develop a clear and logical framework for enhancing institutional and human resource capacity. And given the associated externalities, researchers must assess the strategic options available, taking into consideration the interplay among productive infrastructure underpinning the national economy, urban infrastructure, and rural infrastructure (see, for example, Foster and Briceño-Garmendia 2010).

Study objectives

The proposed study’s objectives are as follows:

- Take stock of the state (access, quality, and costs) of infrastructural development and financing.
- Assess infrastructure’s role in economic performance.
- Identify specific capacity constraints that have hindered the private sector’s participation in infrastructure financing.
- Develop a clear and logical framework for institutional and human resource capacity enhancement to boost infrastructure financing.

To address those issues, we employ several approaches. First, we collate and analyze information from different academic and policy analysis sources to estimate the state of infrastructure financing and development in Sub-Saharan Africa. Second, we gather evidence on private sector participation in infrastructure financing in the region—and on the adequacy

of its institutional and human resource capacity—by reviewing case studies of Kenya, Mauritius, and South Africa. We use lessons from those countries to draw inferences about the effectiveness of various financing strategies and capacity needs and to proffer policy suggestions. Third, we explore the relationship between infrastructure and various economic fundamentals in Sub-Saharan Africa. Based on annual data for 2000–2012 from the World Bank’s World Development Indicators, we test an infrastructure-augmented growth model for a panel of all Sub-Saharan countries, using the generalized method of moments (GMM).

Literature review

The links between infrastructure, productivity, and economic development have received a lot of interest from researchers in Africa (Ayogu 2007; Ajakaiye and Ncube 2010) and in many other parts of the world (Esfahani and Ramirez 2003; Egert, Kozluk, and Sutherland 2009). The nexus between infrastructure and poverty and equity in resource allocation has also been analyzed (Ndulu 2006; World Bank 2006). Empirical findings are varied, but a consensus seems to be emerging that infrastructure plays a key role in a country’s economic performance and, by extension, poverty alleviation. Such evidence has been provided through various methodologies from the United States (Munnell 1990), France (Cadot, Röller, and Stephan 1999), Germany (Kemmerling and Stephan 2002), Spain (Moreno, López-Bazo, and Artís 2003), and panels of several countries (Mittnik and Neumann 2001; Kamps 2004). Most studies find a positive long-term effect of infrastructure on output.

Infrastructure financing has also been the topic of several studies. In Africa, Briceño-Garmendia, Smits, and Foster (2009) point out that the region’s countries spend between 6 percent and 12 percent of their GDPs on infrastructure, but because their economies are small, that investment does not amount to much in absolute terms. But the region’s aid-dependent low-income countries devote about 30 percent of additional funding to infrastructure. Irving and Manroth (2009), using data from 24 African countries, suggest that institutional investors should be developed, particularly pension funds. With proper regulation, those investors could realize their full potential and replace local banks as infrastructure financiers because their liabilities better match the longer terms of infrastructure projects.

Although private sector financing is broadly seen as the remedy to the infrastructure gap, Sub-Saharan Africa receives only a small share of private infrastructure investment due to low or nonexistent sovereign credit ratings, limited capacity of local financial markets, and higher risks arising from longer payout periods and susceptibility to political interference and regulatory risks (Sheppard, von Klaudy, and Kumar 2006).² But more innovative financing strategies involving private participation have been developed, including public–private partnerships (PPPs);³ local currency infrastructure bonds; and commodity-linked bonds, which are typically issued as exchange-traded funds (Brixiova et al. 2011). Ncube (2010) breaks down PPPs into various categories and discusses their strengths and shortcomings in the African context.⁴ The proposed study aims to contribute to this emerging discourse by, among other efforts, rigorously analyzing the suitability of those new funding strategies to the Sub-Saharan region.

² Only 16 of 48 countries have foreign currency debt ratings, and only 4 have ratings of BB– or higher, which provide relatively broad access to financial markets (Sheppard, von Klaudy, and Kumar 2006).

³ PPPs can ease budget constraints and raise efficiency by leveraging private sector management expertise and innovation. Developing a comprehensive and transparent list of contingent liabilities, such as government debt guarantees, is key for realistic assessment of fiscal risks stemming from PPPs (Ncube 2010; Brixiova et al. 2011).

⁴ These categories include Design-Bid-Build, Private Contract Fee Services, Design-Build, Build-Operate-Transfer, Long-term Lease Agreements, Design-Build-Finance-Operate, Build-Own-Operate, and others.

CHAPTER 2. THE STATE OF INFRASTRUCTURE AND INFRASTRUCTURE FINANCING IN SUB-SAHARAN AFRICA

Data on the state of infrastructure in Africa are currently available in several documents generated by different researchers and policy analysts in several institutions, including the World Bank, the African Development Bank, regional development banks (such as the East African Development Bank) and country-specific repositories. In the first part of this study, we collate and present data to provide unified estimate of the state of the region’s infrastructure financing and development.

One comprehensive account of Sub-Saharan Africa’s infrastructure endowment—the one that underpins our study—is the widely cited work of Yepes, Pierce, and Foster (2008). In their analysis, the Sub-Saharan region trails its peers in the developing world on nearly every infrastructure metric. The situation is worse for the low-income countries in the region; the East African Community has the worst performance, while the Southern African Development Community seems to be the most infrastructure endowed (table 2.3 of Yepes, Pierce, and Foster 2008). Studies conducted around the same time (such as Foster 2008) concur with those findings. An important contribution of Yepes, Pierce, and Foster (2008) is the estimate of SSA’s infrastructure deficit relative to other regions of comparable income levels (table 2.1).

Table 2.1: Sub-Saharan Africa’s infrastructure deficit

	Sub-Saharan Africa				South Asia	East Asia & Pacific	Europe & Central Asia	Latin America & Caribbean	Middle East & North Africa
	Low income	Lower-middle income	Upper-middle income	Sub-Saharan aggregate					
Total road density ^a	137	215	293	152	306	237	576	740	599
Paved road density ^a	31	94	238	49	149	59	335	418	482
Fixed-line telephone density ^b	10	106	120	33	39	90	261	197	100
Mobile telephone density ^b	55	201	422	101	86	208	489	350	224
Internet density ^b	2.0	5.1	10.3	2.8	1.7	6.6	16.4	14.1	10.1
Electricity generation capacity ^c	37	256	246	70	154	231	970	464	496
Electricity coverage ^d	16	35	28	18	44	57	—	79	88
Clean water ^d	60	75	90	63	72	75	87	90	85
Sanitation ^d	34	48	39	35	48	60	78	77	77

a. Km/1,000 km². b. Subscribers per 1,000 people. c. MW per 1 million people. d. Percentage of households with access.

Note: Km = kilometer; MW = megawatt.

Source: Yepes, Pierce, and Foster 2008.

The large infrastructure deficit in Sub-Saharan Africa was believed to be holding back per capita economic growth by 2 percentage points annually and reducing firms’ productivity by up to 40 percent (Foster and Briceño-Garmendia 2010). Although some infrastructure indicators (such as Internet and mobile telephone access) have seen improvements over time, SSA’s low infrastructure development, relative to other regions at the same income, is still an important issue. Figure 2.1 shows the evolution of infrastructure endowments for developing regions between 2007 and 2013. The infrastructure situation in the Sub-Saharan region remains abysmal. Sub-Saharan Africa trails all developing regions in every infrastructure index. For instance, fixed-line telephone coverage has stagnated over time at fewer than 0.5 lines per

1,000 people, compared with other developing countries, all of which have at least 1.5 lines per 1,000 people. To some extent, the apparent low telephone reach has been compensated for by the expanding mobile telephone coverage, but even on the mobile telephone score, Sub-Saharan Africa is poor relative to other developing regions. The discussion that follows examines the state of various kinds of infrastructure in the region.

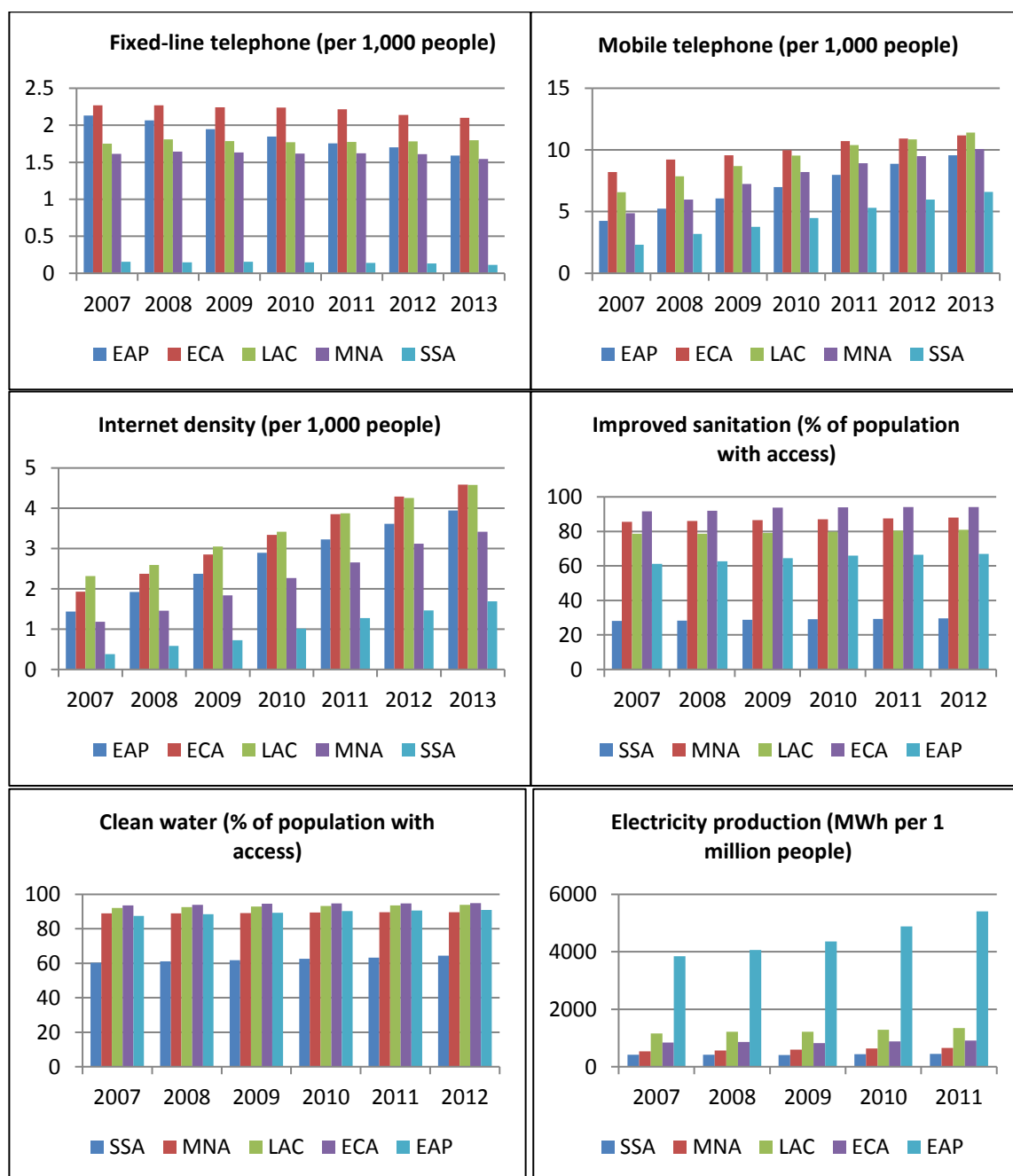
Power

As seen in both table 2.1 and figure 2.1, power generation and transmission seems to be the worst performing infrastructure sector for the Sub-Saharan region. The situation is critical in the low-income countries, where only about 16 percent of the population had access to electricity in the mid-2000s (table 2.1), compared with 88 percent in neighboring North Africa and the Middle East. Various accounts have documented the critical power situation in Sub-Saharan Africa: Over a five-year period, between 2008 and 2012, the region's total primary energy consumption increased by only 0.9 percent—from 10.23 Q Btu's to 10.32 Q Btu's.⁵ In 2012, the region consumed only about 1.9 percent of world energy consumption. Furthermore, only about 32 percent of Sub-Saharan Africans have access to electricity (World Bank data).⁶

⁵ Q Btu's = Quadrillions of British thermal units.

⁶ All World Bank data used in this paper were accessed on various dates between March and May 2015 from World Development Indicators, from the following website:
<http://0-databank.worldbank.org.innopac.wits.ac.za/data/reports.aspx?source=world-development-indicators>.

Figure 2.1: Trends in Sub-Saharan Africa infrastructure deficit



Note: SSA = Sub-Saharan Africa; MNA = Middle East & North Africa; LAC = Latin America & Caribbean; ECA = Europe & Central Asia; EAP = East Asia & Pacific.

Source: World Bank's World Development Indicators.

Estimates for 2012 indicate that the 49 countries in Sub-Saharan Africa, with a combined population of nearly 1 billion people, actually generate 389,000 gigawatt-hours (GWh) of electricity (of which South Africa's share is 239,000 GWh, or 61 percent), amounting to only 1.8 percent of the world's total electricity output and about 78 percent of South Korea's (U.S. Energy Information Administration [EIA] data).⁷ The region's installed electricity generation capacity is approximately 70 GW, with a deficit of about 70 GW (World Bank data); however, about 25 percent of that capacity is not operational because the plants are aging or in a state

⁷ <http://www.eia.gov/electricity/data.cfm#summary> (accessed July 29, 2015).

of disrepair (most existing power stations were commissioned before 1990)—an indication of underinvestment in the energy sector over time.

That situation has led to decreased efficiency, higher maintenance costs, and frequent power outages (KPMG 2014). The number of days per year of outages in the region range from 6 (South Africa) to as many as 182 (Democratic Republic of the Congo), with each outage averaging between 4.15 hours in South Africa and 19.31 hours in Angola (Eberhard et al. 2011). In most countries, a good portion of power generation is from hydropower stations, coal, and gas power plants. The more expensive thermal generation (using diesel turbines) is used in many countries to boost supply in times of low baseload generation. To meet suppressed demand, to provide additional capacity, and to support projected economic growth, installed electricity production capacity should grow by more than 7 GW per year (Eberhard et al. 2011).

Transport

Ports infrastructure

Sub-Saharan Africa has an extensive port system, which was built to serve the needs of individual countries and the neighboring hinterlands (Transnet 2014). The West African ports focus on exports of primarily agricultural exports and oil; the Southern African ports handle a variety of imports and mineral exports; and the East African ports process various imports and exports. Foster and Briceño-Garmendia (2010) report that several ports suffer from low capacity, particularly in terminal storage, maintenance, and dredging capability, and are poorly equipped and inefficient (with high port charges and low container handling rates).

In terms of traffic, the region witnessed approximately 7 percent per annum growth in both containerized and general cargo between 1995 and 2005 (Mundy and Penfold 2008), and container growth is believed to be about 2 percent higher than the world average (Transnet 2014). But capacity use is estimated at only 80 percent, which is likely to persist into the near future. The ports are generally poorly equipped, operate at low levels of productivity, and are mostly incapable of handling the current generation of large ships (Mundy and Penfold 2008). Further, because few ports focus on dry bulk products in the region, bulk terminals are relatively small and are placed within the general break-bulk cargo and container berths. Given the emerging need to export large quantities of mineral products, especially to the Eastern hemisphere, the situation is untenable.

The region's air traffic grew at an estimated 6 percent a year from 1997 to 2006, but the growth was stronger in Southern and Eastern Africa (Foster and Briceño-Garmendia 2010). Air cargo is important in some export trades (such as flowers from Kenya and fish from Tanzania). Generally, air infrastructure capacity is not a serious problem (Foster and Briceño-Garmendia 2010)—the number of airports is stable, and enough runways exist to handle traffic, with good scheduling and modest investment in taxiways and terminals. But air traffic control facilities need to be modernized and improved.

Rail transport infrastructure

About 47 railways operate in 32 countries in Sub-Saharan Africa, with the total track rail length estimated at 82,000 km (Bullock 2009). The key railway infrastructure metrics do not suggest a good railway network for many countries in the region. For instance, the spatial density, which compares track mileage with the size of a country, ranges from 1 to 6 for most countries and 16 for South Africa; 13 countries have no operating railway. But that measure may be misleading for countries with large underdeveloped areas. To complement the measure, the network density per million inhabitants, which ranges from 30 to 50 for most Sub-Saharan countries but is fairly high for Gabon (520), Botswana (480), and South Africa (460), is often

used (Foster and Briceño-Garmendia 2010). European countries range from 200 to 1,000. Southern Africa does an estimated 74 percent of Sub-Saharan Africa's freight traffic, 70 percent of total passenger kilometers, and more than 80 percent of total net ton-kilometers (Transnet 2014).

Outside South Africa, the region's rail network is poorly maintained and aging, with a large part of the tracks still based on early 20th century technology (Transnet 2014). Poor maintenance has led to the track's deterioration and caused a loss of competitiveness and rolling-stock productivity (Foster and Briceño-Garmendia 2010). Proper using the available capacity, therefore, requires substantial capital investment in rehabilitation and upgrading; some countries, such as Ethiopia and Kenya, have initiated the upgrading process. Furthermore, several Sub-Saharan countries have concessioned their railway networks to realize the benefits of a more efficient private sector management (see, for example, AfDB 2011a).

Road infrastructure

Sub-Saharan Africa's road network comprises strategic trading corridors of not more than 10,000 kilometers that carry about \$200 billion of trade annually. The road access rate is only 34 percent, compared with 50 percent in other parts of the developing world, while transport costs are 100 percent higher (African Union 2014). The region has ambitions for an intraregional road network, called the Trans-African Highway, which remains a pipedream due to poor maintenance on key segments. Such a network would require construction of between 60,000 and 100,000 kilometers of paved road (Foster and Briceño-Garmendia 2010). The region's road density (204 kilometers of road per 1,000 square kilometers of land area) is substantially less than the world average of 944 kilometers per 1,000 square kilometers. That density is less than 30 percent of the next-lowest region, South Asia. Furthermore, as of 2011, only about 15 percent of the region's roads were paved, compared to 26 percent in Latin America and the Caribbean, 65 percent in East Asia and the Pacific, 76 percent in the Middle East and North Africa, and 86 percent in developing Europe and Central Asia (World Bank data).

Nonetheless, the region's road density in relation to population is slightly higher than South Asia's and only slightly lower than the Middle East and North Africa's (Foster and Briceño-Garmendia 2010). Important to note is that Sub-Saharan Africa's existing road network also is not fully used. For instance, traffic volumes are low and typically concentrated in major networks, averaging only about 500 vehicles per day, and the traffic volume in rural areas is only 30 vehicles per day except in Nigeria and South Africa, where it is higher (Gwilliam et al. 2008). Rural road networks typically carry less than 10 percent of the classified network's traffic except in Ethiopia, Malawi, and Nigeria, where they carry more than 20 percent.

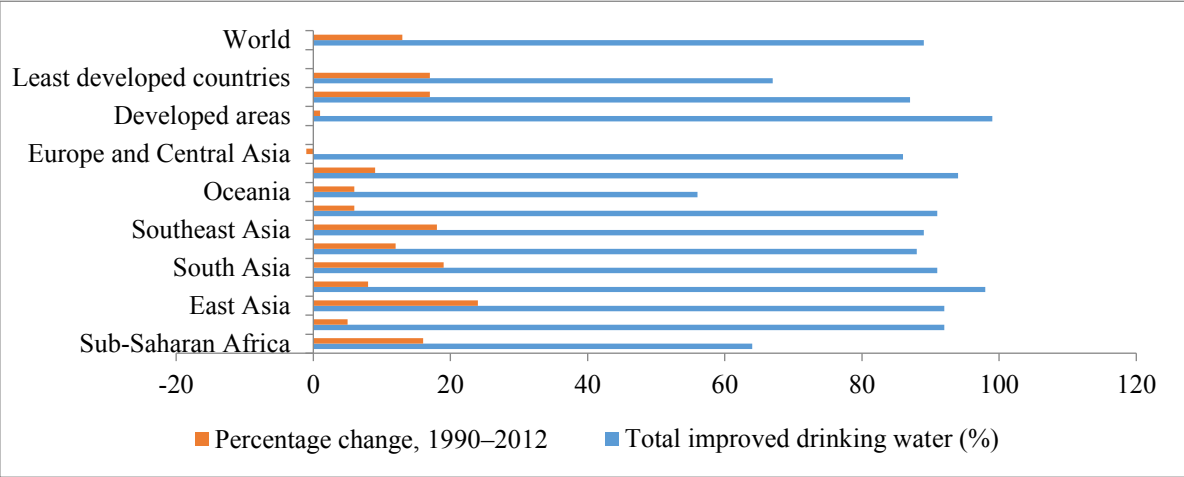
Water and sanitation

Water is an important resource for development. But existing estimates show that about 300 million people in Sub-Saharan Africa experience water scarcity (ECA 2006). The region has ample water resources, but they are underdeveloped, unsustainably managed, and underutilized, with only 5 percent of agriculture using irrigation (African Union 2014). The Africa Water Vision 2025 called for an increase in the development of water resources potential by 5 percent in 2005, 10 percent in 2015, and 25 percent in 2025, to meet increased demand from agriculture, hydropower, tourism, and transportation.

Despite efforts to develop water resources, however, water provision has declined, and water utilities in urban areas have struggled to keep pace with population growth; in rural areas, more than 40 percent of residents have continued to rely on surface water and boreholes (Foster and Briceño-Garmendia 2010). Indeed, recent UNICEF statistics show that, as of 2012—with the

exception of Oceania, where only 56 percent of the population has access to improved drinking water—Sub-Saharan Africa, with 64 percent, lags behind all regions and also falls below the least developed countries average of 66 percent (see figure 2.2).⁸ Overall, 748 million people worldwide did not have access to improved drinking water in 2012; 43 percent (or 325 million) of those people live in Sub-Saharan Africa (WHO and UNICEF 2014). Those figures suggest that two of every five people in the world without access to improved drinking water live in Sub-Saharan Africa.

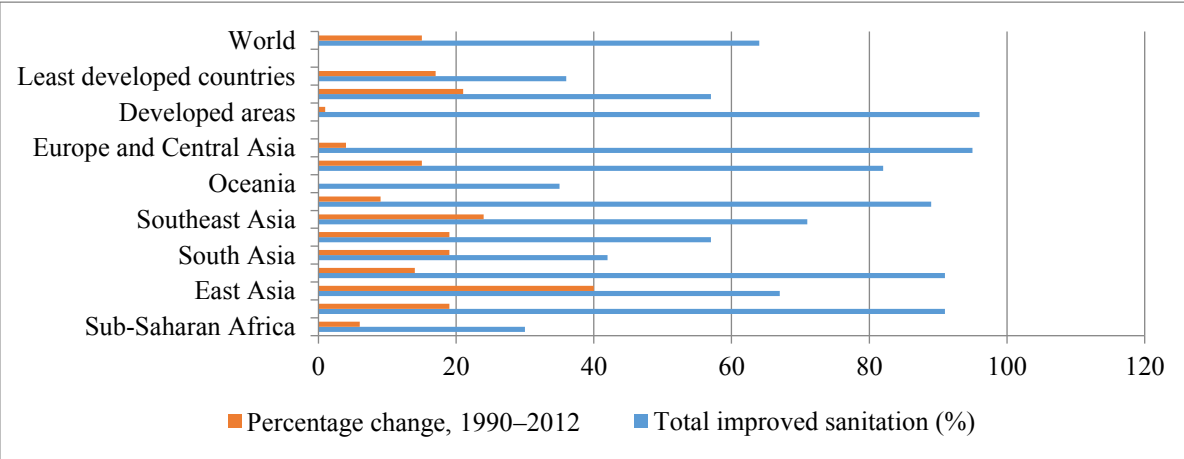
Figure 2.2: Access to improved water, by region



Source: WHO and UNICEF 2014.

Sub-Saharan Africa’s sanitation situation seems even bleaker. Foster and Briceño-Garmendia (2010) report that about 30 percent of the region’s population (40 percent in rural areas) practices open defecation, and about half the population—urban and rural, rich and poor—use unimproved latrines, resulting in poorly understood health effects. Figure 2.3, which compares the use of improved sanitation facilities across regions, shows that the region’s progress in improving sanitary conditions has been slow—access to improved sanitation grew by only 6 percentage points, from 24 percent in 1990 to 30 percent in 2012.

Figure 2.3: Access to improved sanitation, by region



Source: WHO and UNICEF 2014.

In some cases, the population covered by improved sanitary facilities actually declined. For instance, in Nigeria, the coverage of improved sanitation fell from 37 percent in 1990 to 28 percent in 2012 (WHO and UNICEF 2014). That decline contrasts with the experience in other developing regions, such as South Asia, where the use of improved sanitation facilities

⁸ Accessed April 12, 2015 from <http://data.unicef.org/water-sanitation/water>.

increased by 19 percent since 1990, to reach 42 percent of the population in 2012. But some Sub-Saharan countries have expanded or upgraded sanitation, each year moving as much as 3 percent of their population up the ladder to better forms of sanitation: Ethiopia has done so with unimproved latrines; Burkina Faso, Madagascar, and Rwanda, with improved latrines; and Senegal, with septic tanks (Foster and Briceño-Garmendia 2010).

Information and telecommunications

According to Lomas (2012), mobile phone networks have expanded rapidly in Africa, reaching 80 percent of the population, up from only 2 percent in 2000. Those figures seem to be supported by the Partnership on Measuring ICT for Development and Task Group on World Summit on the Information Society (2014), which reported that mobile cellular signal coverage had improved to 79 percent of rural populations in Africa in 2012, up from only 23 percent in 2003. Coverage is still, however, below the world average: 87 percent of the world's rural population was covered by a mobile cellular signal in 2012, up from 76 percent in 2008 and 45 percent in 2003. But Africa as a whole records the largest leap in cellular signal coverage, from about 23 percent of the population in 2003 to 88 percent in 2012. Africa is also developing new services, such as mobile money transfer—pioneered in East Africa—on its network platform (AfDB, OECD, and UNDP 2014). Table 2.2 provides a summary of some statistics.

Table 2.2: Rural access to mobile cellular connection.

Region	Overall mobile cellular coverage (%)	Rural population covered (%)	Rural population covered (millions)	Rural population not covered (millions)
Africa	88	79	498	129
Americas	99	96	171	9
Asia	92	87	2,017	309
Europe	100	98	196	3
Oceania	98	84	3	0.6
World	93	87	2,886	451

Source: Partnership on Measuring ICT for Development and Task Group on World Summit on the Information Society (2014).

Internet connections have greatly improved, as well, since East, Southern, and West Africa were connected to subsea cables in the late 2000s (Lomas 2012). UNECA and AUC (2013) report that the number of Internet users in Africa increased by an average of 2 users for every 100 inhabitants in 2011, in part from the increasing use of smartphones for Internet services. At the end of 2013, an estimated 2.7 billion people were using the Internet worldwide (Partnership on Measuring ICT for Development and Task Group on World Summit on the Information Society 2014). Despite the apparent ubiquity of information and communication technologies (ICTs), their benefits are not uniformly experienced by the 7.1 billion people in the world. According to ITU (2014), more than 4 billion people worldwide—the majority of whom live in developing countries—do not yet have access to the Internet. Again, African countries lead the regions of the world where a 3G cellular signal is least available, with many Sub-Saharan countries reporting no 3G mobile cellular coverage for their rural populations (Partnership on Measuring ICT for Development and Task Group on World Summit on the Information Society 2014). African Union (2014) estimates that the Internet penetration rate for Sub-Saharan Africa was only 6 percent in 2012, compared with an average of 40 percent elsewhere in the developing world.

Funding gap and financing strategies

Several estimates have been made of the infrastructure funding gap in Sub-Saharan Africa, all of which paint a grim picture. Foster and Briceño-Garmendia (2010) estimate that Africa needs some \$80 billion a year to address its infrastructure deficit, about 30 percent for refurbishing

existing infrastructure and about 50 percent for the power sector. AfDB (2011a) estimates that about \$93 billion (15 percent of GDP) per year is required to fix the infrastructure gap, about half of it in the power sector. With current infrastructure spending only about \$45 billion a year, the financing gap clearly is sizable (AfDB 2013a). The African Union created the Programme for Infrastructure Development in Africa (PIDA) to, among other tasks, coordinate the effort to bridge Sub-Saharan Africa's yawning infrastructure gap.⁹ PIDA estimates that the region's infrastructure upgrading and modernization needs would cost \$360 billion a year until 2040 (2020 for ICT) and has developed a strategic framework that is expected to deliver 37,300 km of modern highways, 30,200 km of modern railways, 1.3 billion tons of added port capacity, 61,099 MW of hydroelectric power, 16,500 km of interconnecting power lines, 20,101 hm³ (cubic hectometers) of new water storage capacity, and 6 TB (terabytes) of ICT international broadband capacity (African Union 2014).

Water and sanitation

Funding requirements for specific infrastructure sectors are as huge as the overall requirements. For the water sector, for instance, UNECA (2006) estimates that on aggregate, \$20 billion a year is required to achieve the targets of the Africa Water Vision 2025. To meet the Millennium Development Goals for water, Africa needs an estimated \$16.5 billion a year (roughly 2.6 percent of its GDP). Although that cost looks prohibitive for many countries, it can be reduced through lower cost technologies, such as standposts and boreholes (Foster and Briceño-Garmendia 2010). Indeed, with lower cost technologies incorporated, AfDB (2011a) estimates the annual funding gap in the water sector at \$11 billion, reporting that the sector is characterized by massive waste and losses between \$1 billion (AfDB 2011a) and \$2.7 billion (Foster and Briceño-Garmendia 2010) each year to operational inefficiencies of water utilities.

Spending on the water sector today is \$3.6 billion, one-fourth of what is required. Further, to meet the Millennium Development Goal target for sanitation, Sub-Saharan African countries need to spend an estimated 0.9 percent of GDP a year—0.7 percent for investment and 0.2 percent for operation and maintenance (Foster and Briceño-Garmendia 2010). The researchers observe that households pay most of the investment bill, and governments contribute only a small fraction. Considerable health benefits arise from investments in sanitation, including substantial reductions in the incidence of diarrhea, intestinal worms, and trachoma.

Power

For the power sector, it is estimated that the Sub-Saharan region needed to spend an estimated \$41 billion annually between 2005 and 2015, which includes \$14 billion for operations and maintenance, to achieve its desired levels of economic growth (Eberhard et al. 2011). Half of the remaining \$27 billion is required to develop new generating capacity and a good part of the remainder to fund the rehabilitation of existing transmission and generation. But the region needs to address high inefficiencies that have, in the past, stifled investments in the power sector. For instance, only 66 percent of the capital budget allocation to power is actually spent, the rest being diverted to other budget items or reverting to the treasury at year-end.

⁹ PIDA's objective is to accelerate the implementation of regional and continental infrastructure by 2040. PIDA will implement short-term and priority projects until 2020, medium-term projects between 2020 and 2030, and long-term projects between 2030 and 2040. The PIDA priority action plan comprises the 51 PIDA programs and projects designed to address sector-specific, priority infrastructure deficits in energy, transport, ICT, and trans-boundary water (<http://www.au-pida.org/pida-objectives>, accessed March 10, 2015). See Annex 2 (p. 13) of PIDA (2014) for planned infrastructure projects for Africa.

Eberhard et al. (2011) also perform a scenario analysis and estimate that total annual costs of system expansion and operation are 4.2 percent of GDP under trade expansion and 4.4 percent under trade stagnation. The researchers explain that, although high, the overall cost of developing power systems is not unattainable relative to the trading region's GDP. But AfDB (2013a) notes that mobilizing investments in the power sector (and other sectors) is difficult because of financially weak institutions that have an aggregate annual revenue shortfall of about \$8 billion.

Transport

A cost-effective way to expand Africa's power generation capacity, according to Foster and Briceño-Garmendia (2010), is to pool primary energy resources across national boundaries through regional trade. Doing so could help cut the marginal cost of power generation by between \$0.01 and \$0.04 per kilowatt-hour, leading to aggregate savings in the costs of developing and operating the power system of about \$2 billion a year. The authors suggest that operationalization of such an approach is possible if untapped hydropower in the Democratic Republic of the Congo, Ethiopia, and Guinea were developed to export power to Southern, East, and West Africa, respectively, establishing about 22,000 megawatts of interconnectors over the 2005–2015 decade.

Fay and Yepes (2003) estimate that annual infrastructure expenditure in developing countries is approximately 5.5 percent of GDP, of which roads development require about 19 percent, or an estimated 1 percent of GDP, excluding maintenance of existing road networks. Because of past underinvestment and poor maintenance, the figures would be slightly higher for Sub-Saharan Africa. Indeed, Foster and Briceño-Garmendia (2010) estimate that a well-maintained two-lane network of about 100,000 km, of which about 70 percent is already in place, can serve Sub-Saharan Africa's regional connectivity needs. But 25 percent of the existing network needs to be expanded to two lanes and the rest of it needs to be improved.

The total cost of regional road connectivity is estimated at \$2.7 billion a year, the bulk for investment. A further \$2.9 billion a year, a good part of it for upgrading existing unpaved roads to paved roads, is required to achieve within-country connectivity. Additional requirements are approximately \$2.5 billion per year for improvement and new investment in road networks in rural areas that have agricultural production potential, and \$1.6 billion for roads in urban areas. Overall, a transport network with sufficient regional, national, rural, and urban road connectivity—accompanied by adequate rail, port, and airport infrastructure—requires approximately \$18 billion a year, half of which is for maintenance (Foster and Briceño-Garmendia 2010).

Telecommunication

Doh, Teegan, and Mudambi (2004) find that private investment is necessary to transform outmoded or incomplete telecommunications infrastructure systems. But investors are attracted to countries with weak telecommunication infrastructures if those countries support investment liberalization. Thus, state officials should recognize that a policy of retaining maximum state ownership is unlikely to attract private investments in the sector. Indeed, the private sector demonstrated a good appetite for investing in the submarine fiber-optic cable recently laid off the coast of many African countries. The submarine and intraregional fiber-optic cable is expected to gobble up an annual private sector investment of less than \$0.2 billion. If the region were to achieve universal rural access—for both voice service and limited broadband service based on WiMAX technology—it would need an investment of \$1.7 billion a year, with the public sector contribution amounting to only about \$0.4 billion (Foster and

Briceño-Garmendia 2010).¹⁰ In sum, the estimated ICT sector annual investment need is \$9 billion, which includes \$2 billion for maintenance and private sector investment to service existing urban demand (Foster and Briceño-Garmendia 2010).

Financing strategies

Bridging the infrastructure financing gaps just discussed is important for Africa to enjoy economic prosperity. The bulk of current spending on infrastructure, about \$30 billion annually—only one-third of which finances new projects—comes from domestic public sources (Cassel, de Candia, and Liberatore 2010). External infrastructure finance—asccribed largely to increased private capital flows (through public–private partnerships), development assistance, and South–South cooperation—increased five-fold, from \$4 billion in 2002 to \$20 billion in 2007 (Foster and Briceño-Garmendia 2010). In 2010, Sub-Saharan Africa received more than \$55 billion in new infrastructure investments (AfDB 2010). Investments by the Infrastructure Consortium for Africa members rose from about \$14 billion to almost \$20 billion between 2008 and 2009, attributed to improved business and policy environments (AfDB 2013b).

Although private capital flow has been growing a lot in recent years, it almost entirely finances the telecommunication sector (75 percent) while neglecting other sectors, such as water and transport (Kauffmann 2008). The private sector’s lack of enthusiasm in financing Sub-Saharan Africa’s other infrastructure sectors is attributed to several factors, including lack of stable long-term finance, high sector-specific risks, and political instability and governance risks (Kandiero 2009). Unless action is taken to reduce those risks, private sector participation—especially in the more critical power and transportation sectors—might remain suppressed. Official development assistance, which has tended to fill the infrastructure funding gap in the past (Hagerman 2012), increased from 8 percent in 2006 to 18 percent in 2008 (AfDB 2013b); however, many bilateral lenders are now shifting their focus to rural development and poverty reduction (Brautigam 2010). The funding gap left by these, traditionally OECD, lenders is to some extent being filled by nontraditional lenders, such as India, China, and Arab countries, which have increased their Sub-Saharan infrastructure commitments (Foster 2008) to an incredible \$8 billion in 2006 from less than \$1 billion a year in 2001 (Cassel, de Candia, and Liberatore 2010).

In addition, many countries have recently begun to involve the private sector, via public–private partnerships (PPPs), in financing infrastructure development needs. To be economically sensible, PPPs should generate a combination of allocative and productive efficiency that is superior to an entirely public or entirely private project (Välilä 2005). PPPs’ strengths include improved service quality, risk sharing, better budget fulfillment, faster speed of construction, and improved completion rates; pitfalls include higher financing costs, less flexibility, complicated contracts, and hold-ups and reduced flexibility with long-term contracts (Alexandersson and Hultén 2007).

The higher financing costs arise from the non-recourse or limited-recourse nature associated with project financing, which drives up credit risk (Utz 2013). In the case of Design-Build-Operate and Design-Build-Operate-Transfer contracts, the higher costs are usually transferred to project users, which may adversely affect users’ access or welfare. Therefore, the public sector must remain important—as a direct financier, a catalyst for private investment, and the

¹⁰ WiMAX (Worldwide Interoperability for Microwave Access) is a standardized, wireless version of Ethernet intended primarily as an alternative to wire technologies (such as cable modems, DSL, and T1/E1 links) to provide broadband access to customer premises (http://www.tutorialspoint.com/wimax/what_is_wimax.htm, accessed April 7, 2015).

party in charge of addressing externalities, inefficiencies, and maintenance of infrastructure assets (AfDB 2013a).

Infrastructure financing's capacity and efficiency issues

According to Foster (2008), every \$1 spent on preventive road maintenance saves \$4 in rehabilitation. Foster and Briceño-Garmendia (2010) report that Africa loses about \$17 billion annually to various inefficiencies in infrastructure operations or spending. The authors identify several opportunities for efficiency gains, including improving budget execution rates; reallocating existing budgets to subsectors with the highest economic returns, such as power; raising user charges closer to cost-recovery levels; and reducing operating inefficiencies of utilities to prevent waste and promote service quality. AfDB (2013b) argues that capacity and inefficiency issues can be addressed by reforming and supporting the evolution of institutions charged with managing and developing infrastructure. The report suggests that institutional advancements can be fostered by improving spending efficiency, enlarging the regional approach to infrastructure investment, and improving the regulatory framework. Our study seeks to understand the exact nature of institutional capacities (or lack thereof) that may have led to suboptimal infrastructure financing in Sub-Saharan Africa.

CHAPTER 3. INFRASTRUCTURE AND ECONOMIC GROWTH

To empirically explore the relationship between infrastructure and economic growth in Sub-Saharan Africa, we use a methodology proposed by Calderón and Servén (2004). Thus, to begin, we use principal components analysis to construct a representative infrastructure stock index from three variables, commonly used in the literature, that represent what is considered core infrastructure for developing countries (see, for example, Calderón and Servén 2010): telecommunication (number of main telephone lines per 1,000 people), power (the economy's electricity-generating capacity, in MW per 1,000 people), and transportation (the road network's length, in km. per sq. km. of land area).

Data and descriptive statistics

Although some variables (such as road network length) are not available in long or consistent time series, their availability for cross-sections is sufficient to provide adequate information for the index. We use the entire pooled sample of 40 countries in Sub-Saharan Africa to run the principal components analysis, with the power variable expressed in logarithmic form.¹¹ The second principal component provides the best weights for our index construction.¹² The resulting index, a linear combination of the three underlying metrics, is derived as follows:

$$INFS=0.888(TELS)+0.949(POWs)+0.125(TRAs) \quad (1)$$

where TELS, POWs, and TRAs are, respectively, metrics for telecommunications, power, and transport stocks, as described previously, and INFS is the index of infrastructure stocks.

The infrastructure quality index is similarly constructed from three variables: telecommunications (secure Internet per 100 people¹³), power (percentage of transmission and distribution losses in the production of electricity), and transport (the share of paved roads in total roads). Using the first principal component, we use the following linear transformation to develop the infrastructure quality index (INFq):

$$INFQ=0.349(TELq)+0.766(POWq)+0.541(TRAq) \quad (2)$$

where TELq, POWq, and TRAq are, respectively, the metrics for telecommunications, power, and transport quality. The indexes compare well with the underlying infrastructure variables, as seen in the pairwise correlations, reported in table 3.1.

¹¹ The countries studied are Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Central African Republic, Chad, Comoros, Congo (Dem. Rep.), Congo (Rep.), Côte d'Ivoire, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Tanzania, Togo, Uganda, Zambia, and Zimbabwe.

¹² The best principal component is defined as the one that provides the set of weights that yields an index with the highest correlation with each index component.

¹³ Waiting time for telephone main lines has been used in previous studies. But this variable is not available (in the WDI database) for African countries.

Table 3.1: Correlations between synthetic infrastructure indices and infrastructure variables

	Infrastructure stock index (INFS)	Infrastructure quality index (INFQ)
Telecommunications (number of main telephone lines per 1,000 people)	0.1081	
Power (economy's electricity-generating capacity, in MW per 1,000 people)	0.5415	
Transportation (the road network length, in km, per square km of land area)	0.9521	
Telecommunications (secure Internet per 100 people)		0.9193
Power (percentage of transmission and distribution losses in the production of electricity)		0.6375
Transport (share of paved roads in total roads)		0.6825

Note: Correlations are run on pooled annual data of 40 Sub-Saharan African countries from 2000 to 2011. Data are obtained from the World Bank's World Development Indicators. The infrastructure stock index is constructed as $INFS = 0.888(TELs) + 0.949(POWs) + 0.125(TRA_s)$ and the infrastructure quality index as $INFQ = 0.349(TELq) + 0.766(POWq) + 0.541(TRAq)$; the lower case "s" and "q" in the formulae represent stock and quality, respectively; TEL, POW, and TRA represent telecommunication, power, and transport metrics, respectively, as defined in the table. The variable "electricity-generating capacity of the economy, in MW per 1,000 people" is in logarithmic form. Index weights are derived from the second and first principal components, respectively, for the stock and quality indexes.

Most data for this study comes from the World Bank's World Development Indicators (WDI). GDP growth, the independent variable, is constructed as the log of the ratio of GDP per capita in period t to GDP per capita in period t-1. The explanatory variables are lagged values of the log of GDP per capita (GPC); government spending as a proportion of GDP, coded GVS; trade openness (OPN) defined as the ratio of total trade to GDP; governance (REG), proxied by the perception of regulatory quality index; inflation (INF) defined as the rate of change in the consumer price index; and the two infrastructure indexes.

Table 3.2: Descriptive statistics

	GPC	GVS	OPN	FDV	TOT	REG	INF	HDI	INFS	INFQ
Mean	6.509	0.332	4.229	3.291	1.096	-0.648	3.252	0.455	19.836	21.835
Median	6.175	0.257	4.203	3.248	1.000	-0.589	1.492	0.443	21.155	13.967
Std. deviation	1.108	0.259	0.470	0.632	0.359	0.620	12.553	0.113	26.346	38.340
Minimum	4.910	0.016	3.043	0.481	0.212	-2.260	-9.824	0.262	0.000	0.000
Maximum	9.548	1.515	5.381	5.021	2.552	0.898	263.0	0.783	186.36	462.99
Missing obs.	0	14	0	14	0	39	0	4	0	0
Pairwise correlations										
GPC	1.000									
GVS	0.318	1.000								
OPN	0.575	0.192	1.000							
FDV	0.374	0.893	0.266	1.000						
TOT	0.108	-0.196	0.068	-0.188	1.000					
REG	0.410	0.090	0.053	0.259	-0.020	1.000				
INF	-0.013	-0.060	-0.051	-0.194	-0.015	-0.087	1.000			
HDI	0.845	0.567	0.510	0.616	0.012	0.381	-0.066	1.000		
INFS	0.183	0.132	0.089	0.172	0.101	0.123	0.006	0.135	1.000	
INFQ	0.421	0.152	0.324	0.183	-0.085	0.108	-0.047	0.404	0.206	1.000

Note: The statistics are obtained from pooled data of 40 Sub-Saharan African countries from 2000 to 2011, obtained from United Nations Development Program (for HDI) and World Development Indicators for the rest of the data. GPC is GDP per capita in logs; GVS is ratio of government spending to GDP; OPN is trade openness, constructed as the share of GDP of total value of external trade; FDV is the log of credit to the private sector to GDP; TOT is terms of trade, constructed as value of exports to value of imports; REG is the perception of regulatory quality (a proxy for governance); INF is the rate of inflation, constructed from the consumer price index; HDI is the Human Development Index (some missing value extrapolated as a linear function of time); INFS and INFQ are infrastructure indices, as described in table 3.1. Missing variables are skipped in our computations.

Also included, as a control variable, is human capital, surrogated by the United Nations Development Programme (UNDP) Human Development Index (HDI), whose components are life expectancy, gross national income per capita, and expected years of schooling. The index was changed in 2010; previously, the standard of living (log GDP per capita at purchasing power parity) and school enrollment rates were used in place of national income and the two “years of schooling” variables, respectively. The HDI are not available for several years. To fill the observation gaps, we first estimate the 2009 index as the arithmetic mean of 2008 and 2010 indices, and then we run an ordinary least squares regression of HDI indices for 2008–2013 against time and intercept. The regressions yield a (highly) significant time coefficient in 38 of 40 countries. Assuming linearity between HDI and time, we then extrapolate HDI data for 2001–2004. Descriptive statistics for the entire data set are in table 3.2.

The maximum values of the two infrastructure indexes are fairly high. An examination shows that those values relate to South Africa, whose infrastructure is relatively more advanced than that of the rest of the region; that makes South Africa an outlier in the panel. Therefore, we run our empirical tests initially with all 40 countries in the panel, including South Africa, and then exclude South Africa in the subsequent (robustness) test. Terms of trade statistics show that, for the median country in the region, all the revenues from exports are used to finance imports. But because most of these countries export unprocessed commodities, the bulk of imports are likely to be consumables rather than raw materials for production. By that logic, at this preliminary stage, terms of trade seem to be unfavorable to growth. A final observation regards missing variables. Data are scarce on several of our variables for the Sub-Saharan

region. But that does not affect the validity of our empirical results, as missing data have been dealt with scientifically. Second, in the robustness test, we exclude Rwanda and Zimbabwe, which have the highest number of missing observations.

Empirical strategy

To understand the infrastructure provision's effect on economic growth, we use annual data for the period 2000–2012 to test the following augmented growth model on a panel of 40 Sub-Saharan African countries:¹⁴

$$\Delta y_{it} = \alpha y_{i,t-1} + \beta_1' X_{it} + \beta_2' Z_{it} + \theta_t + \mu_i + \varepsilon_{it} \quad (3)$$

where Δy is the growth in GDP per capita; X is the vector of standard growth or inequality determinants, including output per capita, financial depth, government spending, trade openness, human capital, governance, inflation, and terms of trade; Z is a vector of infrastructure-related measures, including indices and variables of stock of infrastructure and quality of infrastructure; θ_t and μ_i are unobserved time- and country-specific effects, respectively; α is the convergence coefficient; and ε_{it} is noise. Because of potential endogeneity in the data, estimation will be done through the generalized method of moments (GMM), using procedures proposed by Arellano and Bond (1991) and Arellano and Bover (1995) for dynamic panel data models. The procedure controls for endogeneity through instrumental variables: we use suitable lags of the explanatory variables, in the spirit of Arellano and Bond (1991), as instruments.¹⁵ The system GMM that we use treats unobserved country-specific factors through differencing. Our estimation procedure includes period-specific dummies to control for homogeneous factors that may affect the economic growth of the countries investigated. Missing observations are treated as suggested by the Gretl Software Users' Guide, 2015.¹⁶

Estimation results

Parameters of the system GMM estimates of the growth equation augmented by infrastructure quality and stock are reported in table 3.3. The table carries parameter estimates of infrastructure metrics, as well as parameter estimates for control variables generally agreed in the literature as standard growth explainers. The regression includes an intercept and time dummies to control for factors common to all the countries.

The results show that trade openness, terms of trade, governance (proxied by regulatory quality), inflation (percentage change in the consumer price index), and human capital significantly and positively affect economic growth. The coefficients of inflation unconventionally carry a positive sign: an increment in the price of consumer goods and services, if pushed by demand, could elicit an increment in economic output, which contributes positively to economic growth. Both infrastructure indicators yield positive coefficients, as expected. The infrastructure quality significantly informs growth in the Sub-Saharan African region. The stock of infrastructure index yields insignificant coefficients in our estimates. This result contradicts the public capital hypothesis, which postulates that the stock of public

¹⁴ Serious attempts at incorporating the private sector in infrastructure financing started with market reforms in the mid-1990s. This investigation seeks to capture the relationships of interest post-reforms. Similarly, there is data paucity before 2000 for many small economies in the region. Other related studies have investigated specific countries in the region, such as Uganda (Reinikka and Svensson 1999), Sudan (Badawi 2003), and South Africa (Bogetic and Fedderke 2005).

¹⁵ Although infrastructure quality and stock might be weakly exogenous, Calderón and Servén (2010) have shown that using internal instruments works as well as using a combination of internal and external instruments.

¹⁶ <http://ricardo.ecn.wfu.edu/pub/gretl/manual/en/gretl-guide-a4.pdf> (see p. 164; accessed June 10, 2015).

capital has a significant positive effect on private sector output, productivity, and capital formation (Ayogu 2007); it also contradicts some studies that find that infrastructure investments significantly affect economic growth positively. For instance, Akinbobola and Saibu (2004) find that spending on infrastructure development leads to more job opportunities, higher level of income per capita, and a reduction in poverty in Nigeria; similarly, Fedderke, Perkins, and Luiz (2005) find for South Africa that investment in infrastructure leads growth by raising marginal productivity of capital. More recently, Calderón and Servén (2010) find that infrastructure stocks (proxied using a synthetic index roughly similar to ours) highly significantly and positively influence economic growth.

Given those findings and the well-known underinvestment in infrastructure in the region, one would expect that a marginal change in the stock of infrastructure should elicit economic growth. But our finding that a change in the stock of infrastructure does not stimulate economic growth in the region finds support from several studies. To begin, the results of Fedderke, Perkins, and Luiz (2005) are not robust to alternative measures, principally physical infrastructure. Similarly, the study by Easterly and Levine (1997)—although finding a strong, positive link between growth and some infrastructure indicators (mostly quality indicators, such as telephones per worker, percent of roads that are paved, and the percent of transmission losses in the electricity system)—fails to support the argument that the infrastructure quantity (such as kilometers of roads per worker and electricity-generating capacity per worker) drive the continent’s economic growth.

Table 3.3: Empirical results

	Baseline regression (40 Sub-Saharan countries)			Excluding Rwanda, South Africa, and Zimbabwe		
	Eq. 1	Eq. 2	Eq. 3	Eq. 4	Eq. 5	Eq. 6
Constant	0.377*** (0.09)	0.303*** (0.11)	0.351*** (0.12)	0.257** (0.11)	0.285** (0.12)	0.331*** (0.12)
Lagged GDP per capita	0.885*** (0.04)	0.904*** (0.11)	0.887*** (0.05)	0.878*** (0.05)	0.877*** (0.05)	0.864*** (0.05)
Government spending	0.031 (0.04)	0.030 (0.05)	0.027 (0.05)	-0.064 (0.04)	-0.075 (0.05)	0.054 (0.05)
Trade openness	0.039** (0.02)	0.035* (0.02)	0.040* (0.02)	0.042** (0.02)	0.051** (0.03)	0.054** (0.03)
Financial depth	-0.058*** (0.01)	-0.045** (0.02)	-0.053*** (0.02)	-0.030* (0.02)	-0.028 (0.02)	-0.035* (0.02)
Terms of trade	0.024** (0.01)	0.029** (0.01)	0.027** (0.01)	0.020* (0.01)	0.033** (0.01)	0.028** (0.01)
Governance (regulatory quality)	0.043*** (0.01)	0.037*** (0.01)	0.041*** (0.01)	0.018 (0.01)	0.023 (0.02)	0.023 (0.02)
Inflation	0.001** (0.00)	0.001 (0.00)	0.001* (0.00)	-0.001 (0.00)	0.000 (0.00)	-0.000 (0.00)
Human development index	0.911*** (0.35)	0.711** (0.36)	0.850** (0.40)	0.796** (0.40)	0.913** (0.43)	1.015** (0.44)
Infrastructure stock	0.002 (0.00)		0.001 (0.00)	0.002 (0.00)		0.002 (0.00)
Infrastructure quality		0.002** (0.00)	0.002** (0.00)		0.002*** (0.00)	0.003*** (0.00)
Observations	387	387	387	368	368	368
Specification tests (p-values)						
AR(2)	0.16	0.17	0.15	0.16	0.17	0.17
Sargan	0.87	0.98	0.88	0.99	0.99	0.99

Note: We estimate a system GMM using annual data of 40 countries (equations 1–3) and 37 countries (equations 4–6) for the period 2000–2011. The dependent variable is growth in GDP (log of the ratio of GDP per capita in year t and GDP per capita in year $t-1$). The regression includes an intercept and time dummies; robust standard errors are in parentheses. *, **, *** indicate statistical significance at 10 percent, 5 percent, and 1 percent, respectively.

Infrastructure plays an important role in augmenting productivity and output, hence, in raising the rate of return on private capital. This augmentation leads to higher private investment, hence, output. Infrastructure quality coefficients are all positive and significant in our estimates. These results, therefore, suggest that emphasis should be placed not on providing the infrastructure bulk but on ensuring that public infrastructure is of the standard that can increase the rate of return on private capital and, hence, augment productivity. For instance, the provision of electric power is important in encouraging private investment. But if the power supply is unreliable—say, due to a high frequency of outages—private entrepreneurs will be forced to have alternative and expensive stand-by arrangements (such as thermal generators), which reduces the return on their invested capital (Malikane 2014).

Similarly, the existence of a long road network might not be useful in attracting private capital if a substantial part of the network is effectively unusable because of the roads' bad state of repair. Our thesis, therefore, is that the quality of infrastructure matters for economic growth, even in countries that are relatively less endowed with infrastructure stocks, such as those in Sub-Saharan Africa. To test the veracity of this thesis, we run additional tests that exclude South Africa (due to its relatively better infrastructure stocks endowment) and Rwanda and

Zimbabwe (which have the greatest number of missing observations). Additional test results, reported in table 3.3 (equations 4–6), show that our findings on the infrastructure-economic growth nexus are robust to alternative panel compositions and missing observations. The robustness of these results to regional country clusters, as well as additional tests on the relationships found here, are being investigated in a longer paper dedicated to that analysis

CHAPTER 4. INFRASTRUCTURE FINANCING CAPACITY IN SUB-SAHARAN AFRICA

To gather evidence on the private sector’s participation in infrastructure financing in Sub-Saharan Africa, and on the adequacy of its institutional and human resource capacity, we used a case study approach. We sampled three countries—South Africa, Mauritius, and Kenya—examining the relative state of development of their capital markets and infrastructure. The AfDB, OECD, and UNDP (2013) rank South Africa, Kenya, and Mauritius, in that order, as the three African countries with the greatest depth of financial markets, and Mauritius and South Africa as the second and fourth best, respectively, in infrastructure development. Thus, those countries are likely the best cases of private sector involvement in the region’s infrastructure financing.

This section reports results of primary data relating to capacity issues of infrastructure financing in Africa. The questionnaire, provided in the appendix, details the nature of questions posed to respondents. The mostly open-ended questions allow respondents latitude to be as detailed as possible. Most data gathered was therefore nonstructured and nonnumeric. We use thematic analysis to interpret the data and make inferences. We conducted our inquiry in Kenya, Mauritius, and South Africa and, accordingly, report our findings separately for each country.

Kenya

Given the short time available, we reached only 17 respondents in Kenya, 6 from the public sector. The following pages summarize the responses to the study’s key questions. We present our results within five capacity themes: capital markets, public–private partnerships, spending of infrastructure allocations, human resources and processes, and information technology.

Capital markets and infrastructure financing capacity

Table 4.1 summarizes the responses to the key questions that seek to determine whether capital markets in Kenya can enable financing of public infrastructure:

As a follow-up to question 5 in table 4.1, respondents were asked whether using one platform or exchange for the trade of debt and equity securities presented challenges to traders or to the exchange’s management. Most respondents, as expected, indicated that, because of the small size (by traded volumes) of the two major asset classes, creating separate trading platforms would result in suboptimal use of those markets. But some respondents explained that settlement and clearing of traded equity securities took place at the Central Depository System, whereas bond trading was cleared and settled at the Central Bank of Kenya. According to those respondents, that dichotomy could present managerial complexities were the exchange to increase its turnover, as coordinating clearance might be difficult. Furthermore, respondents explained that bond prices were, in practice, largely negotiated “over the counter” among institutional investors, who are the main investor group, and then merely authenticated—for settlement purposes—at the automated trading system, which is the formal trading platform. This “parallel trade” system introduced information asymmetry to bond trading, which reduced the efficacy of the exchange’s price discovery mechanism. The respondents wisely suggested that an over-the-counter market should be created to deal with the challenge.

Table 4.1: Capital market capacity responses—Kenya

	Dominant response	Proportion and percentage of respondents	
1. Is there a well-developed public capital market in the country that can enable the government (central and local) to issue debt securities to finance infrastructure needs?	YES	16/17	0.94
2. Has the public debt market for federal/national, state or county, and municipal debt issues been formalized in the country?	YES	17/17	1.00
3. Has the formalized public debt market been extended to issuances by private issuers (companies and institutions)?	YES	17/17	1.00
4. Are issuances of debt by public and private entities considered important asset classes for investment purposes by investors in the country?	YES	14/17	0.82
5. Is the debt market trading on the same platform as the national stock exchange?	YES	17/17	1.00
6. Is the exchange modern and feted with sufficient ICT infrastructure?	YES	17/17	1.00

To help examine the country's public debt market, respondents were asked if borrowers adequately used the exchange. Most respondents reported great demand for debt instruments in Kenya. Demand especially exists from such institutional investors as pension funds, insurance firms, and savings and credit cooperative societies—some of which can, by law, invest up to 70 percent of their holdings in fixed-income instruments. As evidence of the demand, all bond issues at the Nairobi Securities Exchange (NSE) have been oversubscribed, with investor appetite going beyond national borders.¹⁷ But demand has not been sufficiently matched by supply of public debt, particularly by the corporate sector. Respondents ascribed potential corporate issuers' lack of enthusiasm for the public debt markets to at least one of the following:

- *Excess liquidity in the commercial banking sector.* Several respondents explained that commercial banks in Kenya are awash with liquidity and are willing to offer interest rates, as low as—and sometimes lower than—the prevailing rates for Treasury bills to institutional borrowers. If public debt securities are to be priced well, especially with Treasury issues of the same maturity profile as the default risk benchmark, corporate bond issuers will not likely be able to obtain long-term, arms-length credit at interest rates lower than those offered by commercial banks.
- *Stringent public listing requirements and disclosure phobia.* Many private companies find abiding by the debt listing requirements difficult. Among other things, potential private debt issuers are required by pertinent regulations to have paid-up capital of KES 15 million (approximately USD 160,000); hold net assets of KES 10 million (USD 107,000); maintain healthy leverage ratios; and file financial reports quarterly, post listing, with the Capital Markets Authority. Many potential issuers consider those listing requirements stringent, onerous, and costly and would rather negotiate loan terms discretely, with private lending houses.
- *Commercial banks' domination in the public debt markets.* Because of their preference for short-term maturities (to match their liabilities), commercial banks, which dominate the demand side of the public debt markets, tend to discourage issuances of long-term debt instruments. That forces potential corporate long-term debt issuers to

¹⁷ Foreign investors currently hold nearly 55 percent of all outstanding bonds.

resort to private debt for long-term funding. The same commercial banks are likely the key beneficiaries of such private debt arrangements.¹⁸

- *Illiquidity in the corporate bond markets and long settlement time.* The corporate bond counter at the Nairobi Securities Exchange (NSE) records only an average of 2 trades per month, compared to an average of 100 trades for Treasury bonds. The low trade volume introduces illiquidity in the corporate bonds market, which inhibits price discovery and discourages issuance. In some markets, dealers or market makers stand ready to buy back bonds in the secondary markets and provide liquidity; that has not taken root in the NSE. The long settlement time, currently averaging $t + 5$ days, and inferior DVP technology relative to advanced markets also hinder secondary trading and price discovery.¹⁹
- *Difficulties in pricing bond issues.* Markets in which short, intermediate, and long-tenure Treasury securities are available help develop the yield curve and usually act as the benchmark for corporate bond pricing. But the Kenyan government has frequently had to deal with biting budget deficits, which have sometimes made Treasury bills rates erratic and hence incapable of providing a reasonable benchmark for short-term debt. Moreover, because long-term debt's demand and supply must respond to changes in debt market conditions, their yields are also erratic and incapable of providing reliable, stable signals to corporate bond issuers.
- *Lack of a bond index.* A bond index, which the NSE has not had, is necessary to gauge the health of bond markets. Recently, however, the Financial Times Stock Exchange launched a bond index at the Kenyan bourse.

Implications for infrastructure financing capacity

The hindrances to corporate bond issues are important to infrastructure financing. Respondents generally agreed that the Kenyan government recognizes the need to avoid crowding out the private sector from capital markets. Consequently, the government has increasingly turned to sources other than the local capital markets to meet public infrastructure financing needs. For instance, the government recently issued a Eurobond to finance power and transport infrastructure, which was oversubscribed by more than 150 percent.²⁰ Clearly, the absence of corporate issuers in the bond market interferes with the capacity to optimally use local capital markets to finance public infrastructure.²¹

Asset-backed securities (ABS)

The evolution of an asset-backed securities platform, which can easily support ring-fenced public issues such as infrastructure bonds, has been slow. Although a legal framework is in place, some respondents thought that the framework has borrowed too heavily from

¹⁸ Other than using commercial banks, Kenyan corporates typically obtain long-term credit from leasing agents or roll over short-term debt, such as commercial paper and trade credit.

¹⁹ Delivery versus payment (DVP) is a technology used in bond trading. It is designed to suit institutional investors, who would ordinarily hesitate to pay for an asset or security before it is in negotiable form.

²⁰ <http://www.businessdailyafrica.com/Infrastructure-bond-bids-pass-target-by-Sh24bn/-/539546/2497334/-/d0f0yqz/-/index.html> (accessed June 8, 2015).

²¹ Some respondents thought that the duty of physical infrastructure financing should not rest with the central government but with state-owned bodies (parastatals), such as Kenya Roads Board, Kenya Ports Authority (for transport infrastructure), and Kenya Electricity Generating Company (for power infrastructure), among others. In that regard, the respondents observed that the parastatals preferred negotiated financing (with foreign governments and banks). Were those subnationals and parastatals encouraged to access the local bond market by issuing municipal and agency bonds, the domestic public debt market would be deepened and become capable of supporting the financing of huge capital projects.

developed markets. In particular, the ABS Regulations 2007, which provided for securitization through a special purpose vehicle, was criticized as an American model that had little relevance to a nascent capital market such as Kenya's. In response, the Capital Markets Authority undertook amendments to the regulation. The result was the newly issued ABS Regulation 2013, which allowed for securitization through a trust. But, in some ways, the new regulation has been a nightmare to implement. For instance, the mother institution transfers assets to the trust through a transaction at arm's length, which attracts value-added tax (VAT). Because VAT was already paid on the original transaction, the result amounts to double taxation for the ABS originator. Thus, to close an ABS deal, one must first seek VAT exemption from the Treasury, a step that transaction advisors and potential ABS issuers regard as time consuming and unnecessary.

Non-capital market sources of infrastructure financing

Given local capital markets' lack of capacity to enable the government to adequately finance infrastructure projects, respondents suggested several nontraditional financing options:

- *Islamic bonds.* The government could issue debt instruments that target institutions operating on Islamic financial principles. The law governing issuance of financial instruments was recently amended to accommodate Islamic financial instruments.
- *Infrastructure bond issuance in international capital markets.* Twice, the government has done this successfully. But those two issuances are not infrastructure bonds in the strict sense of the phrase because cash flows to bondholders are not based on the ring-fencing concept, in which cash flows are derived solely from proceeds from the specific infrastructure project being financed.
- *Diaspora bonds issued to target Kenya's diaspora in foreign markets.* Such issuances need to be ring-fenced to distinguish them from general-obligation bonds and to instill confidence in the diaspora community that cash flows will be based on the specific infrastructure project's performance, while still backed by the government's credit.
- *Earmarked fees.* The respondents who suggested this option put a caveat on the fees' suitability to finance large infrastructure outlays, citing the need to base them on economic performance. But earmarked fees might be useful for infrastructure maintenance support.
- *Donor support.* Governments can negotiate with bilateral lenders to support specific infrastructure projects. Respondents also said that the cost of donor funding far outweighs the cost of issuing securities in the markets, notwithstanding the traditional challenges of terms and conditionalities.
- *Arranging project finance with commercial banks.* Governments can assist in assembling consortiums of investors, lenders, and other participants to finance infrastructure projects too large for a single investor to underwrite.

Respondents also noted that the government might not be able to fully use those alternative sources because of debt-sustainability concerns. The current total debt-to-GDP ratio is 48 percent, and parliamentary approval is needed to exceed that limit. An emerging way of addressing that shortcoming is the public-private partnership (PPP) arrangement.

Capacity to finance infrastructure through PPPs

Kenya's private sector is an important contributor to the country's GDP—vibrant and connected to cross-border business partners. In that regard, the government has extended support to the sector in various forms, including tax exemptions (such as that bond investors are exempted from withholding taxes to encourage corporate bond issues), provision of an

enabling business environment (such as that, licensing requirements have been simplified) and tax subsidies (such as to encourage the production of tradable commodities in the export processing zones). Furthermore, the government now partners with the private sector to realize Kenya's infrastructure objectives. To that end, the government enacted the Public-Private Partnerships (PPP) Act in 2013 and has since put in place an elaborate PPP operational framework and established a PPP Unit as a national Treasury department.

The PPP Unit was formed soon after the enactment of the PPP Act to promote and oversee implementation of the government's PPP programs. The unit plays a key role in identifying problems; making recommendations to the PPP Committee regarding potential solutions; and ensuring that projects meet such quality criteria as affordability, value for money, and appropriate transfer of risk.²² According to a respondent, since its establishment, the unit has initiated 69 projects, which are at various stages, but none have been concluded. Respondents attributed the slow progress to the many layers of approval required before a deal can be concluded. But the country is not new to the PPP concept, having used it long before 2013 to finance several projects, such as replacement of the old Nyali Bridge, the Rift Valley Railway (awarded to a concessionaire by the Kenyan and Ugandan governments), and the independent power producers. Other more successful PPPs are the new Greenfield Terminal at the Jomo Kenyatta International Airport, the Mombasa Ferry Services (currently concessionaire operated), Kenyatta University hospital and hostel projects, and equipment lease by the Ministry of Health.

According to the respondents, the government has not optimally used the private sector to achieve Kenya's infrastructure objectives. First, the legislative framework is cumbersome because it places PPP coordination in the control of several disparate agencies and introduces system red tape that delays project implementation. Second, cumbersome procurement procedures encourage corrupt practices. Third, too much time has been devoted to feasibility studies, which often provide conflicting findings and can lead to even more studies. Fourth, project planning is poor, especially as it appertains to the appropriate PPP model's funding mode and design.

Fifth, land issues related to relocation, compensation, and absorption of local inhabitants into the project must be surmounted before a project can be given the green light. Respondents explain that, in some cases, communities have protested and demanded higher compensation, especially when they have not been adequately consulted before the project. In other cases, informed land speculators and profiteers (sometimes government insiders or their accomplices) have moved ahead of the government to purchase land at the project's earmarked location only to sell it to the government for exorbitant prices. Sixth, security concerns—especially arising from fears of terrorist attacks—and subsequent travel advisories often have derailed PPP negotiations. Finally, transaction advisors and arrangers are in short supply in the Kenyan market. The government needs to recruit internal technical personnel to run the PPP Unit in the long term. Technical expertise has been sought from other countries and through secondments from supranational institutions, such as the World Bank.

All respondents agreed that the Kenyan government is capable of running several PPPs at the same time. But some respondents thought that the government should run only one PPP project at a time for each major economic sector. Others suggested that the government could run as many PPP projects as possible provided the value-for-money conditions were met. Respondents suggested that a thorough value-for-money analysis must be undertaken and any

²² <http://www.pppunit.go.ke/about-pppu/background> (accessed May 2, 2015).

envisaged projects yielding negative value dropped. But respondents claimed that PPPs initiated and managed jointly with state-owned enterprises stood a better chance of success than those managed through special purpose vehicles because the former are more independent and better placed to bring experts on board. Some respondents indicated that the question should not be about the number of projects but rather the quality of projects that are best implemented through the PPP structure. Because project identification is crucial, well-prepared feasibility studies are critical. The capacity to competently identify projects might be limited initially, but in the interim, government can draw on the technical backstopping of external advisors as it builds its own capacity.

Respondents also believe that the government can provide guarantees on all 69 envisaged PPP projects. But the government does not—and should not—provide guarantees for projects run under state-owned enterprises, which are semi-autonomous. Furthermore, the government has not fully exploited PPP potential. The preparatory work for bid solicitation and the subsequent process management is inefficient. If not addressed, this might result in poor response to the solicitation process and ultimately diminish the potential value for money.

Capacity to spend infrastructure development allocations

Respondents were unanimous that the Treasury releases monies allocated to various ministries on a monthly basis and that no serious bottlenecks are associated with money clearance. But the Treasury can release such monies only with parliamentary approval. There have been situations when monies that were earmarked for development expenditures and had received parliamentary approval were not spent as originally intended and had to be surrendered back to the Treasury at fiscal year-end. Respondents attributed that occurrence to the following reasons:

- Procurement procedures are cumbersome.
- Requisition from ministries is delayed.
- The authority to spend has not been granted by the Controller of Budget.
- In many cases, mechanisms for monitoring ministries' spending are lacking or only partly instituted.
- Funds are mismanaged or misallocated. Because the state auditors only review ministries at fiscal year-end, misallocation cannot be unearthed until then. Some ministries have in the past directed development budgets to nondevelopment purposes.
- Funding is inadequate. When the Treasury allocates less than the amount needed to develop a project, ministries sometimes do not allocate their own money to the project in the hope that the Treasury will allocate more money in the next period.
- Exchequer releases are late. In the event of an emergency (for instance, if hunger is declared in a sector of the country), the exchequer might divert part of the development budget to attend to the emergency and then submit a request for a compensatory allocation later in the year (a practice known as mini budget). This causes delays in the release of development monies to affected ministries. In other cases, donor countries might have pledged funding for a project, but not signed the agreement, often because the government fails to meet funding conditionalities. In such cases, budgetary allocations may be made in anticipation, but the exchequer may not extend the funds to ministries until the donors actually avail them.

Overall, respondents contend that the government has the capacity to absorb large amounts of money for infrastructure projects, including debt and grants from international financial markets.

Human resource capacity

We asked respondents a series of questions to determine whether government departments have adequate human resource capacity to handle the infrastructure financing function. Table 4.2 summarizes the key findings.

Table 4.2: Human resource capacity responses—Kenya

	Dominant response	Proportion and percentage of respondents	
1. Does the government have adequate staffing to handle infrastructure matters of each line ministry?	NO	4/6	0.67
2. Is the internal staff well-trained in technical disciplines, such as policy, economics, and finance?	YES	5/6	0.83
3. Is the internal staff conversant with the various markets for infrastructure financing?	YES	6/6	1.00
4. Internal staff capabilities			
i) Are they able to forecast and use interest rates across international markets and to perform a clear and informed comparison of available infrastructure financing?	YES	4/6	0.67
ii) Does the internal staff have the ability to independently and conclusively conduct a feasibility study?	NO	4/6	0.67
iii) Can they satisfactorily conduct a baseline study for envisaged infrastructure development?	NO	5/6	0.83
iv) Do they have the ability to perform cash flow forecasts for projects in their jurisdiction under various macroeconomic scenarios?	NO	4/6	0.67
v) Arising from the previous question (iv), does the staff, therefore, have the capacity to conduct a bankable study, complete with estimates of cash flows, for investors' consideration?	NO	5/6	0.83
vi) Are they able to simulate financial bids and come up with cash bid estimates that reasonably represent actual bids?	NO	6/6	1.00
vii) Does staff have the capacity to process payments, analyze performance measures, and develop reports and trends?	YES	6/6	1.00

Table 4.2 shows that, in their present state, the staff employed in the key ministries that deal with infrastructure financing do not have adequate competencies to perform a bankable study, which feeds into the entire project process. All respondents believe that ministry staff cannot effectively simulate bids and develop reasonable estimates to guide the bid solicitation process. By providing the project specifications, proper background studies inform the government's tender advertisements, tender evaluation and award, value-for-money computations, and risk sharing (in PPPs), as well as establish guarantee requirements and unitary fees. Such human resource inadequacies, therefore, have serious implications for infrastructure financing and, according to some respondents, often have caused delays and cancellations of bid awards, with the usual attendant costly legal corollaries.

Respondents suggested one solution to the skill inadequacy problem: training, training, training! Training can be achieved through apprenticeships under the technical staff currently hired from abroad; secondments of staff to organizations that ordinarily deal with infrastructure issues, such as development banks; provision of regular in-service workshops; collaborations with training institutions, such as universities; and short courses, typically supported by quasi-public organizations, such as Japanese International Cooperation Agency and African Development Bank (AfDB).

To establish whether capacity issues already addressed are reflected in staff performance, regular assessments of training needs are recommended. The respondents suggested several remedies to address variances between actual performance and expected performance (post-

training): giving performance appraisals, relieving the employee of his or her duties, and redeploying underperforming staff to duties that conform better to their skills and knowledge. But no respondents could confirm whether the government had ever applied those measures—with the exception of performance appraisal, which has recently gained widespread usage in government departments.

Information and communication technology preparedness

All respondents agreed that new processes and systems would make working with prospective infrastructure financiers easier. Specifically, they suggested the following:

- The government should embrace e-procurement systems and processes to reduce delays and corrupt activities in procurement.
- The government should introduce e-project management systems to address issues about project bankability and project turnaround times.
- The government should put e-system in place for managing disbursements of project cash disbursements.
- The government should upgrade all ministry and department Internet connections and systems to improve speed and enhance data capabilities.

Respondents also contended that implementing such systems would require additional technology training of ministry staff. Such training would not only prepare them to use the systems effectively but would also minimize staff resistance to the change. Working relationships are not expected to change as a result of the new systems. Currently, employees who work directly with or under projects are conversant with project management software and terminology, but it is important to promote such knowledge among the other staff as well. Respondents believed that government staff are adaptable and open to learning and training.

To its credit, the government has already started implementing some recommendations. For instance, the government recently installed an Integrated Financial Management System in all ministries to replace the individual management systems that each ministry previously operated. Furthermore, all state-owned enterprises recently were directed to open accounts with the Central Bank of Kenya to ease disbursement, monitoring, and evaluation of cash flows. Having those accounts will come in handy for such enterprises whenever they have to rely on the exchequer for partial or full funding of their projects. Respondents also reported that all government departments involved in infrastructure financing have in-house computer hardware and software expertise to manage system problems, crashes, and other emergencies.

Mauritius

Data for Mauritius were gathered from nine respondents of whom five were from the public sector. We present, below, the key matters arising from the responses' analysis.

Capital markets and infrastructure financing capacity

The Stock Exchange of Mauritius, the country's only organized securities exchange, trades in several financial instrument classes, including equity, corporate bonds, Treasury bonds, and exchange-traded funds (see table 4.3). Respondents suggested that the total volume of transactions of all asset classes listed was too small to create separate platforms for each asset class. The market is equipped with adequate infrastructure, including ICT infrastructure, which supports the trading of all securities in one platform. A secondary capital market for bonds, an avenue that would promote the issuance of corporate bonds, is almost nonexistent; however, the financial sector is replete with liquidity and a strong appetite for debt instrument. Yet not

many issued debt instruments are floated in the market, especially by corporate issuers. The government, on the other hand, has issued several bonds of various maturities in the market—however, not enough to satisfy investors’ appetite. Because of the inadequate supply of securities and thin trading, the market’s debt segment is not as liquid as the equity segment.

The government is trying to address the problem of debt market thinness. In the 2014 financial policy statement, the Financial Services Commission of Mauritius was mandated to help develop the bond market by considering licensing commercial banks as primary market dealers, which would then act as market makers. Similarly, the government introduced the trading of Treasury bills on the exchange in December 2003, as the first step in a process aimed at establishing an active secondary market for government securities. The stock market has been working closely with the Central Bank of Mauritius and commercial banks to set up a platform for the trade of medium- and long-term government securities on the exchange. Also, transaction fees at the exchange were recently reduced to encourage trading.

Table 4.3: Capital market capacity responses—Mauritius

	Dominant Response	Proportion and percentage of respondents	
1. Is there a well-developed public capital market in the country that can enable the government (central and local) to issue debt securities to finance infrastructure needs?	YES	5/9	0.56
2. Has the public debt market for federal/national, state or county, and municipal debt issues been formalized in the country?	YES	9/9	1.00
3. Has the formalized public debt market been extended to issuances by private issuers (companies and institutions)?	YES	8/9	0.89
4. Are issuances of debt by public and private entities considered important asset classes for investment purposes by investors in the country?	YES	6/9	0.67
5. Is the debt market trading in the same platform as the national stock exchange?	YES	9/9	1.00
6. Is the exchange modern and feted with sufficient ICT infrastructure?	YES	7/9	0.78

A regulation has also been recently enacted to allow the government to raise money directly to finance infrastructure activities.²³ But the government has not formally gone to the capital market to seek funds in this manner; respondents gave several reasons to explain why. First, the government has imposed a statutory total debt ceiling of 50 percent of gross domestic product (GDP). The debt-to-GDP ratio currently stands at about 54 percent, which slightly exceeds that ceiling. The government would not like to increase that debt, violating the self-imposed ceiling and possibly becoming unsustainable. Second, sourcing debt from internal markets might have an adverse impact on capital availability to the private sector, which might compromise the achievement of economic growth targets. Third, alternative funding sources, such as the World Bank and African Development Bank, provide adequate finance. Respondents claimed that a good relationship with external debt financiers is important

²³ The Asset-backed Securities Regulations have been issued under the Capital Markets Act (Cap 485A) to guide the issuance of infrastructure and other asset-backed debt at the Nairobi Securities Exchange. See <file:///C:/Users/a0035636/Downloads/Capital%20Markets%20Assets%20Baked%20Securities%20Regulations%202007.pdf> (accessed July 16, 2015).

because they sometimes renegotiate loan terms should the country encounter cash flow constraints during the loan tenure.

Capacity to finance infrastructure through PPPs

The Mauritian economy is developing on free enterprise principles, in which the private sector plays a vital role. The private sector is vibrant and sizable relative to GDP and has cross-border operations and connections. Thus, respondents explain, the government has implemented several measures support private enterprise, including a low tax environment and tax subsidies; an environment that makes doing business easy; policy reforms and regular dialogue with business to reduce bottlenecks; business facilitation through the removal or consolidation of licensing requirements; and introduction of e-payments to ease business setups.

Respondents explain that government has partnered with the private sector in the past to realize the country's infrastructure financing objectives in various sectors, including power supply (through well-negotiated long-term contracts with many independent power producers, which will expire around 2016 and might have to be renegotiated); long-term leases of land, which enables long-range planning of production and realization of return on investment; and solid and liquid waste management. But the partnerships in place were mostly arranged several years ago, and they neither fit the current definition of public-private partnerships (PPPs) nor are they arranged within the ambit of the current PPP framework. The government recently established a PPP Unit—as a Ministry of Finance department—which works closely with line ministries that are directly involved in public infrastructure projects, such as the Ministry of Transport. Ministry support teams have also been established in each line ministry to coordinate with the PPP Unit.

Within this PPP framework, the government has not been able to partner with the private sector on any project. According to respondents, two infrastructure projects were recently mooted for PPP financing: a comprehensive road infrastructure project and a light rail transport (LRT) system. In both cases, the PPP unit worked with the Ministry of Transport, which appointed a local project manager, and an external consultant who is well conversant with PPPs and LRT systems. The government was looking to raise about MUR 15 billion (approximately USD 417 million) for the LRT project and MUR 30 billion (USD 834 million) for the road project. According to respondents, local institutional investors were reluctant to participate in the project because of their high levels of risk aversion. They nonetheless expressed willingness to “get on board when the projects get rolling.” Although foreign banks, such as Barclays and HSBC, were enthusiastic about the proposals, neither project could muster sufficient investor appetite, and both were shelved.

Therefore, the Mauritian government has not, in the context of the current PPP framework, used the private sector to realize the country's infrastructure development objectives. Furthermore, the country has no PPP projects in the pipeline. Respondents attribute this to several factors. First, the PPP Unit and line ministries lack project management expertise and advisors who can properly price projects. Second, the expertise deficit and inadequate public awareness have created a public perception that the PPP approach benefits the private sector more than it does the intended beneficiaries; this has led to the public's resistance. Third, although current legislation can help operate PPPs, no specific legislation is dedicated solely to PPPs and that defines PPP parameters and parties' duties, rights, and obligations. Because of this, the private sector perceives risk with PPP projects. Fourth, the lack of political support could be blamed for the envisaged LRT and road projects failing to take off. As respondents explained, the new political leadership, having ridden to power on the promise to improve the

efficiency of water provision (which sees about 50 percent of water lost in the supply chain), was not supportive of the LRT and road projects.

Capacity to spend infrastructure development allocations

For development and infrastructure allocations, every ministry has finance staff who undertake due diligence at the project budgeting phase. Ministry of Finance officers are posted to the line ministries specifically to advise on the project process. After their input and authorization, a funding proposal for the particular project is prepared and forwarded to Ministry of Finance (which hosts the National Treasury) for approval. Approval often is sought at the start of the financial year through the national financial budgeting process. The Treasury then confirms, among other details, that the engineer's certificate (where relevant) is attached. If approved, the Treasury allocates funds for the project and forwards the proposal—together with others from other ministries—to parliament. If parliament grants approval, cash is disbursed to the relevant ministry. Preparing the budget document and receiving parliament approval takes approximately three to four months.

The transfer of funds takes about one week from the point of its requisition, depending on whether all supporting documents (such as invoices countersigned by the Minister) have been submitted with the requisition. Any monies not spent in the allocated fiscal year are returned to the Treasury at fiscal year-end. But ministries can apply to the Treasury to reuse, in the next fiscal year, unused funds returned the previous year. Such applications typically are granted, with minimal requirements for justification. A change in the law is envisaged to allow up to 5 percent of lapsed funds to automatically carry over into the next fiscal year.

Line ministries spend 80–85 percent of their allocations each year, and a lot is re-allocated. For example, say the Treasury approved project A (building a new road in location “a”) for funding in a given financial year. If project B (road rehabilitation after heavy rains in location “b”), which was not approved, becomes, in the ministry's estimation, more urgent during the fiscal year, the ministry can apply for Treasury approval to spend the monies allocated to project A on the new, urgent project B. The Treasury often approves such applications. Thus, the 80–85 percent spending may sometimes account for two projects rather than one.

Reasons for underspending

Ministries may underspend development allocations for several reasons.

- Contract award often delays beyond the beginning of a fiscal year; hence, work begins much later. Because spending is prorated on the actual work done, monies attributed to work not yet done will be reflected as unspent in the ministry's records.
- The procurement procedure is lengthy and may delay further if bidders are not responsive and the tender exercise must start over. Among other reasons, respondents ascribe such delays to technical capacity shortages in line ministries to prepare project specifications and manage the process.
- Project takeoff—hence spending—often has been delayed by the Public Infrastructure Division and the Central Procurement Board, which are in charge of technical aspects, such as project design preparation (after the line ministry prepares project specifications), preparation of tender documents and bid evaluation, and project launch.
- Line ministries cannot supervise large numbers of public works; hence, project implementation typically is staggered across time.

- Mauritius is a small economy with few contractors who can be awarded large tenders; similarly, the skilled labor market is limited. These labor market deficiencies slow down project implementation.

Dealing with bottlenecks in infrastructure allocations spending

Respondents suggested several solutions to the lack of full spending on infrastructure project allocations.

- Human resource capacity should be built in line ministries to deal with project planning, preparation, and management and in the Central Procurement Board to ensure timely evaluation of bids. Where possible, the national budget should provide funds to hire project finance and project management experts in line ministries, on short contracts, to assist with project preparation and implementation.
- The government should consider creating a centralized agency to handle all project management duties, rather than duplicate those roles at the various line ministries.
- Human resource capacity in risk analysis and contingency planning must be built. Frequently, scope adjustment and project component changes become necessary once the project has started; this is indicative of poor planning. But need exists to have specialists in line ministries (or in the proposed centralized agency) who can take corrective action, for instance, when project time and cost overruns appear imminent.
- Although capacity constraints can largely be explained by lack of specialized training of staff in government service, it can also be explained by the country's lack of experience with private sector involvement in public infrastructure provision. Thus, training is necessary to enhance government employees' skills in deal structuring and project financing. Such training would be more effective if done through actual PPP transactions rather than in a classroom.
- Procurement procedures should be simplified to foster transparency, fairness, and accountability.

Human resource capacity

Table 4.4 summarizes respondents' views on the state of ministerial human resource preparedness to deal with private sector involvement in infrastructure financing in Mauritius. The table reveals an urgent need to undertake human resource capacity enhancement within the government if the private sector is to be successfully engaged. Respondents agree that public infrastructure financing expertise is deficient in the country and that the country should make a deliberate effort to provide or sponsor relevant training. But most respondents opine that staff development is not necessary for each line ministry lest the country end up with an expensive overcapacity relative to its small size. Thus, the Public Infrastructure Ministry should be provided with the desired staffing capacity so that it can provide advisory services to the line ministries.

Table 4.4: Human resource capacity responses—Mauritius

	Dominant response	Proportion and percentage of respondents	
1. Does the government have adequate staffing to handle infrastructure matters of each line ministry?	NO	5/5	1.00
2. Is the internal staff well trained in technical disciplines, such as policy, economics, and finance?	NO	5/5	1.00
3. Is the internal staff conversant with the various markets for infrastructure financing?	NO	5/5	1.00
4. Internal staff capabilities			
i) Are they able to forecast and use interest rates across international markets and to perform a clear and informed comparison of available infrastructure financing?	NO	5/5	1.00
ii) Does the internal staff have the ability to independently and conclusively conduct a feasibility study?	NO	5/5	1.00
iii) Can they satisfactorily conduct a baseline study for envisaged infrastructure development?	NO	4/5	0.80
iv) Do they have the ability to perform cash flow forecasts for projects in their jurisdiction within various macroeconomic scenarios?	NO	4/5	0.80
v) Arising from the previous question (iv), do they therefore have the capacity to conduct a bankable study, complete with estimates of cash flows, for investors' consideration?	NO	5/5	1.00
vi) Are they able to simulate financial bids and come up with cash bid estimates that reasonably represent actual bids?	NO	5/5	1.00
vii) Does staff have the capacity to process payments, analyze performance measures, and develop reports and trends?	YES	3/5	0.60

Information and communication technology preparedness

Processes that govern infrastructure financing are clearly stated and are covered in various regulations and laws. For instance, the PPP process is defined to include a feasibility study, a market study, obtainment of approval at every stage from the PPP committee, and use of an open tender system. Those components, however, exist only on paper, as no modern IT system is linked to that process. Thus, developing and implementing new processes to service various infrastructure financing functions is clearly needed.

To the country's credit, the government recently started automating the budget process, with phase one currently under way. The entire process of budget automation could be done in one or two years. The automation process is led by the Mauritian State Informatics Limited and is being done in partnership with external firms, such as Oracle (the budget system will run on Oracle). The capital budgeting process and project management systems are being automated through a similar partnership with external parties. The ministries are, however, still using the conventional, paper-based framework in their budgeting process.

A computerized system (IT platform) is also being developed for procurement. That system should make preparing requisitions and receiving quotations from all suppliers easier and quicker. But a change in law, or enactment of new legislation, might be necessary to effect the new IT procurement platform.

South Africa

Except for two respondents who were willing to grant us an interview and complete the questionnaires by hand, every potential respondent in South Africa asked us to email questions to them. As of the time of compiling this report, several of those respondents had not yet returned their questionnaires. Thus, we have made our report from only 11 returned

questionnaires (4 from the public sector) and 2 interviews in the private sector—a total of 13 respondents.

Capital markets and infrastructure financing capacity

Addition to the answers in table 4.5, respondents stated that the Public Financial Management Act (PFMA) and the Municipal Finance Act (MFA) deal with the issues in questions 2 and 3. But many municipalities do not have the asset base or financial resources required to support heavy debt repayment and, as such, find financing their infrastructure needs difficult.

Table 4.5: Capital market capacity responses—South Africa

	Dominant Response	Proportion of respondents	
1. Is there a well-developed public capital market in the country that can enable the government (central and local) to issue debt securities to finance infrastructure needs?	YES	11/13	0.84
2. Has the public debt market for federal/national, state or county, and municipal debt issues been formalized in the country?	YES	13/13	1.00
3. Has the formalized public debt market been extended to issuances by private issuers (companies and institutions)?	YES	13/13	1.00
4. Are issuances of debt by public and private entities considered important asset classes for investment purposes by investors in the country?	YES	13/13	1.00
5. Is the debt market trading in the same platform as the national stock exchange?	YES	10/13	0.78
6. Is the exchange modern and feted with sufficient ICT infrastructure?	YES	13/13	1.00

Respondents were asked to explain whether using one platform (exchange) for the trade of equity and debt securities presented challenges to the exchange or to traders. Respondents clarified that although the trading of several security classes is housed at the Johannesburg Securities Exchange (JSE), trading mechanics and platforms differ for individual securities. For debt securities, for instance, the JSE Debt Board, the platform through which both Treasury and corporate bonds are listed, was established recently following the acquisition and upgrading of the Bond Exchange of South Africa by the JSE. The specialized mechanics of trade at the board encourages bond trading efficiency and is managed independently of the equity trading platform; hence, it does not present any challenges.

Respondents also stated that local debt markets have been extensively used by government agencies to source for infrastructure funding. Furthermore, the dealers appointed to make a market for government bonds (including the bond issues of parastatals) interact at length with local banks and investment companies. There are a few setbacks, though. First is the legal framework: the PFMA does not include debt as a potential financing method; the MFA, on the other hand, allows debt financing, but many municipalities do not qualify for repayment plans implied by the magnitude of funding that they are likely to seek. Second, the use of project bonds as a financing mechanism may be unattractive to investors with a lower tolerance for risk, which is inherently high in the construction industry. Institutional bond investors, although happy to take on performance risk, generally are not prepared to take on any form of construction risk. Third, beyond 10 years, the Treasury bond yield curve is not so accurate and stable that it can be used as a pricing benchmark for infrastructure bond issues. This has two effects: potential bond investors are likely to require a higher return than is probably justified by the risk inherent in infrastructure bond issues to compensate for pricing uncertainty; and it

distorts forecasts for the effective demand for that class of bonds and, hence, discourages the public sector from issuing them.

Respondents said that, for several reasons, those financing avenues have not been fully explored. First, South Africa's private sector alone is not large enough to help cover the existing infrastructure funding gap at the rates of return typically earned on infrastructure investments. Private sector involvement is limited those entities whose return requirements are not high because of their restricted risk appetite. Those entities typically include large-scale investors, such as pension funds and state-owned investment companies, which are formed solely to drive economic development. Second, there is a lack of proper government policy and of expertise in structuring financing deals. Third, potential (foreign) bond investors perceive the country as an unattractive investment destination because of skills shortage, unreliable and expensive energy, and relatively high political risks.

Alternatives to capital-markets-based financing

The South African central government largely invests in infrastructure through the state-owned companies, which raise funds in a variety of ways, including budget allocations, bond financing, and long-term PPPs. The provincial governments have their own retail bond issues, along with their budget allocations from the national Treasury and other bespoke financing mechanisms. Further options being considered include corporate social investment trust, foreign grants, equity in the form of land, long-term lease of land, and private equity. The more mundane approaches include negotiating loans with development banks, such as AfDB, NEPAD, and Islamic Development Bank; supranational institutions, such as the World Bank; commercial banks; and quasi-public organizations, such as the European Union and the United States Agency for International Development.

Another alternative is public-private partnerships (PPPs), which are gaining preference by the public sector. But this option has its shortcomings: First, the private sector has little appetite for PPPs because of process delays and investors' low risk tolerance. Second, there are perceptions that government gets "ripped-off by the private sector" through PPPs; perceptions of lack of transparency and observance of public interest in the award of PPP tenders; and lack of good track records with previous PPP projects.

Again, the available alternative infrastructure financing sources have not been optimally used by the government for several reasons—among them, budget misallocations, restrictions imposed by PFMA and MFA, and private sector low risk tolerance. Furthermore, the institutional capacity among municipalities is too low to enable them take advantage of emerging funding sources.

Capacity to finance infrastructure through PPPs

All respondents believe that the private sector in South Africa is an important contributor to the country's GDP. The government provides support to the private sector in several ways, including tax subsidies for investors who invest in certain labor-intensive sectors, such as construction and manufacturing; tiered pricing of energy; and a "friendly" corporation tax policy that implicitly subsidizes trade and manufacturing. Furthermore, the government has set up the Export Credit Insurance Company to support South African companies expanding into markets across the border; established a grants initiative through the Department of Trade and Industry to aid research and product development of companies in certain pre-identified core sectors of the economy; and created the Coega Industrial Development Zone, an initiative that targets high-impact industry with various incentives.

South Africa's private sector is sizable, vibrant, and connected to cross-border business partners. Although bank financing is still more popular as a source of financing among South African corporates, the private sector employs a great deal of non-bank financing. The public debt market in South Africa is still dominated by Treasury bonds; at the end of 2013, the JSE had roughly 1,600 listed debt instruments, totaling more than ZAR 1.8 trillion (about USD 145 billion) outstanding in nominal terms, more than half of them placed by the South African government.²⁴ The private sector—particularly insurance firms and pension funds, which are unable to obtain assets of a maturity long enough to match the duration of their liabilities elsewhere in the capital market—is believed to have strong appetite for PPP projects.

The government has, therefore, drawn from private sector expertise in recent years to help provide public infrastructure. Examples abound: various public health projects (such as Albert Luthuli Hospital in Durban and Fairview Hospital in Free State); and several projects in the transport sector (such as Gautrain, all national road concessions run by South African National Roads Agency [SANRAL]) and in the energy sector (such as independent power producer programs and renewable energy projects). The government has also partnered as an equity provider in the subsidized housing project and guaranteed debt in the purchase of manufacturing equipment in Coega factories in Port Elizabeth.²⁵

Barriers to effective use of the PPP strategy

Although a lot has been achieved through public–private partnerships, respondents opine that the public sector has not optimally used the private sector to realize the country's infrastructure needs. Specifically, respondents identify the following key challenges:

- Municipalities that would benefit from PPPs have not clearly understood the process and are run by people without the requisite knowledge to implement it.
- The public sector is not enthusiastic about PPPs for several reasons: the elaborate roll-out procedure required; the less-than-impressive track record with PPP projects; and inefficiencies in delivering infrastructure projects, such as cost and time overruns.
- Treasury Regulation 16, the framework that governs the PPP process, is considered too complex and deemed by the private sector as seeking to regulate rather than promote PPPs.
- Although a clear PPP framework exists, there is no political will or commitment to extend the PPP program. Thus, although private sector has an appetite for PPPs, there is a shortage of project pipeline from which the private sector may choose.
- The public sector and South African citizens distrust the PPP process because they perceive that PPPs' benefits are tilted heavily in the private sector's favor and that the award of PPP tenders is corrupt.
- Inadequate knowledge and expertise exist about how best to structure financing deals within both the public and the private sector.
- PPPs require a high level of due diligence, which can be time consuming and costly. In that sense, such projects also attract relatively high required rates of return to compensate for any possible risk factors not foreseeable during due diligence.

Capacity to spend infrastructure development allocations

According to respondents, the Treasury timely releases funds allocated to development activities. But instances have occurred when allocated project monies were not spent by the concerned state departments and municipalities and were ceded to the Treasury at fiscal year-

²⁴ <https://www.jse.co.za/trade/debt-market> (accessed April 17, 2015).

²⁵ The housing project has been dubbed the Reconstruction and Development Program (RDP) housing scheme.

end. Respondents ascribed this to the lack of technical expertise in the smaller municipalities to use their Municipal Infrastructure Grant allocations; and to the bureaucracy that causes delays in decision making and, hence, delays in money use.

To address those challenges, the government has relied on consultants, who are often deployed to lend their technical expertise to municipalities and other departments to accelerate Municipal Infrastructure Grant expenditure absorption. Furthermore, the government, in conjunction with universities and other training institutions, has been running in-service courses that target municipal officials who are directly involved in project and infrastructure management.

Human resource capacity

Table 4.6 shows some deficiencies in staff competencies, which may inhibit efficient operations of the infrastructure function. For instance, available staff cannot simulate investors’ financial bids, which is necessary in private investor bid evaluation and, if not handled well, may cause delays and indecisiveness in the award of contracts. But some respondents also proposed that the private sector should perform some of those tasks. For instance, respondents suggested that private sector entities participating in a PPP bid should produce a set of funding and financing options that the relevant government departments should assess.

Table 4.6: Human resource capacity responses—South Africa

	Dominant response	Proportion of respondents	
1. Does the government have adequate staffing to handle infrastructure matters of each line ministry?	NO	4/4	1.00
2. Is the internal staff well trained in technical disciplines, such as policy, economics, and finance?	YES	4/4	1.00
3. Is the internal staff conversant with the various markets for infrastructure financing?	YES	4/4	1.00
4. Internal staff capabilities			
i) Are they able to forecast and use interest rates across international markets and to perform a clear and informed comparison of available infrastructure financing?	NO	3/4	0.75
ii) Does the internal staff have the ability to independently and conclusively conduct a feasibility study?	YES	4/4	1.00
iii) Can they satisfactorily conduct a baseline study for envisaged infrastructure development?	YES	4/4	1.00
iv) Do they have the ability to perform cash flow forecasts for projects in their jurisdiction within various macroeconomic scenarios?	YES	3/4	0.75
v) Arising from the preceding question (iv), do they therefore have the capacity to conduct a bankable study, complete with estimates of cash flows, for investors’ consideration?	YES	2/4	0.50
vi) Are they able to simulate financial bids and come up with cash bid estimates that reasonably represent actual bids?	NO	3/4	0.75
vii) Does staff have the capacity to process payments, analyze performance measures, and develop reports and trends?	YES	4/4	1.00

Notwithstanding suggestions of that nature, the government has instituted several procedures to address staff deficiencies. First, the government is making every effort to employ professional staff in relevant departments, such as its Infrastructure and Economics Unit of the Treasury, who can technically analyze and engage meaningfully with the private sector parties that want to get involved in the various forms of infrastructure financing. Second, the government is encouraging foreign entities that have expressed interest in infrastructure tenders to partner with local private sector investors, at the bidding stage, to qualify for the

award of tenders for large-scale infrastructure projects. That enables skills transfer, which allows the country to build capacity and skills to aid infrastructure development in the future through local expertise. The government hopes that such a policy would make sourcing private sector expertise cheaper and quicker in the future and enable the government to expedite the initial tender award process. Further, the government has teamed up with universities and other higher learning institutions to provide skills enhancement as a component of corporate social investment.

To ensure that these capacity enhancement initiatives are reflected in performance, staff performance monitoring and management strategies have been put in place. For example, the senior management staff of each state department are required to sign a performance contract with top management, which is evaluated for target achievement at the end of each quarter.

Information and communication technology preparedness

New processes are needed to make working with prospective infrastructure financiers easy, according to respondents. Such new processes include a simplified supply chain management system that can mitigate corrupt practices within the government and in the private sector; a simplified PPP Treasury Regulation 16 to speed up the process and delivery; an IT platform for handling tendering and management of private sector involvement; and a repository of bankable infrastructure projects that are readiness graded on an electronic platform accessible to national and international financiers. The respondents believe that additional IT capability would improve the infrastructure function's efficiency and effectiveness.

The staff in the ministries involved in infrastructure development is, however, conversant with the public-private partnership and process and project management techniques and software, according to the respondents. To ensure that capability, appropriate qualification and experience are required at the time of recruitment, including being registered with professional bodies in their line of expertise. This recruitment process has ensured that skilled IT personnel exist in government departments to develop the new systems and platforms. In the unlikely event that such skill is insufficient, specialists in universities and other public institutions may be called upon to assist. But because the ministries have, in some cases, not yet installed specific project management software, it is unclear whether personnel in those ministries have the knowledge to manage and run the financing aspects of infrastructure development (such as using software to aid in forecasting cash flows and computing internal rates of return). Respondents clarified that such specialized functions can always be outsourced, as internal capacity is built.

CHAPTER 5. A FRAMEWORK FOR CAPACITY ENHANCEMENT TO SUPPORT INFRASTRUCTURE FINANCING IN SUB-SAHARAN AFRICA

Chapter 4 outlined several capacity constraints suffered by three prominent capital markets in Africa in terms of infrastructure financing. The three markets differ on infrastructure financing barriers and on the measures that those countries have instituted to deal with those barriers. Drawing from lessons from the three countries, this chapter offers a four-prong framework for infrastructure financing capacity building for Sub-Saharan Africa.

Capacity enhancement strategy #1: Incentivize public debt markets development

Chapter 4's analysis suggests that effective infrastructure financing is closely intertwined with the development of a country's capital markets, especially the long-term debt market. Governments that want to locally finance their infrastructure projects should help develop the local capital markets.

Consider a government with no debt ceilings. The government can raise an unlimited amount of long-term debt to finance infrastructure projects from the domestic capital market. In any given period, t , assuming no outstanding infrastructure bond issues, assuming that bond issues are fully backed by government credit and are therefore riskless, and assuming no floatation costs, the initial required cost of financing is the investors' real required rate of return plus expected inflation, r . Because human capital (knowledge, skills, experience of project staff such as engineers) is inelastic in the short run, additional projects in a given period exert pressure on human resource capacity, reduce the efficiency with which they are managed and, potentially, reduce the return on invested capital. Thus, the marginal cost of public infrastructure financing increases with additional new bond issues, beyond some hypothetical breaking point, to reflect additional project risk. The new required cost of financing is thus:

$$r^d = r + \xi \quad (4)$$

where ξ is the additional premium arising from increased project risk (overstretched human resource capacity). But the cost of infrastructure financing from the domestic markets, in equation (4), is still lower than the cost of financing by issuing a bond in foreign markets.²⁶ That is because foreign bondholders will price several risk factors, including sovereign risk (from foreign investors' point of view, sovereign risk represents default risk, which increases with declines in a country's sovereign credit rating as more debt is used to support infrastructure projects) and foreign exchange risk,²⁷ which increases the cost of infrastructure financing to

$$r^f = r^d + \gamma_{fx}\beta_{fx} + \gamma_{sv}\beta_{sv} \quad (5)$$

where γ_{fx} and γ_{sv} are, respectively, foreign exchange risk and sovereign risk premia, and β_{fx} and β_{sv} are, respectively, the magnitudes of foreign exchange and sovereign risks borne. This simple analysis shows that issuing infrastructure bonds in the domestic capital market is more advantageous for the government than issuing them in the foreign markets. Because findings suggest that huge appetite exists for additional debt issues in all the security markets studied, African governments can effortlessly tap into their local debt markets for

²⁶ For instance, the use of Eurobonds to finance infrastructure projects has been popular with several countries in Africa (such as Ghana and Kenya), which have used them multiple times in recent years.

²⁷ Currency risk is not expected for Eurobonds, which are denominated in foreign currency, but should be positive for foreign bonds.

infrastructure financing. But the markets are not developed to meaningful levels in this manner. Governments therefore have the motivation—and the onus—to formulate policies and provide incentives that can spur the development of domestic public debt markets. The benefits of local public debt markets development will go beyond governments' immediate infrastructure financing needs. Indeed, firms will have a larger and potentially cheaper pool of financing that will lower their cost of capital, thus improving countries' economic output.

Securitization

African countries with fairly large capital markets can deepen them by creating or incentivizing the creation of additional securities. In some cases, capital market regulations exist that govern the issuance of asset-backed securities, but they are either ineffective or inadequate to incentivize the creation of such securities. African capital market regulatory bodies can, in liaison with their governments, go beyond just providing an avenue for securitization. We recommend that governments consider providing guarantees for securities originated by banks from their infrastructure financing portfolios.

Capacity enhancement strategy #2: Tap into private sector resources

Our first recommendation is predicated on the simplifying assumption that governments can issue debt instruments and use them to raise unlimited amounts of capital. In practice, high debt levels might be unsustainable if economic growth does not match the growth in public debt. Therefore, most countries have self-imposed public debt ceilings typically tied implicitly to the rate of GDP growth. In this context, continued use of the capital markets (as well as official development assistance from foreign governments and loans from multilateral funding agencies) might not be feasible because they might cause public debt to exceed sustainable levels. Thus, alternative infrastructure financing sources must be embraced.

A more sustainable approach is the public–private partnership financing mode. In the PPP structure, a private investor finances the infrastructure project, with the government partnering in various ways, which may include equity participation. Project cash flows are ring-fenced to satisfy the obligations to the private financier. But governments' ability to use the PPP alternative is also handicapped by several capacity constraints. African governments can address such constraints in several ways:

- Establish well-resourced and technically competent PPP Units that are autonomous or delinked from national Treasuries. That should result in streamlined PPP management processes, both at the bid solicitation stage and post-award/contract management phase.
- Develop in-house expertise (in project planning and management), as well as encourage pooling at the national level of transaction advisors, to provide guidance at all stages of the process and to create capacity to engage meaningfully with private sector participants.
- Shift away from the current emphasis of future revenue guarantees for PPP projects by the government to being an equity investor. This allows equitable risk sharing, which might appeal more to the private sector partners, as well as to end-users of infrastructure projects.
- Educate both the private sector and the public sector about the workings of PPPs. Similarly, governments must improve the levels of trust for PPPs by making the process transparent.
- Consider private financing of development and infrastructure through more robust and fairer fiscal and tax systems. This is in view of the conflicting findings of several

studies on the relationships between fiscal exemptions and tax subsidies granted to private sector, government revenue and FDI flows, and given the emerging evidence on the role of a stable and transparent business environment in attracting investments (see, for example, Halvorsen 1995; Zee, Stotsky, and Ley 2002), as well as the OECD (2013) initiative on base erosion and profit shifting.

Capacity enhancement strategy #3: Build public sector human resource capacity

To make local capital markets and PPPs work properly, qualified human resources need to drive the processes and provide expert advice to the parties involved. In particular, the public sector (government) needs in-house expertise to interact with the markets, as well as the private sector entities interested in investing in public infrastructure. Infrastructure capacity is lacking in various respects in the countries sampled. Specifically, Sub-Saharan governments should focus on the following:

- Training is essential. It can be achieved through short courses; regular in-service workshops; collaborations with training institutions, such as universities; apprenticeships under the technical staff currently hired from abroad or from the private sector; and seconding of staff to organizations that typically deal with infrastructure issues, such as development banks. Conducting regular assessment of training needs is also important.
- Staff development does not have to be provided for each line ministry lest countries end up with expensive overcapacity relative to their GDP. Special infrastructure ministries or departments could be created, if not yet in existence, or they could be better empowered by having the desired staffing capacity to provide advisory services to line ministries.
- To ensure that capacity enhancement initiatives, such as training, are reflected in performance, staff performance monitoring and management strategies should exist.

Capacity enhancement strategy #4: Equip ministries with computerized systems

The efficiency and effectiveness of human resources can be improved, or at least augmented, by adopting modern technology and artificial intelligence systems. Many governments recognize the need to provide computerized platforms for their operations and have indeed embraced modern information technology. Computerized platforms are required, with necessary legislative reforms, to enhance efficiency in procurement and project management. In some cases, governments have installed specific financial management software, but it is unclear whether personnel in those ministries have adequate knowledge to manage the infrastructure's financing function. The governments can, in the short term, outsource qualified personnel to run such systems as they build internal capacity for the long run.

CHAPTER 6. SUMMARY AND CONCLUSIONS

This study has examined capacity issues for infrastructure development and financing in Sub-Saharan Africa. It started with a document analysis, in which the state of infrastructure and the state of infrastructure financing were collated from several disparate reports and papers. Financing needs for Africa's infrastructure are colossal, and not much has been done recently to reduce the funding gap. Energy infrastructure seems to be the most in need, the region having produced only about 1.9 percent of the world's total electricity output. The spending need was estimated at about \$41 billion annually between 2005 and 2015, which included about \$14 billion for maintenance and operations. The transport sector comes close behind the energy sector in financing need, requiring about \$18 billion a year in new investment, half of which is for maintenance. The water and sanitation requirement appears to be higher than that for transport, at about \$20 billion. But those costs can be lowered through lower-cost technologies—such as standposts and boreholes—and reduction of waste to about \$11 billion. Sub-Saharan Africa is reportedly performing much better in the telecommunications sector than in any other infrastructure sector, with mobile phone networks, for example, having reached up to 80 percent of the population. Yet the region still has the lowest performance among the world's developing regions, with a shortfall in financing estimated at \$9 billion per year.

We also investigated the effect of infrastructure development on Sub-Saharan Africa's economic growth by applying principal components analysis on three key variables representing telecommunications, power, and transport to developed indices of infrastructure stock and infrastructure quality. Using those indices and a set of control variables, we estimated an augmented growth model using the System GMM approach. Our results show that infrastructure quality explains economic growth, whereas infrastructure stock does not. We interpret that result to imply that good infrastructure quality augments productivity and output by raising the rate of return on private capital. We recommend that governments not only emphasize the provision of infrastructure bulk but provision of infrastructure to the standard that can incentivize production by lowering the cost of capital.

Finally, we did case studies of three Sub-Saharan countries—Kenya, Mauritius, and South Africa—chosen based on their levels of capital market development. The purpose was to establish the capacity issues that may hamper the sourcing of infrastructure finance for various public projects. The survey covered several areas of capacity, including the capital markets, human resource, infrastructure spending, and information and communication technology. Our findings vary for the three countries, with South Africa coming out as relatively better poised to use its capital markets to finance the country's infrastructure activities, and with better qualified and experienced human resources in the ministries that deal with infrastructure financing and the national Treasury. But some of South Africa's regulations governing the PPP process were said to be too complex and needed a review. Also, there is need to sensitize the public on the PPP process and to disabuse the public's perception that the process is riddled with corrupt procurement practices and that PPPs are beneficial to the private partners at the public's expense.

Kenya is well organized as far as PPPs are concerned, having passed legislation governing the process in 2013 and subsequently establishing a separate PPP Unit under the national Treasury. The Unit, however, has not successfully closed a PPP project, although several such projects

have been initiated; delays in project closing have been attributed to the heavy bureaucratic process. The country's capital markets, although relatively well developed, do not seem ready to provide sufficient financing to satisfy public infrastructure needs. For instance, no clear policy exists for how the government can use the capital markets for such needs. Similarly, Kenya has a shortage of competent transaction advisors who can structure financing in a way that meets issuers' needs, and the few advisors that are available are said to be too expensive. Also, public officers need training to interact effectively with private sector financiers, as well as to simulate and evaluate tenders. Although the Kenyan government has implemented a financial management system, it needs to adopt modern computerized procurement and project management systems to make the process more efficient.

Mauritius perhaps most closely reflects the Sub-Saharan African infrastructure financing capacity constraints. The country's capital market is small, with only 43 listed stocks, only six (one foreign) listed corporate bonds, and a market capitalization of about \$7 billion at the end of 2014. Although the market is equipped with modern communications infrastructure, the bond market is thin and has no active secondary market; hence, it cannot support the issuance of a "massive" instrument listing to raise infrastructure finance. Furthermore, there are fears that sourcing large amounts of infrastructure financing in the local capital market would crowd out the private sector and starve it of the sorely needed investment funds.

Within its PPP framework, Mauritius has not been able to partner with the private sector on any project; the two projects that were recently floated under the PPP framework could not muster sufficient private sector interest and were consequently shelved. Several infrastructure spending bottlenecks have occasionally forced ministries to cede allocated funds to the national Treasury at the end of each year; however, such funds can be reallocated to the project in the next spending year. Mauritius also seems to be seriously lacking in human resource capacity, with ministerial staff said not to possess several critical skills that can enable the smooth functioning of their infrastructure dockets. The country is only now computerizing its platforms for capital budgeting, project management, and procurement procedures.

Given the identified capacity shortcomings for each country, we make several country-specific recommendations that may enable the governments to improve the infrastructure financing function. An important capacity constraint identified by respondents is skill shortage in deal structuring in all countries in the case study. The following policy recommendations are pertinent:

- African governments should consider joining forces to provide training for the development of such skill, which can be employed on a shared basis, to complement expensive expertise from outside the continent.
- Based on our findings regarding infrastructure-growth nexus, governments should ensure that the provisioning of public economic infrastructure emphasizes quality if it is going to effectively affect the economic growth targets that could propel the region into middle-income status.
- Sub-Saharan countries should build infrastructure financing capacity through a deliberate endeavor to create strong and autonomous infrastructure agencies, which can repel political interference and make the PPP process more transparent. This will enable countries to deal with citizens' current distrust of private sector involvement in infrastructure development.

These recommendations have several limitations. First, the choice of three infrastructure sectors used in the quantitative analysis in chapter 3 was guided by belief in the growth

literature that those sectors provide the greatest contribution to economic development. A more broad-based index could probably yield better results. In this context, although this paper focuses on physical infrastructure, incorporating social infrastructure—especially health and education—would make the results broader and more policy informative. Subsequent studies should endeavor to fill that need. Second, chapter 4’s three-country survey was designed to showcase some of the region’s better performers and draw lessons that can inform the region’s policy formulation. A larger sample of countries would enrich our findings. Furthermore, although we more or less achieved information saturation in each country, with incremental respondents confirming or merely repeating information provided by earlier respondents, one might argue that each country’s number of respondents was small and that some information might have been left out that could make our case study findings more compelling. That is especially true for the more diversified South African economy.

APPENDIX: INTERVIEW QUESTIONNAIRES

Section I: Capital markets and alternative financing sources

PLEASE TICK ONE OPTION FOR MULTIPLE CHOICE RESPONSE QUESTIONS

1.	Is there a well-developed public capital market in the country that can enable the government (central and local) to issue debt securities to finance infrastructure needs?	YES	SOME ACTIVITY	NO
2.	Has the public debt market for federal/national, state or county and municipal debt issues been formalized in the country?	YES	IN PROCESS	NO
3.	Has the formalized public debt market been extended to issuances by private issuers (companies and institutions)?	YES	IN PROCESS	NO
4.	Are issuances of debt by public and private entities considered important asset classes for investment purposes by investors in the country?	YES	NOT SURE	NO
5.	Is the debt market trading in the same platform as the national stock exchange?		YES	NO
If your answer above is YES, what are the challenges arising from this lack of separation, if any?				
6.	If debt and stock are traded in the same platform (exchange), is the exchange well known and engaged in reasonably regular trading activity?		YES	NO
7.	Is the exchange considered modern and feted with sufficient ICT infrastructure?		YES	NO
8.	If the answer to Question 7 above is NO, what factors hinder the full use of local debt markets?			
9.	How is the government addressing the inadequate use of local debt markets capacity?			
10.	How much can the government realize, per issue, from the domestic debt markets, including banks?	ESTIMATE IN USD		
11.	If the amount (in your answer to Question 10) is not adequate to fund all of the public sector's annual infrastructure needs, what other sources are available for infrastructure financing?			
12.	To what extent has the government used the sources (in Question 11) in the past (PERCENTAGE—e.g., 100 percent if the required infrastructure funding)?	5 years?	10 years?	
13.	Have those sources enabled the government to <i>fully bridge</i> the infrastructure financing gap?	YES	NO	
14.	If the answer to Question 13 is NO, what factors hinder the full use of those alternative sources?			
	How is the government addressing those issues/factors?			
	Are the methods the government is using to address those issues appropriate, in your view? Why or why not?			

Section II: Public-private partnerships (PPPs)

1.	Is the private sector, in your view, an important/significant contributor to the country's GDP? Why or why not?	YES	NO
2.	Is the private sector seen to be supported by the government (e.g., by way of fair taxation, subsidies, collaboration in production and provisioning of a business-enabling environment)?	YES	NO
In which of the above ways (or other) is the government supporting private enterprise, if any? (LIST)			
3.	Is the private sector sizable, vibrant, and connected to cross-border business partners?	YES	NO
4.	Is the private sector known or seen to use substantial non-bank external finance sources for its production activities?	YES	NO
5.	Has the government partnered with the private sector to realize the country's infrastructure needs?	YES	NO
6.	Exactly how is the government partnering with the private sector? (PLEASE LIST some kinds of PPPs currently in place)		
7.	Has the public sector (local and central government) optimally used the private sector to realize development objectives in the infrastructure financing context?	YES	NO
8.	If the answer to Question 7 is NO, what are the challenges/barriers that have hindered optimal utilization of PPPs in the financing and development of infrastructure in this country? (Barriers can include legislation, coordinating agencies, procurement policies, project planning, etc.) Please explain your responses.		
9.	How, in your view, might the barriers/challenges that you have highlighted be addressed?		
10.	Does the government have adequate capacity to run several PPP projects at a time?	YES	NO
If YES, how many projects can the government manage at a time? If NO, what are the reasons?			
11.	Does the government have the capacity to provide revenue guarantees typically required by the private sector financiers before agreeing to finance a project?	YES	NO
12.	If your answer to Question 11 is NO, what factors inform the government's ability to raise such guarantees? What, in your view, is the government doing to address those factors?		

Section III: Spending of infrastructure development allocations

1.	How long does it take, on average, for the Treasury to clear/authorize money for use by line ministries and departments? months	
2.	What issues are involved in the clearance of money for use from the Treasury by line ministries? (PLEASE LIST)		
3.	Have there been situations in the recent past when allocated project money was not spent and got repossessed by the Treasury or reallocated to the next spending year?	YES	NO
4.	What causes the lack of spending of money allocated for infrastructure development?		
5.	How do you intend to deal with those causes of lack of infrastructure spending?		
6.	Arising from the issues in Questions 1-5, does the country have the capacity to absorb large amounts of money for infrastructure projects, especially in the form of debt or grants from international financial markets/sources?	YES	NO
7.	If the answer to Question 6 is NO, what suggestions would you make to help improve the capacity to receive and use such funds?		

Section IV: Human resources

1.	Does the government have adequate staffing to handle infrastructure matters of each line ministry?	YES	NO
2.	Is the internal staff well trained in technical disciplines, such as policy, economics, and finance?	YES	NO
3.	Is the internal staff conversant with the various markets for infrastructure financing?	YES	NO
4.	Internal staff capabilities		
i)	Are they able to forecast and use interest rates across international markets and to perform a clear and informed comparison of available infrastructure financing?	YES	NO
ii)	Does the internal staff have the ability to independently and conclusively conduct a feasibility study?	YES	NO
iii)	Can they satisfactorily conduct a baseline study for envisaged infrastructure development?	YES	NO
iv)	Do they have the ability to perform cash flow forecasts for projects in their jurisdiction under various macroeconomic scenarios?	YES	NO
v)	Arising from Question (iv), do they therefore have the capacity to conduct a bankable study, complete with estimates of cash flows, for investors' consideration?	YES	NO
vi)	Are they able to simulate financial bids and come up with cash bid estimates that reasonably represent actual bids?	YES	NO
vii)	Does the staff have the capacity to process payments, analyze performance measures, and develop reports and trends?	YES	NO
5.	If any of the answers to Question 4 is NO, is there need to develop staff in ways that enhance their abilities? (Please provide a response to each question with a NO answer in 4.)		
6.	What, in particular, do you think should be done to develop internal staff capabilities? (Please provide a response to each question with a NO answer in 4.)		
7.	What specific steps have been taken to develop internal staff capabilities? (Please provide a response to each question with a NO answer in 4.)		
8.	How do you monitor whether capacity issues already addressed (say, by training staff) are being reflected in staff performance?		
9.	What remedies do you have in place to ensure that any variances (between expected performance after capacity enhancement and actual performance) are addressed?		

Section V: Processes and information technology

1.	Is there need to implement new processes (information technology, procurement, etc.) to make it easy to work with prospective financiers?	YES	NO
2.	If the answer to Question 1 above is YES, which new processes need to be implemented?		
3.	Do you need to use different systems or change structures or working relationships to work with the new processes?	YES	NO
4.	If your answer to Question 3 is YES, explain the nature of changes required.		
5.	To what extent is the staff conversant with the workings of public–private partnership arrangements and project management? PLEASE EXPLAIN YOUR RESPONSE.		
6.	Do you need to develop new information technology systems or platforms to support the analysis and smooth running of infrastructure financing–related functions?	YES	NO
7.	If the answer to Question 6 is YES, what particular systems are being envisaged? In which specific ways are these systems going to support the infrastructure financing functions?		
8.	In the absence of the systems and platforms alluded to in Question 6, how is the infrastructure financing function affected, if at all?		
9.	Do you have adequate information technology personnel to develop the new systems and platforms alluded to in Question 6?	YES	NO
10.	If the answer to Question 9 is NO, in which specific way(s) is that shortage affecting the management of the infrastructure financing functions and related services?		
11.	Do state departments dealing with infrastructure financing issues have adequate personnel who can use, troubleshoot, and update the new systems?	YES	NO
	Do state departments dealing with infrastructure financing issues have adequate personnel who can support (e.g., by way of training) new users of the new systems?	YES	NO
12.	Does the staff involved have adequate training in the use of software to manage/run the financing aspects of infrastructure development (e.g., software to aid in forecasting cash flows, computing IRRs)?	YES	NO
13.	Do all departments involved in infrastructure financing have in-house computer hardware and software experts to manage system crashes, troubleshooting, and other emergencies?	YES	NO
14.	If your answer to Question 13 is NO, how is the lack of expertise being addressed?		
15.	Do departmental staff have the ability to run procurement and administrative processes effectively?	YES	NO
16.	If the answer to Question 15 is NO, what constraints do they face in those roles? Are those constraints being addressed? How?		

Section VI: General

Please provide any additional information that you think might be useful to the government and/or the private sector in ensuring that public–private partnerships in infrastructure projects work well.

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