



INTERNATIONAL MONETARY FUND

June 2015

MAKING PUBLIC INVESTMENT MORE EFFICIENT

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- The **Staff Report** prepared by IMF staff and completed on June 11, 2015.

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MAKING PUBLIC INVESTMENT MORE EFFICIENT

EXECUTIVE SUMMARY

Public investment supports the delivery of key public services, connects citizens and firms to economic opportunities, and can serve as an important catalyst for economic growth. After three decades of decline, public investment has begun to recover as a share of GDP in emerging markets (EMs) and low income developing countries (LIDCs), but remains at historic lows in advanced economies (AEs). The increase in public investment in EMs and LIDCs has led to some convergence between richer and poorer countries in the quality of and access to social infrastructure (e.g., schools and hospitals), and, to a lesser extent, economic infrastructure (e.g., roads and electricity).

However, the economic and social impact of public investment critically depends on its efficiency. Comparing the value of public capital (input) and measures of infrastructure coverage and quality (output) across countries reveals average inefficiencies in public investment processes of around 30 percent. The economic dividends from closing this efficiency gap are substantial: the most efficient public investors get twice the growth "bang" for their public investment "buck" than the least efficient.

Improvements in public investment management (PIM) could significantly enhance the efficiency and productivity of public investment. Based on a sample of 25 countries, the IMF's new Public Investment Management Assessment (PIMA) finds significant scope to strengthen the 15 key institutions which shape the planning, allocation, and implementation of public investments. Countries with stronger PIM institutions have more predictable, credible, efficient, and productive investments. Strengthening these institutions could close up to two-thirds of the public investment efficiency gap.

Priorities for strengthening PIM institutions vary across country groups. AEs should ensure that their fiscal and budgetary frameworks provide stable and sustainable bases for investment planning across levels of government. EMs should adopt more rigorous and transparent arrangements for the appraisal, selection, and approval of investment projects. LIDCs should focus on strengthening the institutions related to the funding, management, and monitoring of project implementation. All countries would benefit from stricter oversight of public-private partnerships (PPPs) and better integration between national strategic planning with capital budgeting.

The Fund has a key role to play in helping countries to become more efficient public investors. In this context, the Fund plans to develop the PIMA into a comprehensive assessment of PIM practices, and launch a new PPP Fiscal Risk Assessment Model (P-FRAM) to complement its various other fiscal assessment tools.

June 11, 2015

Approved By
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GLOSSARY

AE	Advanced Economies
COFOG	Classification of the Functions of Government
DEA	Data Envelopment Analysis
EM	Emerging Markets
FTE	Fiscal Transparency Evaluation
GG	General Government
ICOR	Incremental Capital to Output Ratio
ICRG	International Country Risk Guide
IIWG	Infrastructure and Investment Working Group
LIDC	Low Income Developing Countries
MTBF	Medium-Term Budget Framework
PEFA	Public Expenditure and Financial Accountability
P-FRAM	Public Fiscal Risk Assessment Model
PI	Public Investment
PIE-X	Public Investment Efficiency Indicator
PIM	Public Investment Management
PIMA	Public Investment Management Assessment
PPP	Public-Private Partnership
PWT	Penn World Tables
SOE	State-Owned Enterprises
TA	Technical Assistance
WEF	World Economic Forum

I. INTRODUCTION

1. Public investment can be an important catalyst for economic growth. Both theoretical and empirical studies have underscored the positive relationship between high-quality public infrastructure and economy-wide productivity (e.g., Buffie and others, 2012; Ghazanchyan and Stotsky 2013). Against the background of a steady decline in public investment as a share of GDP in advanced economies, evidence of infrastructure bottlenecks in emerging and developing economies, and the sluggish global economic recovery, many have called for ramping up public investment to raise long-run economic growth (IMFC 2014e; G20 2014). The Fund's October 2014 *World Economic Outlook* (IMF 2014c) underscored the contribution of public investment to growth and called for a surge in infrastructure investment to help further global recovery.

2. What determines public investment efficiency and productivity, i.e., the impact on public infrastructure quality and economic growth? Despite widespread anecdotal evidence of projects plagued by time delays, cost overruns, and inadequate maintenance, there are few robust empirical studies of the determinants of public investment efficiency. An exception is Warner (2014), who examined five episodes of public investment surges and found limited impact on long-run growth, due, in part, to weak or circumvented project appraisal, selection, and management procedures. Similarly, in a study of 52 LDCs, Gupta and others (2014), found the strength of public investment management to be a significant factor in the relationship between public investment and growth. Also, based on a survey of their experts, McKinsey (2013) identified US\$1 trillion in potential efficiency gains from improvements in PIM around the globe.

3. This paper finds that better PIM enhances public infrastructure quality and economic growth, and pinpoints key institutional reforms needs to boost public investment efficiency and productivity. In doing so, the paper links recent macroeconomic studies regarding the connection between public investment and growth (e.g., IMF 2014c) and microeconomic analysis of the relationship between PIM practices and project-level performance (e.g., Flyvbjerg 2009; and Rajaram and others, 2014). This paper's findings and recommendations are based on a new comprehensive data set on trends in public investment, infrastructure quality, productivity, and growth, and two analytical innovations: (i) a new cross-country Public Investment Efficiency Index (PIE-X); and (iii) a new Public Investment Management Assessment (PIMA) which is applied to countries across a range of income levels.

4. The paper is structured as follows. Section II examines trends in and relationships between public investment, infrastructure quality, and economic growth, and estimates public investment efficiency across 134 countries. Section III presents the new PIMA and uses it to evaluate the strength of PIM institutions in a sample of 25 countries. Section IV explores the relationship between the PIMA estimates regarding institutional strength and various measures of public investment efficiency, productivity, and performance. Section V identifies priorities for enhancing public investment management and performance across countries, and explores the Fund's role in supporting these reforms in collaboration with other multilateral institutions.

II. PUBLIC INVESTMENT AND INFRASTRUCTURE QUALITY

5. This section reviews cross-country trends in and relationships between public investment, infrastructure quality, and economic growth. In doing so, it:

- Explores trends in public investment and the changing roles of the public and private sectors in the provision of infrastructure, and finds that the value of the public capital stock has only recently begun to recover from decades of decline relative to output;
- Analyzes the impact of public investment on the size and quality of public infrastructure, using a new index measuring the efficiency of public investment, and finds that around 30 percent of the potential gains from public investment are lost due to inefficiencies in public investment processes; and
- Examines the relationship between public investment efficiency and long-run growth, and finds that the most efficient public investors get twice the economic return from their investment than the least efficient.

Box 1 provides definitions of the key terms used in this section and the rest of the paper.

A. Trends in Public Investment and Capital Stock

6. Following three decades of steady decline, public investment as a share of GDP has begun to recover in some parts of the world. In advanced economies (AEs), average public investment has steadily decreased from a high of just under 5 percent of GDP in the late 1960s to a historic low of just over 3 percent of GDP in 2012. In contrast, in emerging markets (EMs) and low-income developing countries (LIDCs), public investment rates peaked at over 8 percent of GDP in the late 1970s/early 1980s, declined to around 4-5 percent of GDP in the mid-2000s, but have since recovered to 6-7 percent of GDP. Hence, public investment rates in AEs remain at historic lows, but have partially recovered in EMs and LIDCs over the last decade.

7. While the real value of the accumulated public capital stock has risen steadily on a per capita basis across countries, it has generally lagged behind economic output. Since 1960, the real value of the public capital stock has nearly tripled on a per capita basis across all countries. However, the public capital stock has failed to keep pace with rising output in AEs throughout this period. After a significant recovery of public capital stocks in the 1980s and 1990s, EMs and LIDCs saw reductions in their public capital/output ratios over the past decades, which have only just begun to reverse in the past few years (Figure 1).

Box 1. Definition of Public Investment Efficiency, Productivity, and Performance**Public Investment Performance**

Public Investment. Public investment is measured as general government gross fixed capital formation (GFCF) and comprises the total net value of general government acquisitions of fixed assets during the accounting period, plus variations in the valuation of nonproduced assets (e.g., subsoil assets). The general government comprises central and subnational governments, but excludes other public entities, such as state-owned enterprises (SOEs) and public-private partnership (PPP) arrangements.

Public Capital Stock. The public capital stock is the accumulated value of public investment over time, adjusted for depreciation (which varies by income group and over time), and is the principal input into the production of public infrastructure.^{1/}

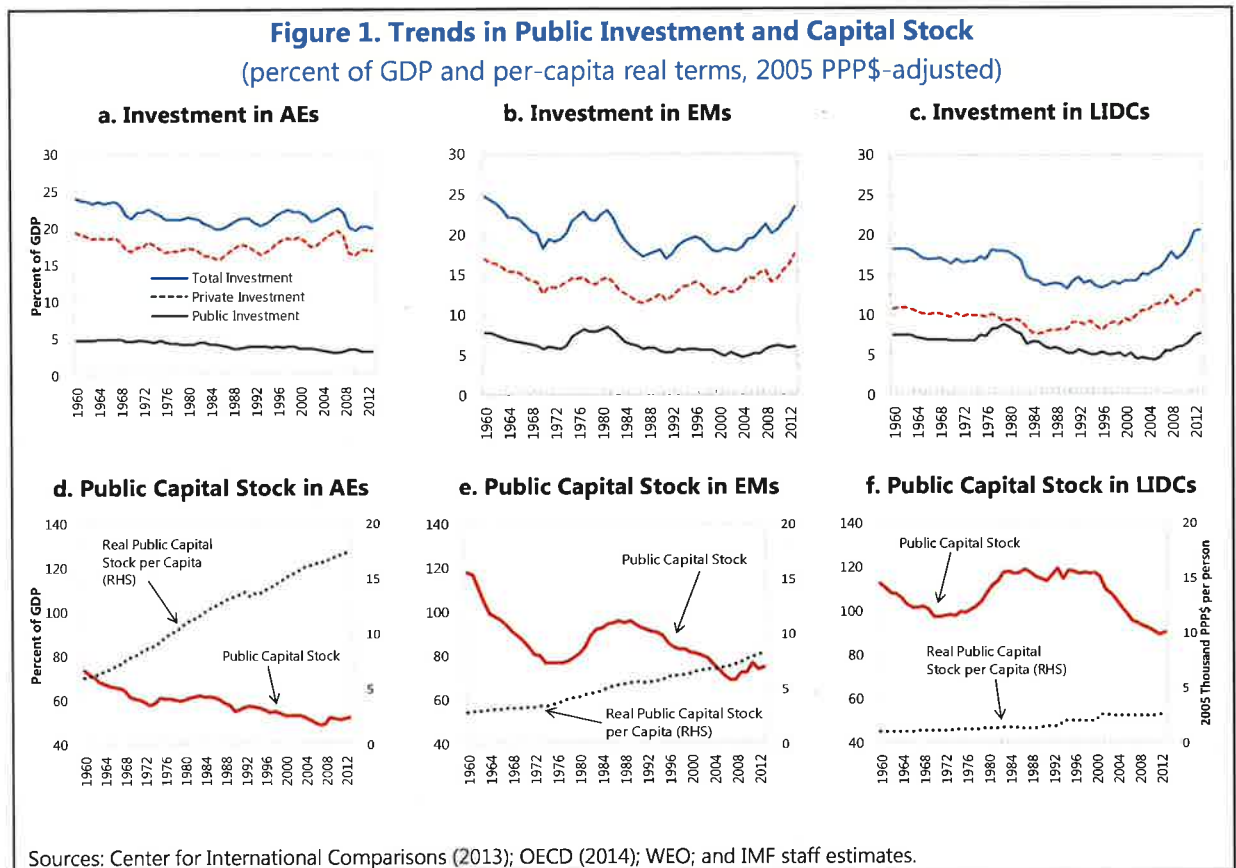
Public Infrastructure. Public infrastructure is the network of physical assets created by public investment. These fixed assets include both *economic* infrastructure (e.g., highways, airports, roads, railways, water and sewer systems, public electric and gas utilities, pipelines, and telecommunications) and *social* infrastructure (e.g., public schools, hospitals, and prisons). The volume of infrastructure is measured using indicators of both access to and quality of the key infrastructure assets, including roads, electricity, water, education, and health care institutions.

Public Investment Efficiency. The efficiency of public investment is the relationship between the value of the public capital stock and the measured coverage and quality of infrastructure assets. As described in Section II and Annex II, the level of efficiency in a given country is calculated as the distance from an efficiency frontier, which is defined by the countries with the highest coverage and quality of infrastructure (output) for a given level of public capital stock (input).

Public Investment Productivity. Public investment productivity is the relationship between investment and economic growth measured by the ratio of average real rate of capital stock growth to the average real rate of economic growth.

Public Investment Performance. Public investment performance refers to both the efficiency and productivity of public investment.

1/ The paper estimates the public capital stock using the perpetual inventory method—drawing from the methodology employed by Kamps (2006) and Gupta and others (2014). See Annex I for the detailed methodology.



8. While the public sector continues to dominate the provision of economic infrastructure in EMs and LIDCs, the private sector plays an increasingly important role in AEs. As discussed in Box 2, over the past half century, innovations in technology and financing arrangements, along with a reassessment of the role of the state, have enabled the commercialization of a growing array of infrastructure networks. In many AEs, the private sector has largely displaced governments in providing economic infrastructures, such as communications, energy, transport, and water supply networks. The privatization of infrastructure provision is most pronounced in AEs like the United Kingdom, where private companies account for almost two-thirds of investment in these sectors. By contrast, in EMs and LIDCs, these networks remain largely in public hands. In India, for example, the private sector accounts for less than a third of infrastructure investment (Figure 2). In addition, the public sector is still the main provider of social infrastructure. In education, the public sector accounts for more than half of total investment in both AEs and EMs; while for health, it ranges from about a third of investment in selected EMs, to about two-thirds in AEs, with a significant dispersion across countries.

Box 2. Public and Private Roles in the Provision of Infrastructure

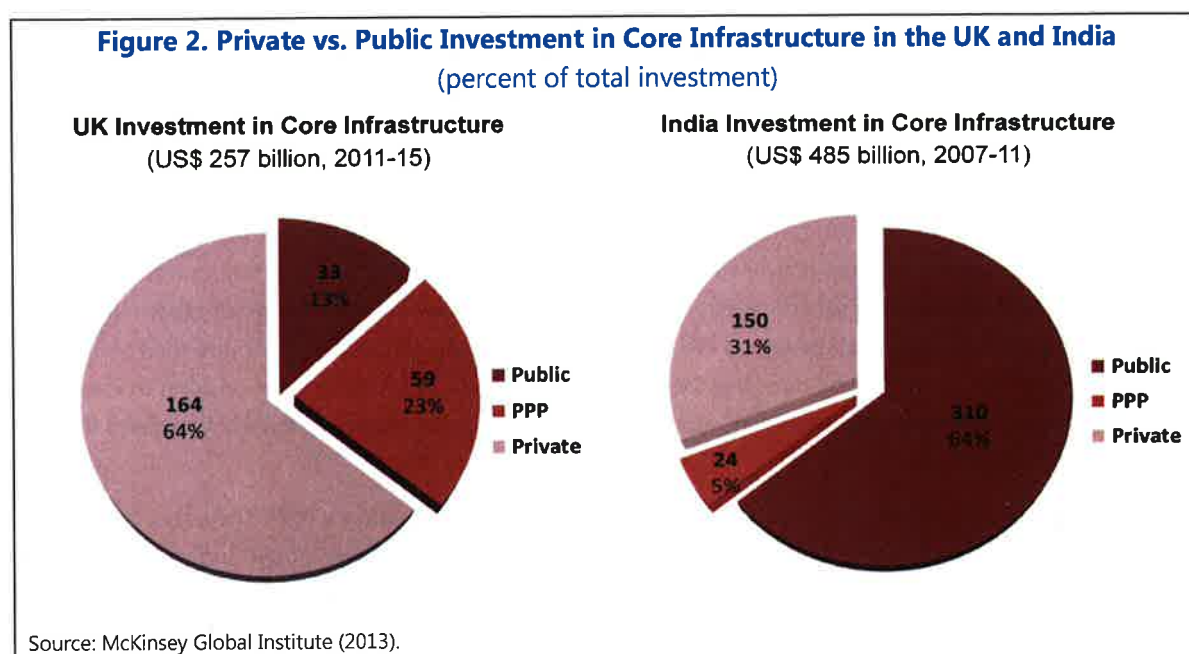
The traditional rationale for the public provision of infrastructure is based on the concepts of public goods and market failures. Markets will fail to provide the socially beneficial level of a public good because it is nonrival (it can be consumed by many at the same time without being exhausted, e.g., a road) and nonexcludable (it is not possible to prevent those who do not pay from using it, e.g., national defense).^{1/} Potential underprovision of infrastructure also arises where services exhibit network effects (e.g., subway systems), positive externalities (e.g., clean water), or natural monopoly characteristics (e.g., electricity transmission). These characteristics give a private provider the ability and incentive to raise prices and/or restrict output below socially desirable levels and provide a rationale for public provision. Governments may also intervene to address social or equity considerations, such as providing universal access (e.g., basic education) or ensuring that vulnerable groups have access to services (e.g., transportation).

Technological innovations have better enabled the commercialization of a number of infrastructure networks, which were previously mostly the preserve of the public sector. Market segments formerly characterized by monopoly provision have changed due to growth in the size of the market and competition introduced by new technologies (e.g., electricity generation, mobile phones). In addition, more sophisticated instruments have been developed to regulate tax, or subsidize activities which generate externalities directly (e.g., pollution taxes, noise ordinances, electronic tolling on roads, and airport landing fees), enabling service provision and infrastructure investment decisions to be left largely to the private sector within an overarching policy or regulatory framework (e.g., telecommunication, electricity, airports, ports).

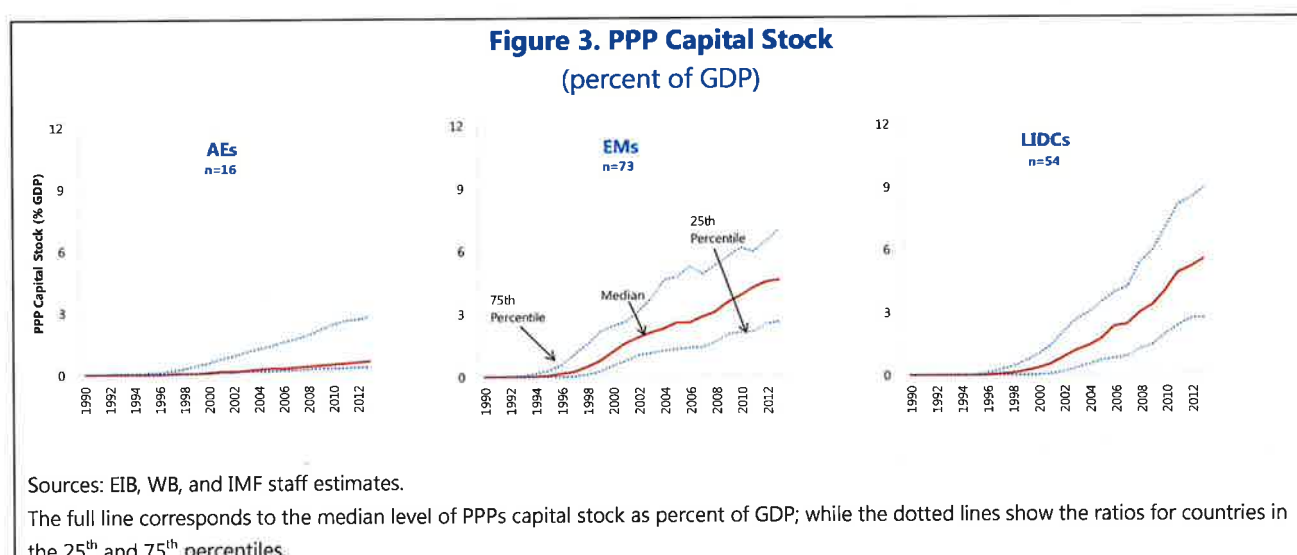
In recent decades, concerns about the public sector's efficiency in providing infrastructure have also encouraged greater private sector provision. Government intervention can generate inefficiencies due to the absence of market signals and commercial discipline. Thus, the case for government intervention due to market failure has to be balanced against risks of "government failure." Therefore, even if market failure occurs, private sector provision may be justified if governments cannot operate efficiently—that is, when governments incur excessive costs relative to expected benefits.

Nonetheless, the public sector still dominates the provision of social infrastructure because of equity considerations (e.g., universal access, social mobility). Similarly, despite technological advances, governments also remain the main providers of large and complex infrastructure projects, such as national railways and urban transport networks, mainly due to market conditions (e.g., pure monopolies) and private sector difficulties in financing big infrastructure projects (e.g., large fixed costs).

^{1/} Most publicly supplied services are mixed or "impure" public goods such as roads—consumption is rivalrous during congested periods, while exclusion may be difficult.



9. In the last decade, a growing proportion of infrastructure services has been delivered through PPPs, though with significant differences across countries (Figure 3). In AEs, the PPP capital stock averaged around 1 percent of GDP in 2013 (or less than 5 percent of the public capital stock). In EMs and LIDCs, PPP capital stock has increased more rapidly to around 5 percent of GDP on average, and up to 9 percent of GDP in some countries. The sharp increase is of particular concern in LIDCs, where PPP frameworks remain weak, potentially exposing public finances to significant risks, and having significant implications for the efficiency of public investment spending (Box 3).



Box 3. Role of Public-Private Partnerships in Public Infrastructure Provision

When used effectively, PPPs can deliver substantial savings relative to purely public provision of goods and services. Under a typical PPP, a firm provides upfront financing, and designs, builds, operates, and maintains an asset in exchange for a combination of user fees and/or periodic payments by the government over the life of the contract. PPPs can offer significant advantages over traditional public procurement in terms of mobilizing private financial resources and know-how, promoting the efficient use of public funds, and improving service quality. Although private financing is typically more expensive than government borrowing, a well-designed PPP contract can generate efficiencies that more than offset the higher cost of private capital by bundling the design, construction, and operation of an asset to incentivize the efficient, timely construction of high-quality assets, and the maintenance of and cost recovery from those assets over time.

However, not all investment projects can be effectively delivered using a PPP. The benefits of PPPs mainly arise from the government's ability to allocate risks efficiently between public and private parties to ensure the right incentives and reduce overall project costs. To do so, the outputs and the quality of services must be predictable and measurable for the duration of the project. PPPs in the IT or health sectors can be difficult, as the technological change is simply too rapid in relation to the typical length of a PPP contract. PPPs also require strong legal, policy, appraisal, approval, and monitoring arrangements to negotiate contracts and ensure that private partners meet their obligations.

Evidence of whether PPPs can provide infrastructure more efficiently than traditional public procurement is mixed. As discussed in Schwartz and others (2008) and Engel and others (2014), the benefits of PPPs vary significantly across projects and countries. For example, in Australia, the rolling stock rail infrastructure project was procured as a PPP, with cost savings of around 30 percent relative to the public-sector comparator. Similarly, five PPP water projects in Singapore resulted in a lower-than-expected bid price, partly due to design innovations and the use of improved technology. However, in many countries, projects have been procured as PPPs not for efficiency reasons, but to circumvent budgetary constraints and delay the recording of the fiscal costs of providing infrastructure services. This has led some governments to proceed with low-quality and fiscally costly projects that would otherwise have been excluded from their public investment plans. In some cases, PPPs have also resulted in large fiscal costs due to poor contract designs, optimistic assumptions about revenues from user fees, and minimum income guarantees provided by the governments. For example, during the 2008 global financial crisis, Portugal was forced to renegotiate its road PPPs when the calling of revenue guarantees by private partners threatened its fiscal position. The complexities and interdependencies between large infrastructure projects can also make them poorly suited to PPPs. In Scotland, the Skye Bridge PPP project faced significantly reduced demand due to lack of coordination with other crossings, which resulted in the government buying back the whole project from the private partner.

The Fund can play a role in helping countries manage PPPs. FAD is developing a PPP Fiscal Risk Assessment Model (P-FRAM), an analytical tool for systematically assessing the potential costs and risks arising from PPP projects (see Annex V).

10. Within the public sector, subnational governments and public corporations are major contributors to public investment. This is particularly true in AEs and large EMs, where regional and local governments undertake more than half of public investment.¹ Investment is more centralized in LIDCs where the central government still accounts for the bulk of general government capital expenditure. Public corporations (government-owned or controlled companies), also account for a large share of total public sector investment in some AEs and in many EMs and LIDCs (Table 1).²

Table 1. Composition of Public Sector Investment, 2013
(percent of GDP)

Institutions	Australia	Denmark	France	Peru	Mexico	Senegal	UK
Central government	0.5	0.9	1.3	2.3	3.4	1.6	1.7
Local government	2.6	1.4	2.8	3.9	0.8	n.a.	0.9
Public corporations and other entities	1.6	1.7	1.7	0.4	2.0	9.4	0.3
Public sector (consolidated)	4.7	4.0	5.8	6.6	6.2	11.0	2.9

Source: IMF staff estimates.

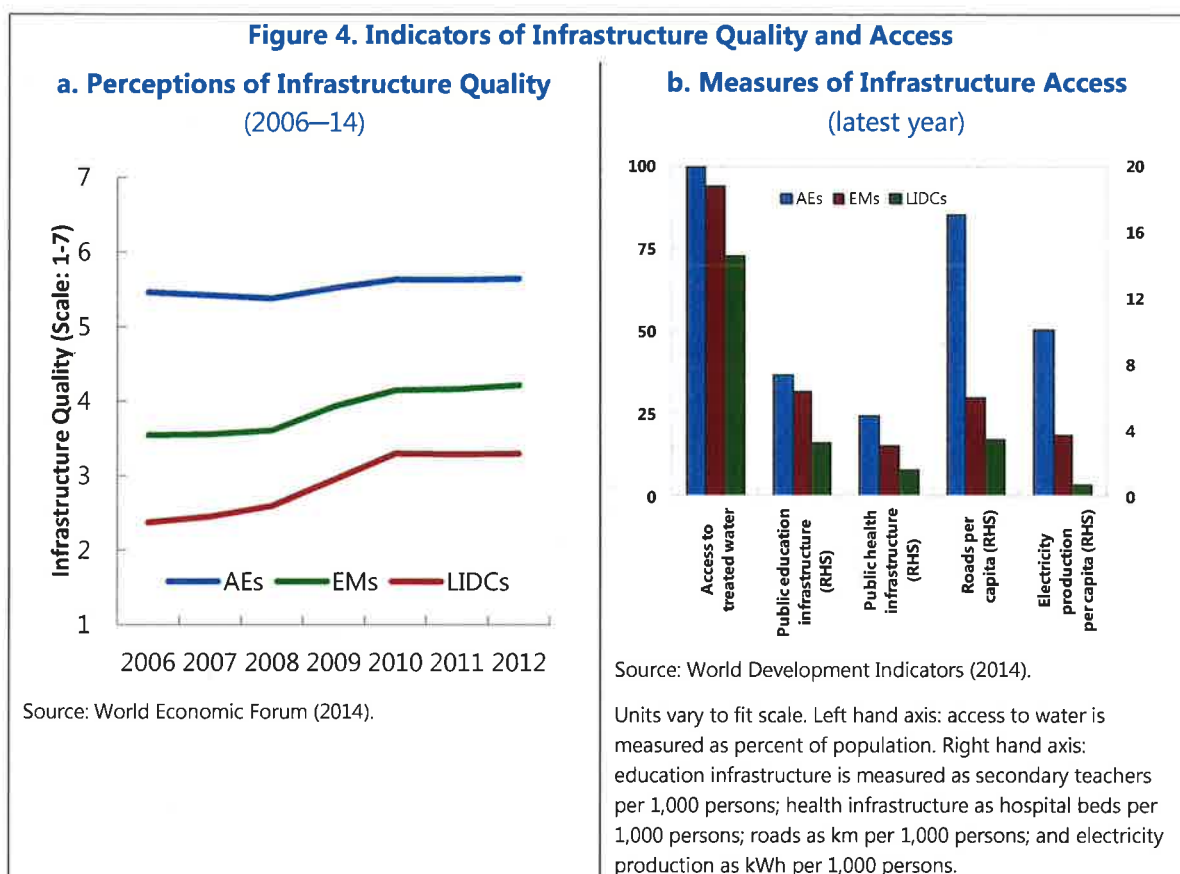
For Mexico, local government data are estimated from OECD National Accounts Database 2012, and may not be fully consistent with central government data.

B. Trends in Infrastructure Coverage and Quality

11. Large discrepancies in infrastructure coverage and quality persist across countries, although higher rates of public investment in EMs and LIDCs have brought about some convergence in access to social infrastructure. Survey-based measures of infrastructure quality suggest that the recent ramping up of public investment in LIDCs has helped reduce the perceived disparity in infrastructure across countries (Figure 4a). Physical measures of infrastructure also suggest significant convergence across countries in the coverage of social infrastructure (e.g., schools, hospitals, and water). However, large and persistent disparities between higher- and lower-income countries remain within the coverage of economic infrastructure (e.g., roads and electricity networks) (Figure 4).

¹Data on the share of subnational governments in total spending can be used as a proxy for their shares in investment spending. For the 28 EMs that report both central and general government spending in the IMF's *Government Finance Statistics*, central governments accounted for 82 percent of total spending. In the eight LIDCs reporting these data, almost all spending was undertaken by central governments.

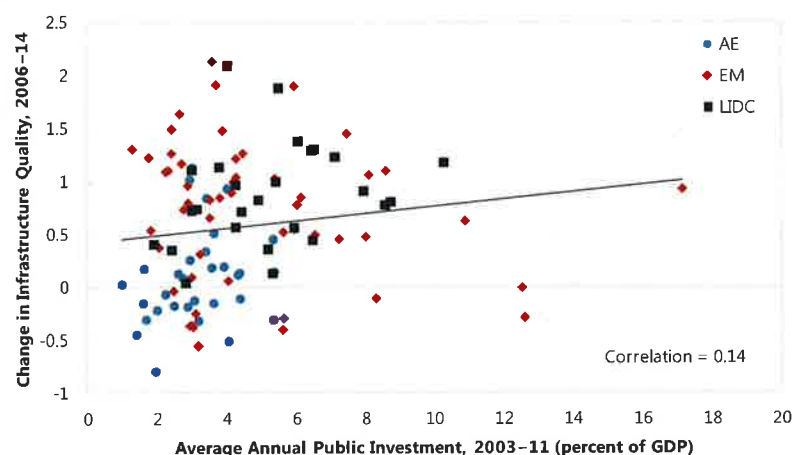
² Table 1 is purely illustrative, as data on the breakdown between central and local governments are limited.



12. Improvements in infrastructure coverage and quality are only loosely correlated with public investment, pointing to significant levels of inefficiency across countries.

Figure 5 shows the relationship between a lagged measure of public investment and the change in perceptions of infrastructure coverage and quality, as measured by the World Economic Forum. The relatively weak correlation between average annual public investments over the previous three years and the perceived improvement in infrastructure coverage and quality, suggests that there is considerable scope to enhance the efficiency of public investment in most countries.³

³ See IMF (2014d) for a similar discussion.

Figure 5. Public Investment and Infrastructure Coverage and Quality

Sources: Center for International Comparisons (2013); OECD (2014); WEO; World Economic Forum (2014); and IMF staff estimates.

C. Estimating Public Investment Efficiency

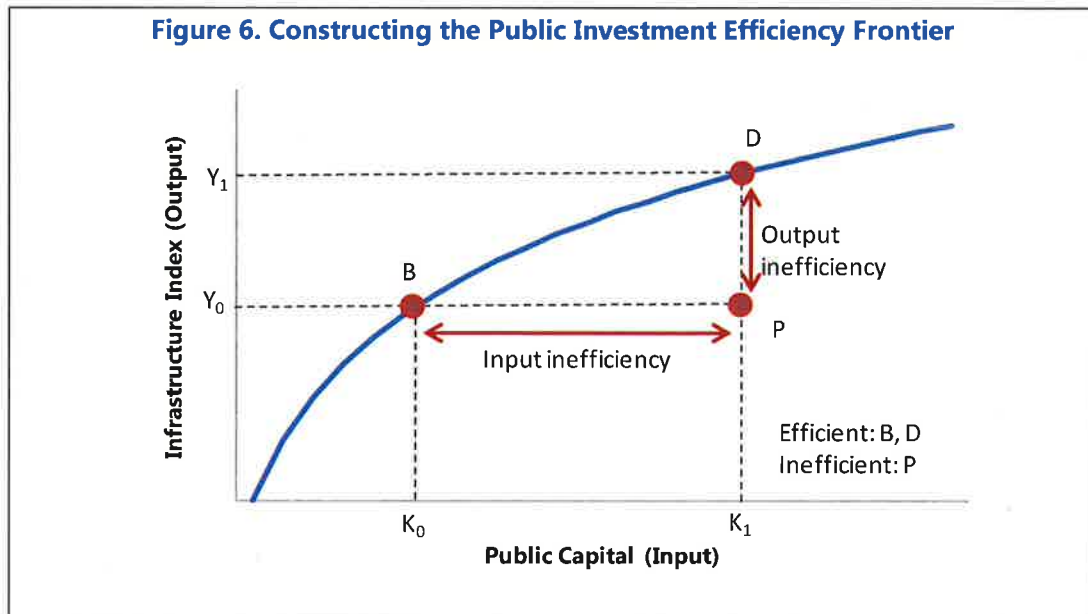
13. This section provides a new comprehensive measure of how much infrastructure “bang” a country gets for its public investment “buck.” For over 100 countries, the new Public Investment Efficiency indicator (PIE-X estimates the relationship between the public capital stock and indicators of access to and the quality of infrastructure assets.⁴ Countries with the highest levels of infrastructure coverage and quality (output) for given levels of public capital stock and income per capita (inputs) form the basis of an efficiency frontier and are given a PIE-X score of 1 (Figure 6). Countries are given a PIE-X score of between 0 and 1, based on their vertical distance to the frontier relative to peer best performers. The less efficient the country, the greater the distance from the frontier, and the lower its PIE-X score. Three measures of infrastructure quality and access are considered in constructing the frontier⁵:

- A *physical indicator*, which combines data on the volume of economic infrastructure (length of road network, electricity production, and access to water) and social infrastructure (number of secondary teachers and hospital beds). While this indicator provides a sense of the coverage of infrastructure networks and physical output of public investments, it does not fully measure the quality of the infrastructure.
- A *survey-based indicator* based on the World Economic Forum’s survey of business leader’s impressions of the quality of key infrastructure services. While this indicator provides a measure of the quality of infrastructure assets, it is affected by individual perception biases and fails to capture the coverage dimension adequately.

⁴ The number of countries with available PIE-X scores ranges from 114 to 134 depending on the model used.

⁵ A more detailed discussion of the measurement of infrastructure performance as well as the construction of PIE-X can be found in Annex II.

- A *hybrid indicator*, which combines the physical and survey-based indicators into a synthetic index of the coverage and quality of infrastructure networks.

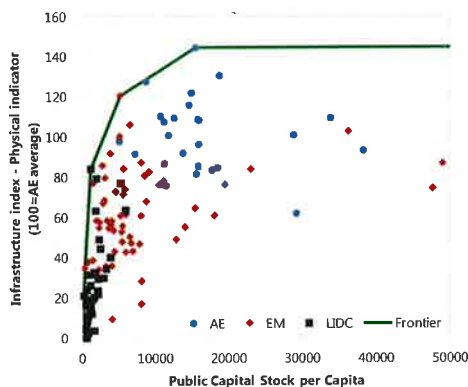


14. PIE-X estimates confirm that there is substantial scope for improving public investment efficiency in most countries. This is illustrated in Figures 7a, c, and e, which show the estimated efficiency frontier, linking the real value of public capital and the three indicators of infrastructure coverage and quality. While there are efficient countries in all income groups, the efficiency of public investment generally increases with income per capita. However, the slope of the frontier decreases as the level of the public capital stock rises, illustrating the decreasing marginal returns to additional investment. This leveling off of the efficiency frontier is especially pronounced for the physical indicator, given the limited scope to expand access to infrastructure services once universal coverage has been achieved. Given the similar results yielded by the different infrastructure indicators and the advantages of using an indicator that incorporates both infrastructure coverage and quality dimensions, the hybrid indicator is used for the subsequent analysis in this section.

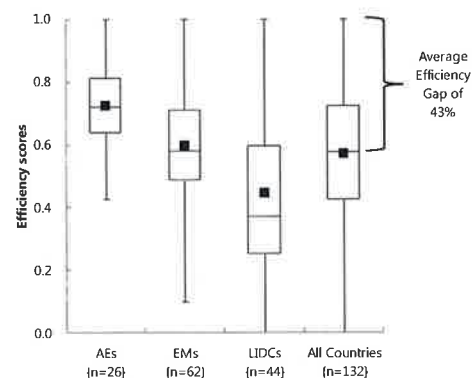
15. Based on the hybrid indicator, the average efficiency gap is 27 percent with some countries having much higher gaps (Figure 7f). This efficiency gap is measured as the distance between the average country and the frontier for a given level of public capital stock and income per capita. The size of the gap shrinks as income rises, with LIDCs facing a gap of 40 percent, EMs facing a gap of 27 percent, and AEs facing a gap of 13 percent on average.

Figure 7. Public Capital and Infrastructure Performance

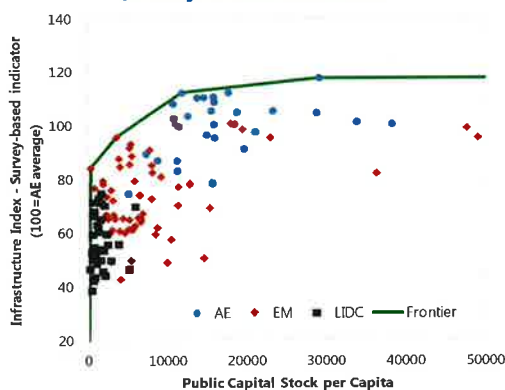
a. Public Investment Efficiency Frontier (physical indicator)



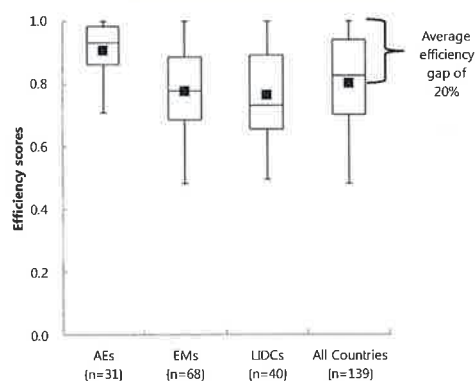
b. Public Investment Efficiency Index (PIE-X) (physical indicator)



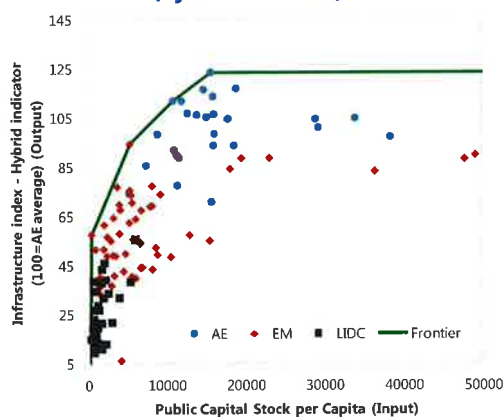
c. Public Investment Efficiency Frontier (survey-based indicator)



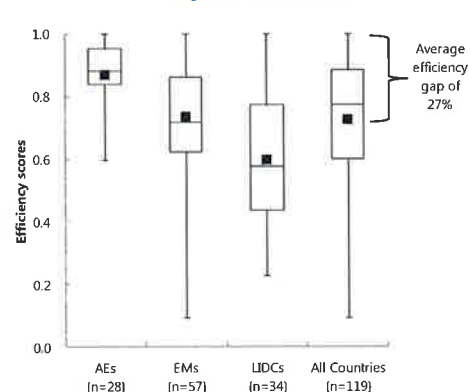
d. Public Investment Efficiency Index (PIE-X) (survey-based indicator)



e. Public Investment Efficiency Frontier (hybrid indicator)



f. Public Investment Efficiency Index (PIE-X) (hybrid indicator)



Sources: Center for International Comparisons (2013); World Economic Forum (2014); OECD (2014); WEO; World Development Indicators (2014); and IMF staff estimates.
The box shows the median as well as the 25th and 75th percentiles while the whiskers show the maximum and minimum values. The black square shows the average. Scores range between 0 and 1.

D. Public Investment Efficiency and Growth

16. The efficiency of public investment has important implications for growth. The impact of public investment on growth is well documented (see Aghion and Howitt, 2009; and Ghazanchyan and Stotsky, 2013). A number of authors have recently argued that countries with more efficient public investment also see stronger relationships between investment and economic growth. Gupta and others (2014) present evidence that public capital—when adjusted for efficiency—is a significant contributor to growth. The IMF (2014c) argues that the growth dividend from investment can be significant, but is limited when the investment process is inefficient. At the same time, Berg and others (2015) point out that countries with low efficiency often also have relatively scarce capital and thus can still enjoy high returns to investment relative to those with more efficient investment but also more capital (see Box 4).

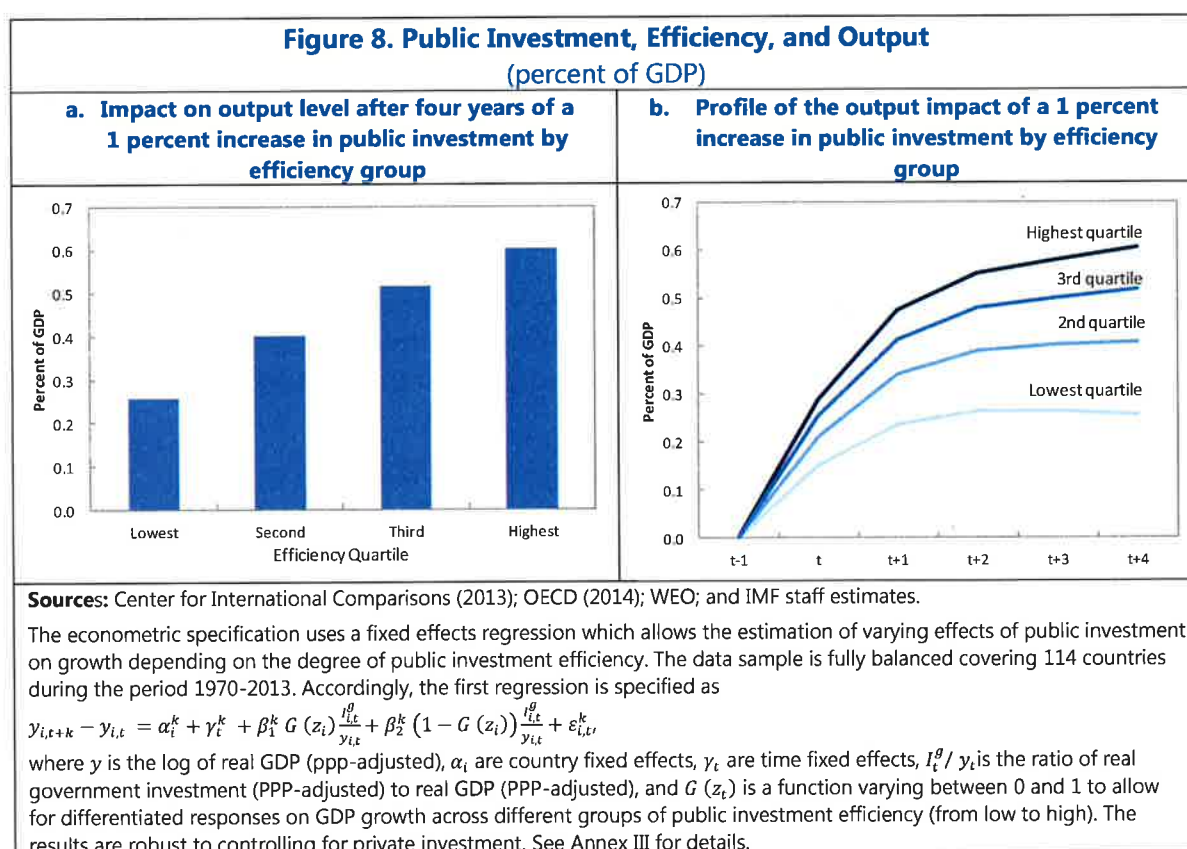
Box 4. Public Investment Efficiency and Growth

Much of the theoretical and empirical literature supports the idea that public investment raises output through both demand and supply effects (see Aschauer, 1989; Straub, 2007; and Chakraborty and Dabla-Norris, 2009). Estimates of the size of this impact vary due to uncertainties around fiscal multipliers on the demand side and inefficiencies on the supply side (Easterly and Rebelo, 1993; and Warner, 2014). The IMF (2014c) found that public investment shocks raise the level of output by around 0.4 percent in the same year, and 1.5 percent after four years in advanced economies. In developing countries, the impact on output was smaller, at around 0.25 in the same year, and 0.5 after four years.

The impact of improvements in the efficiency of public investment on growth has received less attention. Intuition would suggest that countries with more efficient PIM arrangements would also see a bigger growth “bang” from their investment “buck.” This is supported by theoretical (Chakraborty and Dabla-Norris, 2009) and empirical (Gupta and others, 2014) analyses. IMF (2014c) finds that investment shocks have an even bigger growth impact in AEs with more efficient public investment, increasing the level of output by 2.6 percent after four years. However, Berg and others (forthcoming) qualify this latter finding. They note that countries with low levels of efficiency are likely to have particularly scarce public capital and, therefore, a higher marginal productivity of public capital than high-efficiency countries. As a result, the higher marginal productivity may offset any losses from lower levels of efficiency, such that the growth impact of higher investment spending is likely to be roughly invariant to the level of efficiency. These theoretical results however, rely crucially on the assumption that efficiency is constant over time.

The empirical results presented here would support the view that investment efficiency matters for growth. Cross-country regressions suggest that the growth dividend of investment is larger for high-efficiency than for low-efficiency countries (Figure 8 below). Regardless of the relationship between public investment efficiency and growth *across* countries, improving efficiency *within any given* country has an unambiguously positive impact on growth. As discussed in the main text, the most efficient public investors see twice the growth impact compared with the least efficient, in line with the results in IMF (2014c). This is also consistent with model simulations in Berg and others (forthcoming) that show that efficiency may have substantial growth benefits for low-efficiency countries. Indeed, “investing in investing”—or strengthening public investment management—could yield an even high growth “bang” for their investment “buck.”

17. The economic dividend from closing the public investment efficiency gap could be substantial—moving from the lowest quartile to the highest quartile in public investment efficiency could double the impact of that investment on growth.⁶ Figure 8a shows that a one-off 1 percent of GDP increase in public investment increases output by just 0.3 percent for countries in the bottom efficiency quartile, but 0.6 percent for countries in the top efficiency quartile. Were a country in the lowest efficiency quartile able to increase its efficiency to the level of the highest quartile, it would double the economic “bang” it gets for its public investment “buck.” As shown in Figure 8b, the effect is strongest in the first year of the investment increase and then tapers off, this decrease occurring most rapidly for the lowest efficiency countries. This illustrative calculation is consistent with more comprehensive empirical studies of the relationship between investment and growth (Calderón and Servén, 2004; IMF, 2014c; and Gupta and others, 2014).



⁶ Higher efficiency could increase growth through a number of channels. Higher quality public capital can lower transaction costs for the private sector and raise the marginal productivity of private human and physical capital. Improving investment efficiency would also create fiscal space by providing better infrastructure at lower cost and releasing resources for more investment or growth-enhancing recurrent expenditure and/or reductions in marginal taxes.

III. ASSESSING PUBLIC INVESTMENT MANAGEMENT

18. Differences in the efficiency of public investment across countries partly reflect differences in the relative strength of PIM institutions. The impact of public investment on infrastructure quality and economic performance is, of course, mediated by a range of factors. These include, for example, the level of economic development, structural characteristics of the economy,⁷ the quality of governance, geography, and climate. However, a growing body of literature underscores the role that the legal, institutional, and procedural arrangements for public investment management play in determining the level, composition, and impact of public investment (see Box 5). The analysis presented in Sections III and IV suggests that improvements in public investment management practices could reduce the efficiency gap identified above by two-thirds on average across countries. Clearly, the necessary institutional changes cannot be introduced overnight; they entail significant legal and institutional changes, often require the development of new skills and capacities, and will take time to deliver the envisaged benefits. Countries need to invest in public investment management.

A. The Public Investment Management Assessment (PIMA) Framework

19. Fund staff has developed a new Public Investment Management Assessment (PIMA) to assess the quality of public investment management practices. The PIMA evaluates 15 key institutions for planning, allocation, and implementing public investment. These PIM institutions are a subset of the broader framework of budget institutions that govern the public financial management process.⁸ The PIMA includes elements similar to other PIM diagnostic tools,⁹ but provides a more comprehensive assessment of the public investment decision-making process at three key stages:

- i. **Planning** sustainable levels of investment across the public sector;
- ii. **Allocating** investment to the right sectors and projects; and
- iii. **Implementing** projects on time and on budget.

Based on a review of the PIM literature (summarized in Box 5), the remainder of this section discusses the 15 institutions that make up the PIMA framework, describes the methodology used to generate the overall PIMA scores, and presents the results of PIMA evaluations for a sample of 25 AEs, EMs, and LIDCs.

⁷ See (Albino-War, 2014) for a discussion of public investment in natural resource-rich MENA and CCA oil-exporting countries.

⁸ See IMF (2014b).

⁹ Such as the Public Investment Management Index (Dabla-Norris and others, 2012) and the World Bank's "unified framework" (Rajaram and others, 2014).

Box 5. Public Investment Management: Literature Review

Empirical studies underscore the importance of fiscal institutions for public investment performance.

Weak institutions are associated with higher levels of investment, but also greater volatility in investment expenditure and lower quality of infrastructure (Tanzi and Davoodi, 1997; Keefer and Knack, 2007; and Grigoli and Mills, 2013). By contrast, higher public investment efficiency is generally associated with stronger institutions and low dependency on natural resource revenues (Albino-War and others, 2014). The Public Investment Management Index (PIMI) developed by Dabla-Norris and others (2012) showed wide variations in the efficiency and effectiveness of PIM across middle- and low-income countries. Yet, because the index relied largely on secondary-data sources, it could not evaluate all key institutions specific to public investment and depended on proxies for others. Nonetheless, using a PIMI-adjusted capital stock, Gupta and others (2014) found that the quality of PIM is an important determinant of the productivity of public capital.

The literature on PIM practices highlights the importance of transparency and well-governed institutions at key stages of the investment cycle:

- **Planning:** Balassone and Franco (2000), Creel and others (2007), and Schaechter and others (2012), discuss the role of *fiscal rules* in ensuring sustainable levels of public investment. OECD (2014) underscores the importance of effective, integrated *strategic planning* at the *national and subnational level*. Schwartz and others (2008) discusses the institutional arrangements needed to maximize the gains and minimize the risks associated with *PPPs*. OECD (2005) provides detailed guidance on the financial oversight and governance of *state-owned enterprises*, many of which operate in the infrastructure sector.
- **Allocation:** Dabla-Norris and others (2012), and Fainboim and others (2013) stress the importance of *medium-term budget frameworks*, *the unification of current and capital budgets*, and *consolidation of extrabudgetary funds* to the effective allocation of investment to the most productive sectors. Rajaram and others (2014) highlight the contribution of transparent and rigorous *project appraisal and approval* procedures to ensure that projects are selected based on credible estimates of their costs and benefits.
- **Implementation:** Dabla-Norris and others (2012), Flyvberg (2009), and Rajaram and others (2014) all underscore the role of firm *expenditure controls*, efficient *liquidity management*, regular *project execution reporting* and strong *project management* arrangements in ensuring that investment projects are delivered on time and on budget. The IMF's Government Finance Statistics Manual 2014 (GFSM 2014) discusses the benefits of regular *reporting on the condition and value of the resulting infrastructure assets* for fiscal monitoring and investment planning purposes.

20. Stage 1: Planning. Efficient investment planning requires institutions that ensure public investment is fiscally sustainable and effectively coordinated across sectors, levels of government, and between public and private sectors. The PIMA therefore assesses whether countries have:

- **Fiscal principles or rules** which ensure that overall levels of public investment are adequate, predictable, and sustainable;
- **National and sectoral plans** which ensure public investment decisions are based on clear and realistic priorities, cost estimates, and objectives for each sector;

- **Central-local coordination** arrangements that integrate public investment plans across levels of government, provide certainty about funding from the central government, and ensure sustainable levels of subnational borrowing;
- **Management of public-private partnerships**, which ensure effective evaluation, selection, and monitoring of PPP projects and liabilities; and
- **Regulation of infrastructure companies**,¹⁰ which promotes open and competitive markets for the provision of infrastructure services, objective pricing of infrastructure outputs, and effective oversight of infrastructure company investment plans.

21. Stage 2: Allocation. Allocation of capital spending to the most productive sectors and projects requires a comprehensive, unified, and medium-term perspective to capital budgeting, as well as objective criteria and competitive procedures for appraising and selecting particular investment projects. The PIMA therefore assesses whether countries have:

- **Multi-year budgeting** that provides transparency and predictability regarding levels of investment by ministry, program, and project over the medium term;
- **Budget comprehensiveness** that ensures that all public investment, regardless of the funding channel, is authorized by the legislature and disclosed in the budget documentation;
- **Budget unity** that ensures that decisions about individual projects take account of both their immediate capital and future operating and maintenance costs;
- **Project appraisal** that ensures that project proposals are subject to published appraisal using standard methodology and taking account of potential risks; and
- **Project selection** that ensures that projects are systematically vetted, selected based on transparent criteria, and included in a pipeline of approved projects.

22. Stage 3: Implementation. The timely and cost-effective implementation of public investment projects requires institutions that ensure projects are fully funded, transparently monitored, and effectively managed. The PIMA therefore assesses whether countries have:

- **Protection of investment** that ensures project appropriations are sufficient to cover total project costs and cannot be diverted at the discretion of the executive;
- **Availability of funding** that allows for the planning and commitment of investment projects based on reliable forecasts and timely cash flows from the treasury;
- **Transparency of budget execution** that ensures that major investment projects are tendered in a competitive and transparent process, monitored during project implementation, and independently audited;

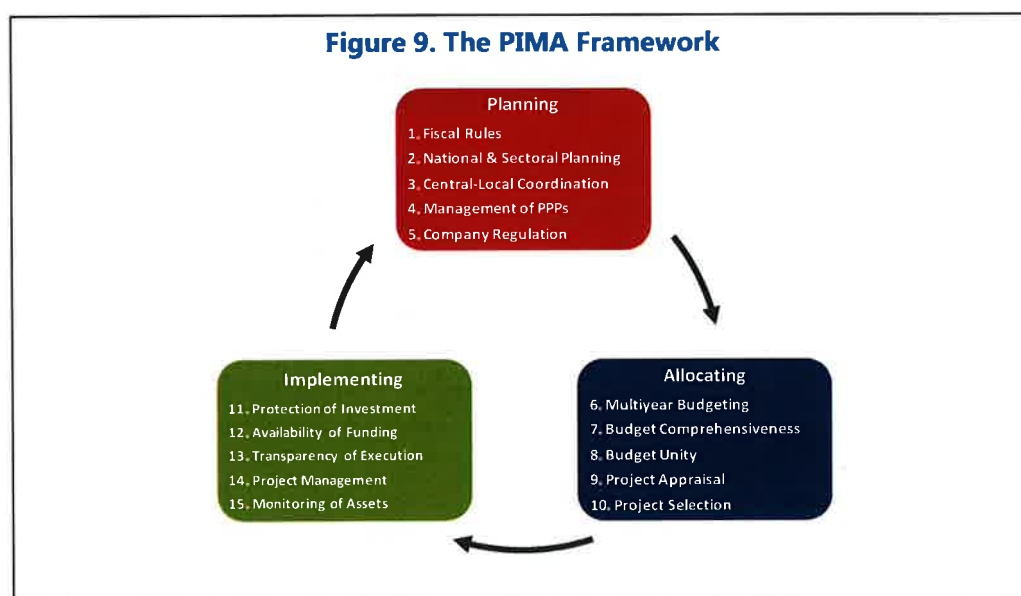
¹⁰ Examples are regulated private sector companies in the telecom, energy, transport and water sectors.

- **Project management** that identifies an accountable project manager working in accordance with approved implementation plans, and provides standardized procedures and guidelines for project adjustments; and
- **Monitoring of public assets** that ensures assets are properly recorded and reported and that their depreciation is recognized in financial statements.

B. PIMA Methodology

23. The 15 institutions described above provide the framework for PIMA (Figure 9).

For each of the 15 PIM institutions, three key design features are identified, each of which can be fully met, partly met, or not met. Based on how many of these key features are in place, countries are given a PIMA score of between 0 (no key features in place) and 10 (all 45 key features fully in place). The precise evaluation methodology is described in Annex IV. The PIMA improves upon other evaluations of public investment management in a number of respects. The PIMA is more comprehensive, bringing in elements related to macro-fiscal frameworks, integration of investment planning in medium-term budgeting, coordination of public investment across levels of government, and private sector participation in the provision of public infrastructure. The framework is also more relevant to countries at the higher end of the income scale, reflecting more advanced practices in the areas of fiscal principles, management of PPPs, project appraisal and selection, and monitoring of public assets. Using the new tool, the next section looks at the relative strengths and weaknesses of PIM practices across a sample of 25 AEs, EMs, and LIDCs.¹¹

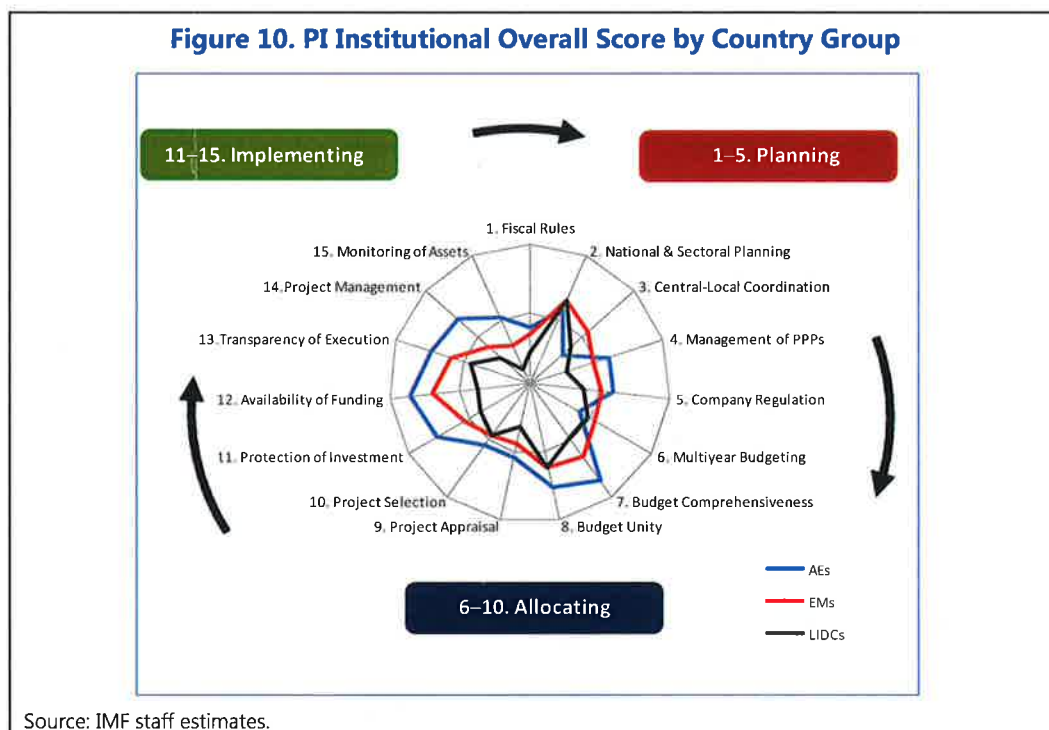


¹¹ The countries in the sample were selected to represent a broad range of countries in terms of income, geography, size, public investment levels, and public investment quality. They include seven AEs (Finland, Germany, Japan, Korea, Spain, the United Kingdom, and the United States); nine EMs (Algeria, Brazil, Chile, India, Jordan, the Philippines, Qatar, Romania, and South Africa); and nine LIDCs (Bolivia, Cambodia, Ethiopia, Ghana, Nepal, Niger, Senegal, Sri Lanka, and Uganda).

C. Results of the PIMA Evaluation

Overall PIM Strengths and Weaknesses

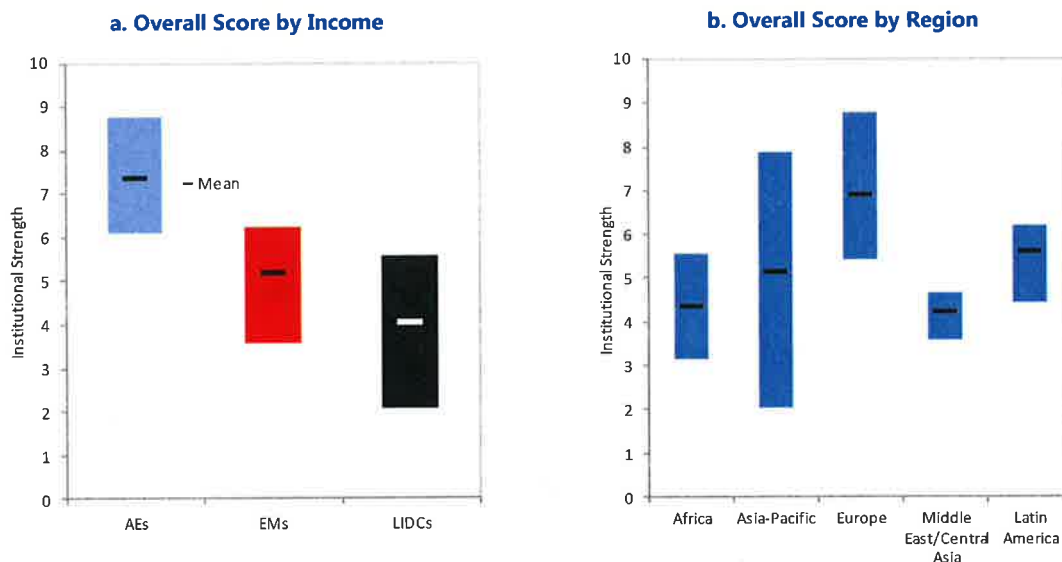
24. AEs have stronger PIM institutions overall, but not uniformly so. The overall strength of PIM is strongly correlated with income, with PIM institutions being, on average, weakest in LIDCs and strongest in AEs (Figure 10). Exceptions are national and sectoral planning, central-local coordination, and multiyear budgeting, where EMs or LIDCs score at least as well as AEs.



25. Average institutional strength tends to increase along the investment cycle, with planning being the weakest and implementation the strongest. Yet, there are important exceptions here too. AEs are relatively strong in the management of PPPs, regulation of infrastructure companies, and budget comprehensiveness and unity. EMs and LIDCs perform relatively poorly when it comes to availability of funding, management of project implementation, and monitoring of public assets.

26. Variations in institutional strength are largest among LIDCs and in the Asia-Pacific region. LIDCs in the sample have the overall largest variation in institutional strength, while AEs have the smallest (Figure 11a). While AEs perform better on average, some score worse than the best LIDCs and EMs for a majority of institutions. Overall scores by geographic region show PIM to be strongest in Europe and Latin America, weakest in countries in the Middle East and Central Asia, and characterized by considerable variation in the Asia-Pacific region (Figure 11b).

Figure 11. Overall Scores by Income and Region



Source: Staff estimates.

Note: The boxes show the spread between the minimum and the maximum values, as well as the mean scores.

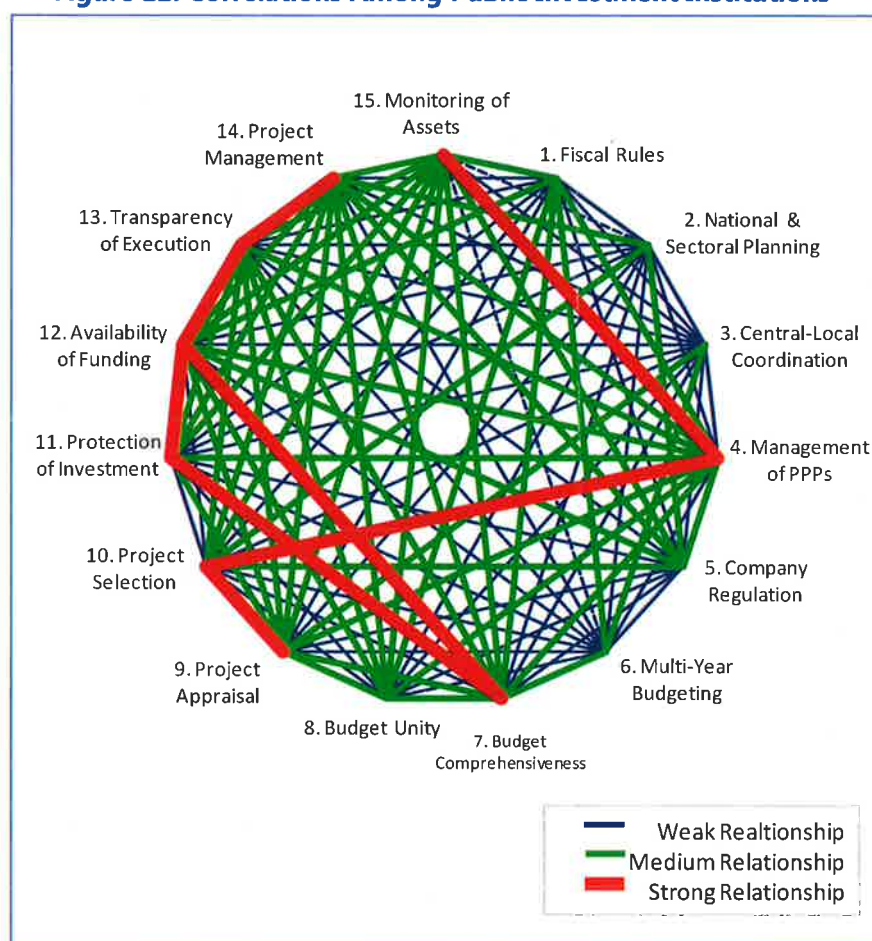
Linkages between PIM Institutions

27. Correlations in the strength of different institutions point to complementarities between different stages of the PIM process (Figure 12). Notably:

- Budget comprehensiveness, protection of investment allocations, and ensuring the availability of funding are strongly correlated, highlighting the complementarity between sound budgeting and the efficient financing of capital projects;
- Countries with strong institutions for project selection and project appraisal are generally also strong in the management of PPPs, underscoring the benefits of strong project evaluation across both conventional public and PPP projects;
- Implementation institutions, such as transparency of budget execution, management of project implementation, and availability of financing, tend to be developed in tandem as countries realize their importance for public investment performance;
- Countries that effectively monitor public assets also tend to have strong institutions for managing PPPs, indicating the role that the adoption of modern accounting standards plays in the recognition of both the physical assets of government and contingent liabilities associated with PPPs; and
- National and sectoral planning correlates relatively weakly with other institutions. This may suggest that national and sectoral strategic plans can sometimes be drawn up in a vacuum and in a manner that is not well integrated with budgeting. Box 6 provides examples of

countries where strategic planning has been strengthened in recent years with an eye to improving the strategic focus of both budget and PIM processes.

Figure 12. Correlations Among Public Investment Institutions



Source: IMF staff estimates.

Correlations are measured as simple correlations between each of the institutions. Weak relationships are in the range between 0.1 and 0.3. Medium relationships are in the range between 0.3 and 0.6. Strong relationships are correlations above 0.6.

Box 6. Public Investment and Strategic Planning

Many developing and emerging market countries have long-established centralized processes for investment planning. The strategic planning of investment fell out of favor in advanced economies in the 1960s and 1970s, during which time investment decisions were devolved to line ministries, agencies, and public corporations, but has recently been revived in a number of countries. The aim of this new wave of centralized investment planning is to target scarce funds to key infrastructure bottlenecks, ensure that investment projects comply with rigorous standards of evaluation; establish a pipeline of strategically important projects to be financed through public, private, or hybrid financing mechanisms; share expertise in project management; and track project execution.

Uganda. Investment projects are prioritized within *multiyear sector development strategies*, guided by an indicative medium-term budget framework (MTBF). A public investment programming (PIP) mechanism was established in 1994 to coordinate the prioritization and funding of postconflict reconstruction and rehabilitation, which was then almost entirely funded by donors. Since then, Uganda has institutionalized a transparent framework for planning, appraisal, and approval of capital projects. This framework integrates planning and budgeting requirements, and is coordinated by the Development Committee in Ministry of Finance, Planning and Economic Development. Although the framework is well defined, it is not always adhered to in practice.

Brazil. The Growth Acceleration Program (PAC) introduced in 2007 is a comprehensive rolling four-year plan that coordinates investment and PPPs made by central government, subnational governments, and state-owned enterprises. The program includes large infrastructure projects in the areas of energy, transportation, housing, water and sanitation, environment, and health. To be included in the budget a large project has to be part of the PAC. The Ministry of Planning and Budget created a dedicated unit to plan, coordinate, and supervise implementation, as well as a portal to provide information on the projects. The PAC has helped to boost investment from 1.6 percent of GDP in 2006 to 3.4 percent in 2010. The increase in investment is attributed to a better planning around a development strategy focused on key sectors, increased synergies between public and private sectors, and improved efficiency and transparency on regarding major investments.

Korea. Using a range of tools and procedures, the Ministry of Strategy and Finance (MOSF) manages an elaborate planning and project-selection system. The *Preliminary Feasibility Study* (PFS) evaluates whether a project is eligible for financing through the budget, taking into account both economic and policy analyses, risk assessment, and a regional evaluation. A comprehensive pipeline of investment projects is prepared by the MOSF, based on the results of the PFS, and used to select projects for inclusion in the annual budget and National Fiscal Management Plan.

United Kingdom. The UK government established Infrastructure UK, a dedicated unit within HM Treasury, to coordinate the planning and prioritization of investment in UK infrastructure. In 2010, the unit published its first *National Infrastructure Plan*, identifying the infrastructure investments needed to sustain and enhance economic growth. In September 2013, it published the first National Infrastructure Pipeline identifying the 600-plus public and private investment projects and programs that were planned and underway in seven strategic sectors together with their medium-term cost profile. This pipeline has provided the basis for the identifying projects to be funded in subsequent government budgets, and for securing financing from private sector partners.

IV. EXPLAINING PUBLIC INVESTMENT PERFORMANCE

28. This section considers the contribution of PIM institutions to public investment performance. It presents evidence for a relationship between the strength of PIM institutions, as measured by the PIMA, and various direct and intermediate indicators of public investment efficiency and productivity. It finds that:

- Countries with stronger PIM institutions have more stable, credible, efficient, and productive public investments and lower perceived levels of rent-seeking and corruption; and
- Strengthening PIM practices can reduce the public investment “efficiency gap” by around two-thirds, with the largest payoffs in EMs and LIDCs.

29. There are some important caveats to the analysis presented in this section. First, although efforts have been made to select a diverse group of countries for the study, the sample remains relatively small, introducing some degree of uncertainty as to whether the results also holds for a larger set of countries. Second, a robust causal relationship between the strength of PIM institutions and the indicators of efficiency and productivity is difficult to establish. Hence we complement the analysis with supporting country examples in various boxes. Third, both the PIE-X indicator and the PIMA are limited in terms of coverage and scope and do not necessarily provide the comprehensive picture of public investment quality, efficiency, and management.

A. Measuring Public Investment Performance

30. Public investment performance can be measured directly, through the impact of PIM on infrastructure quality and growth outcomes, or indirectly, through measures of the effectiveness of the intermediate stages of the investment process. In this paper, public investment performance is analyzed using two direct and six indirect indicators. The two direct indicators measure the efficiency of investment (using the hybrid PIE-X indicator described above) and the productivity of investment (using the relationship between investment and economic growth). The six indirect measures consider the efficiency of the investment process at each of the three key stages planning, allocation, and implementation. The eight indicators of public investment performance used in this section are defined below:

Overall Impact of Public Investment

- **Efficiency of public investment** - measured by the PIE-X indicators of the infrastructure coverage and quality estimated in Section II.
- **Productivity of public investment** – measured by the ratio of the average real rate of capital stock growth to the average real rate of economic growth.

Public Investment Planning, Stage 1

- **Level of public investment** - measured by general government (GG) investment as a percentage of overall GG spending.
- **Volatility of total public investment** - measured by the standard deviation of GG

investment growth.

Public Investment Allocation, Stage 2

- **Stability in the sectoral allocation of public investment** - measured by the average absolute year-on-year percentage change in the distribution of government investment spending between the nine COFOG¹² nondefense functions of government.
- **Growth orientation of public investment** - measured as investment in the economic affairs sector relative to total government investments.

Public Investment Implementation, Stage 3

- **Credibility of investment budget execution** - measured as the absolute difference between the budgeted and actual level of general government capital expenditure.
- **Integrity of the public investment process** - proxied by the International Country Risk Guide (ICRG) Corruption Index.¹³

B. PIM Institutions and Overall Public Investment Performance

Public Investment Efficiency

31. Countries with strong PIM institutions get a bigger “bang” for their investment “buck.” Figures 13 a-c shows a strong positive relationship between the overall strength of PIM institutions and the efficiency of public investment, both when using the survey-based indicator of infrastructure quality, the physical indicator for infrastructure access, and the hybrid indicator defined in Section II which combines the two. This relationship remains evident even after controlling for GDP per capita.¹⁴

32. Improvements in PIM can cut the public investment “efficiency gap” by around two-thirds. The average country in the 25-country sample faces an efficiency gap of 27 percent, and could close 66 percent of the distance from the efficiency frontier (discussed in Section II) by adopting the PIM practices of the best performer in the sample.¹⁵ Improving PIM institutions would have the largest payoff in EMs and, notably, LIDCs, where institutions are relatively weak.

¹² The international standard for the functional classification of government expenditure is the UN’s *Classification of the Functions of Government* (COFOG).

¹³ The ICRG *Corruption Index* is a general measure of perceived corruption in society. The higher the score, the lower is corruption.

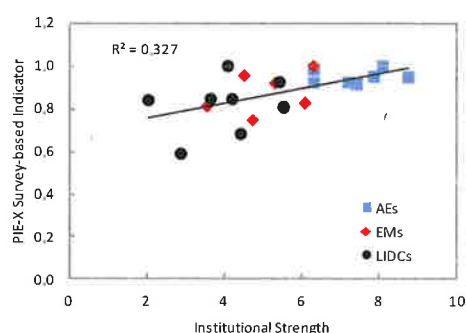
¹⁴ Where the relationship has been controlled for income, this is explicitly mentioned.

¹⁵ Regressions of efficiency on the overall PIM score, using the hybrid PIE-X indicator, suggest that an additional point in PIM overall score is statistically significantly associated with a 5 percent increase in PI efficiency. The result is consistent with other studies. For example, IMF (2014d) found that high public investment efficiency is generally associated with good institutional quality in oil-exporting countries.

Figure 13. Public Investment Efficiency and Productivity to Institutional Strength

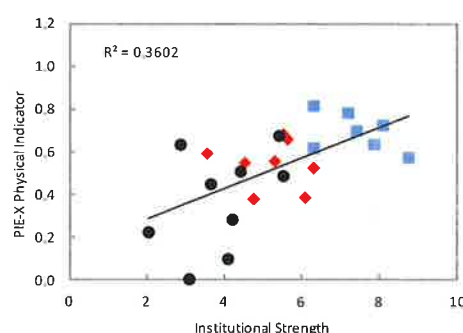
Stronger PIM institutions lead to more efficient public investment. This holds using either a survey-based indicator of infrastructure quality...

a. PIE-X (Survey-based) to PIMA Score



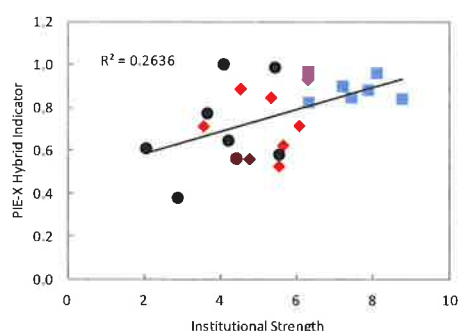
...or a physical indicator of infrastructure coverage

b. PIE-X (Physical Indicator) to PIMA Score



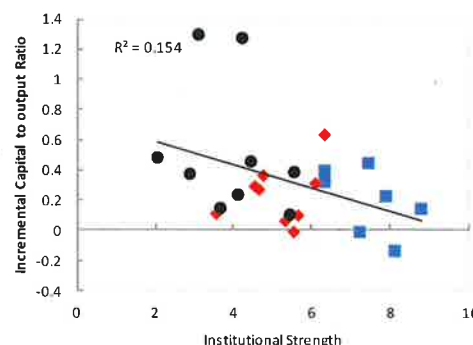
...or a hybrid indicator combining both infrastructure quality and coverage.

c. PIE-X Efficiency (Hybrid) to PIMA Score



Strong PIM institutions also increase the economic productivity of public capital

d. Incremental Capital Output Ratio to PIMA Score



Source: IMF staff estimates.

33. The strength of all three phases of the PIM process is significantly correlated with investment efficiency, both individually and in combination.¹⁶ Allocation and implementation institutions appear to be the most important, as indicated by their greater statistical significance in predicting investment efficiency. At the same time, the overall explanatory power of all 15 PIM institutions combined is higher than that of any individual institution, highlighting the mutually reinforcing nature of strong PIM institutions.

¹⁶ This is confirmed by comparing the explanatory power (R-squared) between bivariate and multivariate regressions of efficiency on each individual PIM institution, the group of institutions by stage of investment, and the PIM's overall strength.

Public Investment Productivity

34. The relationship between strong PIM institutions and the economic productivity of public investment is also positive. Countries with stronger PIM institutions tend to have lower average incremental public capital-to-output ratios (ICORs) and therefore get more growth “bang” for their investment “buck” (Figure 13d).¹⁷ While the correlation between ICORs and the strength of PIM institutions is significant, it is still weaker than for efficiency, underscoring the range of other factors that drive economic growth.

C. PIM Institutions and Other Performance Indicators

Levels of Public Investment

35. Stronger PIM institutions tend to go hand-in-hand with lower levels of public investment (Figure 14a). This may be explained by a number of factors. First, PIM institutions tend to be stronger in more developed economies with less need for additional public infrastructure. Second, stronger PIM institutions (especially more binding fiscal frameworks, stricter criteria for project appraisal and selection, and tighter controls over capital budget execution) constrain public investment by raising the threshold for financing new projects. Third, stronger institutions also mean higher efficiency, which would be expected to reduce public investment outlays.¹⁸ Fourth, the role of the public sector in providing infrastructure also tends to decrease with the level of GDP as key sectors are opened to private sector providers. At the same time, the negative correlation between fiscal frameworks and lower investment levels requires more detailed study, as the introduction of golden rules and other investment-friendly fiscal frameworks has been associated with increased investment in specific countries (Box 7).

36. Stronger PIM institutions are also associated with less use of PPPs. While there are substantial differences within country groups, overall, the data show a negative correlation between the strength of PIM institutions and the share of infrastructure investment in the form of PPPs (Figure 14b). Hence, strong PIM institutions temper the use of PPPs, which are generally considered to carry higher fiscal risks than budget financing. The relative popularity of PPPs in EMs and LDCs may also reflect a generally weaker capacity for project implementation and tighter budget funding constraints.

¹⁷ The ICOR is the ratio of the growth rate of the capital stock relative to the GDP growth rate and the inverse of the economic productivity of capital.

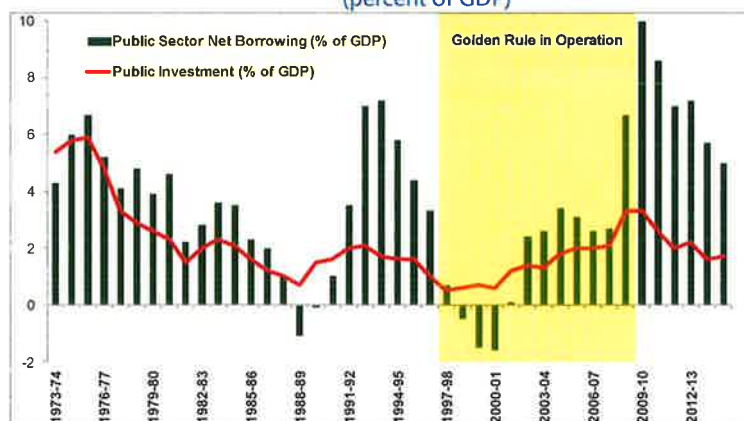
¹⁸ Grigoli and others (2014) have found the same, and view lower levels of corruption and rent seeking as prime reasons for lower investment levels in mature economies.

Box 7. Fiscal Frameworks and Public Investment

In the past two decades, fiscal rules have become increasingly popular and are now in place in more than 80 countries. Typically, these rules—the most common of which are debt and deficit limits and expenditure growth rules—do not treat public investment differently from recurrent expenditure and can contribute to greater procyclicality and lower overall levels of public investment, as shown in Section IV. Yet, some countries have adopted fiscal rules that explicitly protect public investment, including:

- **Structural balance rules.** These types of rules include deficit limits that vary with the state of the budget cycle, asset prices or resource income. The 2012 EU Fiscal Compact prescribes structural balances targets for EU Member States. The benefit of these rules is that they do not require procyclical adjustment during economic downturns. As such adjustments often fall on investment expenditures, structural balance rules can reduce the procyclicality of investment. At the same time, these require complex calculations and judgments regarding trends in GDP growth, the output gap, and elasticity of revenue and expenditure, which can make them difficult to implement in EMs and LIDCs.
- **Golden rules** allow governments to borrow only to invest, but not fund current expenditure. Japan, Spain, and the UK have all operated golden rules at some point. The UK's golden rule, in place during 1997–2009, helped public investment recover from historic lows in the late 1990s (see chart). However, to ensure transparency and fiscal sustainability, golden rules need to define capital and recurrent expenditure based on international standards and be combined with limits on total liabilities.
- **Other rules that exempt infrastructure investment.** Since 2004, India has applied a current balance target that excludes public investment and other priority spending from its expenditure ceiling. Argentina's Fiscal Responsibility Law requires all jurisdictions to balance revenue and expenditure, excluding investment in basic social and economic infrastructures and projects financed by multilateral development agencies. The lack of a transparent definition of the expenditure items that can be excluded from the rule can result in shrinking coverage over time and associated loss of fiscal control.
- **Investment floors.** Following the 1997 crisis, Thailand established a fiscal sustainability framework aimed at combining adequate levels of public investment expenditure with sustainable public finances. Capital expenditure must be at least 25 percent of the budget while public debt is limited to 60 percent of GDP. Thailand has, however, had difficulties meeting its investment target due to PIM bottlenecks.

Public Investment and Borrowing in the UK
(percent of GDP)



Source: HM Treasury, Public Finances Databank (2015).

Stability of Total Public Investment

37. Countries with strong PIM institutions tend to have more stable levels of investment. Figure 14c shows that strong PIM institutions are associated with less volatile investment flows, even when corrected for income levels. Various studies emphasize the importance of avoiding stop-go investment policies, given the consequences for the cost, timeliness, and quality of the resulting infrastructure asset.¹⁹ Rapid scaling up of investment, or efforts to use public investment for countercyclical purposes, have also typically failed to deliver the desired impacts on growth, in part, due to the substantial inefficiencies generated in the process (Warner, 2014). The scaling-up of public investment should be accompanied by efforts to strengthen PIM.

38. Strong implementation institutions seem to be most important to reducing the volatility of public investment. This applies especially to LIDCs, where project management tends to be weak, total public investment is more influenced by large-scale investment projects, and macroeconomic volatility can lead to funding and material shortages. This underscores the importance of strengthening project implementation in LIDCs.

Stability of Public Investment Allocation

39. Countries with strong PIM institutions also tend to have a more stable allocation of investment expenditure between sectors (Figure 14d). This reflects the benefits of strong multiyear planning and budgeting arrangements for the predictability of investment funding. Stability should, however, not turn to rigidity, and the literature does suggest that a number of advanced economies are attempting to introduce more “churn” (reallocation) in the sectoral allocation of public investment from year-to-year (Fainboim and others 2013).

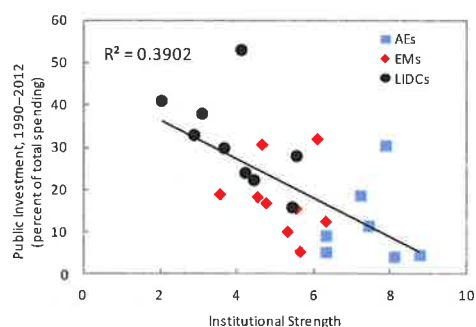
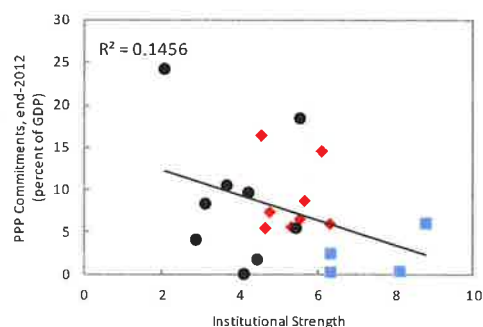
Growth-Friendliness of Investment

40. There is no evidence that stronger PIM institutions lead to a greater emphasis on “hard” infrastructure. The level of investment in the “economic affairs” sector, which includes transport, communications, and energy, does not appear to depend on the strength of PIM institutions. Health investment also shows no relationship to institutional strength. Only education investment seems to increase with institutional strength, even after compensating for income effects.

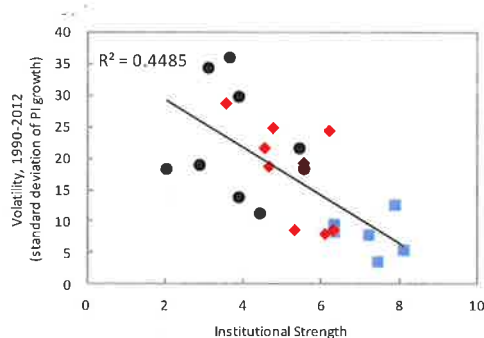
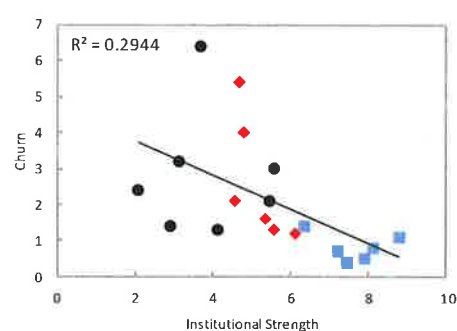
¹⁹ Stop-go investment policies were prevalent in the 1990s and early 2000s in many Latin American countries. See Perry, Servén and Suescún (2008).

Figure 14. Institutions and Other PI Performance Indicators

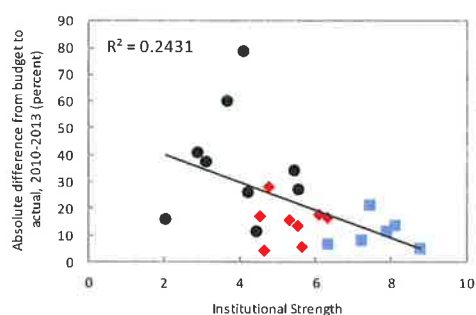
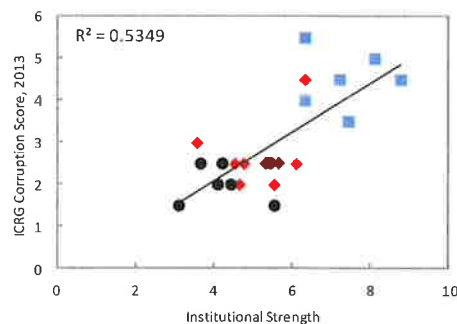
Investment Levels and PPPs decrease with stronger institutions, reflecting in part lack of protection of investment in fiscal frameworks...

a. Average Public Investment to PIMA Score**b. PPP Commitments to PIMA Score**

...strong institutions lead to more stable and predictable investment flows...

c. Volatility of Public Investment to PIMA Score**d. Churn to PIMA Score^{1/}**

...while budgets become more credible and less prone to corruption.

e. Budget Implementation to PIMA Score**f. Corruption to PIMA Score**

Source: IMF staff estimates; WEO.

1/ The average absolute year-on-year percentage change in the distribution of government investment spending between the nine COFOG nondefense functions of government, 2000-12, varies by country depending on data availability.

Credibility of Investment Budgets

41. Countries with strong PIM institutions have more credible capital budgets. EMs and LIDCs tend to suffer from underexecution of their capital budgets due to overly optimistic assumptions about how soon projects can break ground, lack of funding, and weak implementation capacity. By contrast, AEs tend to overspend on large investment projects due to incentives for executing agencies to understate project costs and risks as a means of inflating benefit/cost ratios and securing project approval. Overall, both over- and underspending, relative to the approved capital budget decreases with stronger institutions (Figure 14e). Independent appraisal of investment projects, in particular, can help reduce so-called “optimism bias” in estimates of project costs, benefits, and timetables (see Box 8).

Corruption and Investment

42. Strong PIM institutions are associated with lower perceived levels of rent-seeking and corruption. Public investment projects often provide lucrative opportunities for corruption and rent-seeking. Empirical studies have found corruption to be associated with higher overall levels of public investment and lower levels of public investment efficiency.²⁰ Figure 14f shows a positive relationship between the strength of PIM institutions and perceptions of government integrity as measure by the ICRG Corruption Index. This result holds even when adjusted for income. Open, competitive, and transparent procedures for allocating and implementing public investment projects are particularly important in limiting opportunities for corruption.

²⁰ Tanzi and Davoodi (1997) confirm anecdotal evidence that higher levels of corruption are associated with higher levels of public investment, lower levels of operation and maintenance expenditure, and a lower level of infrastructure quality. Abed and Gupta (2002) stress the impact on institutions and economic performance.

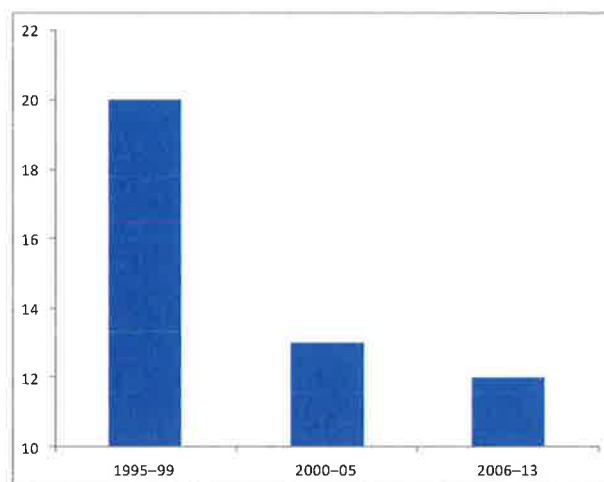
Box 8. Independent Project Costing in Norway

Cost overruns of large public investment projects are common in many countries. It implies that costs at the time of project appraisal were underestimated, which biases project selection and lowers investment rates of return, while degrading capital budget credibility. During the 1990s cost overruns in Norway were the norm rather than the exception, typically ranging from 20 to 40 percent. In 2000, the Norwegian government began an effort, known as QA2, to address this issue.

The focus of QA2 has been on improving project financial management and implementation. Its aim is to produce realistic cost estimates that can serve as firm benchmarks against which project managers can be held accountable. For each major project external experts, using statistical methods, estimate the likely final project cost with 85 percent and 50 percent probability. Parliament approves the project cost at the 85 percent probability level, referred to as the *cost frame*. The implementing agency manages the project using the 50 percent probability level, referred to as the *steering frame*. Because the cost frame is higher than the steering frame, the appropriated amount includes a risk-based contingency in excess of the cost limit that managers strive to achieve.

The results from the first 40 major projects completed under QA2 show that about 80 percent have been completed within the cost frame. Final costs were realized above and below the steering frame in almost equal amounts, meaning that the sum of the steering frames estimated is a good predictor of total capital spending. As a result, the variability of actual costs compared to estimated costs for individual projects has been greatly reduced, and the credibility of the capital budget improved (see chart below).

Norway: Average Deviation of Investment Spending from Budget
(percent)



Source: IMF staff estimates.