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Research Summaries

Lower for Longer: Neutral Rates in the United States

Andrea Pescatori and Jarkko Turunen



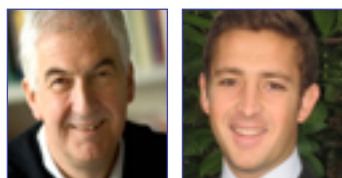
We use a semi-structural model to estimate neutral rates in the United States. Our Bayesian estimation incorporates prior information on the output gap and potential output (based on a production function approach) and accounts for unconventional monetary policies by using

estimates of “shadow” policy rates. Our results show a significant trend decline in the neutral real rate over time. Estimated neutral rates turned negative during the global financial crisis and are projected to increase gradually going forward. The results support the use of unconventional monetary policies to provide extraordinary accommodation during the crisis period and a gradual normalization in policy looking forward. The decline in neutral rates is driven only in part by lower potential growth since other factors, such as excess global savings and higher risk aversion, have also contributed to the decline.

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Economic Principles for Resource Revenue Management

Anthony J. Venables and Samuel Wills¹



This article explores strategies for managing revenue from natural resources, focusing on the balance between domestic and foreign asset accumulation. It suggests that domestic asset accumulation is the priority, while there are three motives for accumulating foreign assets:

inter-generational transfer, parking funds, and stabilization. The paper argues that the first of these is inappropriate for low income countries. The second is required if it is difficult to absorb extra spending in the domestic economy and takes time to build up domestic investment. The third is important, and depends on the extent to which the economy has other ways of adjusting to shocks.

The recent commodity super-cycle saw oil prices rise from below US\$30 per barrel in 2003 to over US\$100 per barrel in 2011, before falling to US\$50 per

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Lower for Longer: Neutral Rates in the United States

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Real interest rates in the United States have been declining for some time, a trend that was underway already before the global financial crisis. This trend was also reflected in lower policy rates. The decline is likely to reflect, in part, global factors, such as higher savings in emerging markets, stronger demand for safe assets, lower investment in advanced economies (Blanchard and others 2014), as well as persistent post-crisis “headwinds” (Yellen 2015). The same factors may have contributed to a decline in unobserved “neutral” or equilibrium real policy rates. Indeed, Federal Reserve Chair Janet Yellen has argued that: “...the equilibrium real federal funds rate is at present well below its historical average and is anticipated to rise only gradually over time as the various headwinds that have restrained the economic recovery continue to abate. If incoming data support such a forecast, the federal funds rate should be normalized, but at a gradual pace” (Yellen 2015).

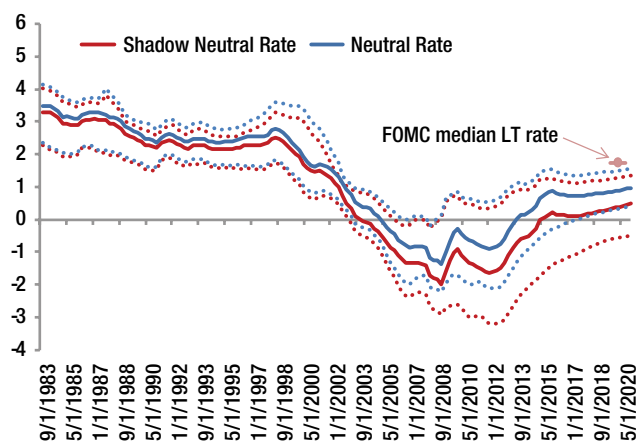
To better assess the current monetary policy stance, in our recent working paper on the neutral rate in the United States (Pescatori and Turunen 2015), we estimate how the neutral rate has evolved over time and evaluate its determinants. While there are subtle conceptual differences between terms used in the literature—“equilibrium,” “natural” or “neutral” rates—we consider the neutral rate as a measure of the real rate that, broadly speaking, is consistent with output at potential and price stability. This definition holds exactly in benchmark New-Keynesian models that do not include a policy trade-off between stabilization of inflation and the output gap; although, it can be argued that the neutral rate also provides a useful benchmark measure of policy stance for more general models (Curdia and others 2015 and Barsky and others 2014). We consider our empirical measures of interest rate gaps (i.e., the difference between observed real rates and estimated neutral real rates) as a useful summary indicator of monetary policy stance.

Our empirical approach builds on the semi-structural empirical framework of Laubach and Williams (2003). The framework is based on an IS-curve equation, which relates output gap to interest rates gaps; a backward looking Phillips curve, which relates core inflation to the output gap; and an equation that links the neutral rate to potential growth and other determinants.

One shortcoming of the previous approach is that it may generate implausible output gap estimates even during periods of well-studied and well-recognized expansions and recessions. To exploit this information—that would otherwise be outside our model—we use a Bayesian approach, which allows us to incorporate prior information on potential output based on a production function approach. We find that our approach provides more plausible results than standard maximum likelihood estimates for the unobserved variables in the model. An additional complication arises because observed policy interest rates have been constrained by the zero lower bound (ZLB) since the onset of the global financial crisis and the Federal Reserve has employed unconventional policies, such as forward guidance and asset purchases, to provide further policy accommodation. We account for this additional accommodation—estimating alternative neutral rates and rate gaps by using existing measures of “shadow” policy rates that are supposed to capture the impact of unconventional policies. Finally, we extend the empirical model to include other observed determinants of the neutral rate.

We find three main results. First, the neutral rate has declined over time and was likely negative during the crisis period (see Figure 1). While there is significant uncertainty in estimates, especially during the global financial crisis, our baseline results show that the neutral rate was likely as low as -1.5 percent during the crisis. These results are broadly in line with the results in Williams (2015), but point to a more significant decline in the neutral rates than is suggested by the narrative approach in Hamilton and others (2015). Furthermore, our results using a “shadow” policy rate suggests an even lower neutral rate. The baseline results suggest that neutral rates, which bottomed out shortly after the crisis, have been trending upwards thereafter and likely have turned positive during 2014.

Figure 1. Neutral Rates (percent)

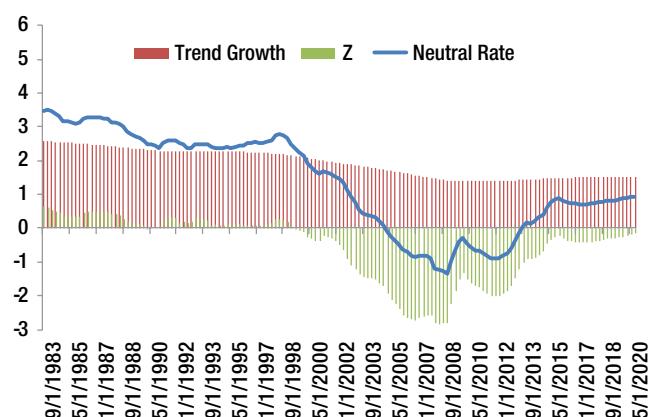


While these results do not provide definite evidence on the debate, they nevertheless point to temporary headwinds (opposed by policy accommodation) rather than a persistent secular stagnation scenario where the central bank is consistently unable to stir up aggregate demand. Projections of the neutral rate, conditional on the World Economic Outlook forecast for output, inflation, and an assumption of a gradual normalization in policy interest rates and the Federal Reserve's balance sheet over time, suggest that the neutral rate is likely to increase only very gradually and to stay well below the Federal Open Market Committee (FOMC) participants' median forecast for the long-term real policy rate (at about 1.75 percent).

Second, interest rate gaps suggest that monetary policy has been strongly accommodative, especially when taking unconventional monetary policies into account. Real interest rate gaps implied by estimated neutral rates confirm that policy has been accommodative since the crisis started. Owing to the decline in the neutral rate, the baseline rate gap during the global financial crisis was relatively small and comparable to the gap observed during the early 2000s slow growth period (when the output gap was just barely negative). This supports the use of unconventional monetary policies to provide extraordinary accommodation during the global financial crisis. The more negative shadow rate gap suggests that unconventional policies added between 1 to 3 percentage points of policy accommodation. Looking forward, the projected gradual increase in the neutral rate suggests that monetary policy is likely to remain accommodative for some time.

Finally, our results show that the trend decline in the neutral real rate was driven by both lower potential growth and other factors, including higher global savings (see Figure 2). The gradual decline in the estimated potential growth rate since the 2000s is an important determinant of the trend decline in neutral rates. However, we also find that the decline in neutral rates observed since the early 2000s is consistent with a significant increase in demand for U.S. safe assets owing to substantial increases in emerging market current account surpluses during this time period. The results also suggest that other factors, such as increased risk aversion, as well as preference for safer assets, may have further amplified the decline in neutral rates in the 2000s and during the global financial crisis. Looking forward, the projected increase in neutral rates is driven by a gradual recovery in trend growth, which recovers to just above 2 percent, and less downward pressure from other factors.

Figure 2. Neutral Rate Components (percent)



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Economic Principles for Resource Revenue Management

(continued from page 1)

barrel in 2014. Over the course of this cycle, global resource rents nearly tripled, from \$7.6 trillion in 2000 to over \$21 trillion in 2008 (constant 2005 US\$, World Bank WDI). In some countries these revenues went straight in to current spending. In other countries natural resource funds were established and some of the revenues were placed offshore. However, there is little evidence that developing countries used revenues to make the domestic investments necessary for sustained growth in non-resource sectors of the economy. As this super-cycle comes to an end, now is an ideal time to evaluate resource policy and prepare for the future.

This research summary draws on work undertaken by the Oxford Centre for the Analysis of Resource Rich Economies (Oxcarre), in particular Venables and Wills 2015, which investigates the economic principles that should underpin use of resource revenues, especially in developing economies. We look first at the trade-off between using resource revenues for current spending (consumption) or for building up assets. We then turn to the question of what assets should be accumulated, focusing on the choice between capital assets in the domestic economy (human as well as physical) and foreign assets (e.g., held in a sovereign wealth fund). We argue that economic principles call for a high proportion of resource revenues to be used for building up assets and, in developing economies, these should be principally domestic capital.

Current Consumption and Asset Accumulation

What proportion of resource revenues should be saved (i.e., used to accumulate assets, real or financial, in the domestic economy or abroad) and how much should be used to finance current consumption? The benchmark answer to this is that spending from a temporary windfall should be smoothed through time according to the permanent income hypothesis (PIH), which says that the annuity value of the windfall should be consumed and the rest saved—with this savings producing a stock of assets to permanently finance the higher consumption. This is easily stated, but less easily applied and adapted to the circumstances of a developing economy. A multitude of issues arise, and we discuss just two.

First, how does the permanent income hypothesis translate into a simple rule for the proportion of revenue that

should be saved? Intuitively, the shorter the duration of the expected revenue flow, the higher the proportion of revenue saved (if a one-day windfall were to finance a permanent increase in consumption, it would all need to be saved). For example, if resource revenue is expected to be a step function (a constant flow dropping to zero at date of exhaustion) and the interest rate is 4 percent, then 20 percent of resource revenue should be saved when exhaustion is 40 years away, rising to 45 percent at 20 years and 67 percent when exhaustion is 10 years away. If the expected decline in revenue is less abrupt, the numbers differ; but a faster rate of decline raises the required saving rate. Notice that, while this suggests high savings, the recommendation of 100 percent saving (sometimes referred to as the “bird-in-hand” rule) follows only if policymakers are so risk averse that they expect future revenues to be zero (exhaustion is imminent).

Second, the permanent income hypothesis needs modification for a developing economy in which current income is low and relatively rapid income growth is expected in the future. The modification is that current poverty makes it desirable to have a somewhat lower savings rate; essentially, it is not efficient to use the revenue to fund a permanent income increase that gives as much to future (and richer) generations as to the current (relatively poor) citizens. Formal analysis of this is in van der Ploeg and Venables (2011); the argument is that, in a capital-scarce economy, saving from resource revenue will bring down the rate of return on capital, flattening the efficient consumption path (the Euler equation) and implying a relatively large initial increase in consumption.

Applying these principles to a particular case is, of course, country and context specific, but some general messages come through. The rate of saving from resource revenues should be high, should increase as the resource stock is depleted, but should not be so high as to forego all short-run consumption benefits.

Domestic Capital and Foreign Assets

An extreme version of the PIH suggests that all saving should be directed into foreign assets, rather than be used to build up domestic capital. The argument is that the capital stock in the domestic economy earns the world rate of return on capital. Investing more would reduce the return below the world rate, and thereby be inefficient. It would be better to invest abroad and earn the world rate. This argument is sound for Norway and other capital abundant economies but is inappropriate for developing

countries that are short of capital of all sorts—human, physical, and public. This is particularly the case in so far as resource revenues accrue to public funds on which there is a premium due to weak fiscal capacity. The returns gained from investing revenues in the domestic economy can be used to build capacity and to fund projects, such as infrastructure, which may in turn increase the level of private investment in the economy. The appropriate rate of return is then the full social rate of return, i.e., the direct benefits of the project plus the social value of induced effects in the private sector.

These arguments point to using resource revenues for domestic investment. What is the case for putting a fraction of them in foreign assets, through a sovereign wealth fund? There are two important arguments, which we refer to as “parking” and “stabilization.”

The parking argument turns on the ability of the domestic economy to make productive use of an increase in investment. Ramping up investment sharply creates a risk that projects undertaken will be of poor quality and low return. There may be bottlenecks, particularly in the supply of non-traded goods necessary for investment such as the construction sector (for physical capital), or the availability of skilled labor (including government capacity to implement projects and the supply of teachers needed for human capital investment). An increase in spending will then bid up prices and yield poor value. At a wider macro-level, the extra spending may lead to inflation and create the risk of boom and bust. There are two responses. One response is to plan ahead, anticipating bottlenecks and phasing investments appropriately—“investing-in-investing” in Collier’s (2010) terminology. The other response is to establish an offshore “parking fund” where revenues are accumulated until they can be invested productively at home. In summary, government needs to design an efficient investment program. The timing of this will, quite generally, not coincide with the timing of resource revenue receipts. Funds need to be held offshore and drawn down to finance domestic investment whenever it is efficient.

The parking fund smoothes anticipated gaps between resource revenues and domestic spending, but there will also be unanticipated revenue shocks driven by the volatility of resource prices. These shocks create an argument for some sort of insurance strategy. A stabilisation fund can play this role, as funds are deposited when prices are particularly high and drawn down when prices are low. What are the economic principles that should govern this

and other responses to resource price volatility?

One possibility is that countries insure themselves against commodity price fluctuation, passing the risk to other economic agents. Contractual terms with foreign investors in the resource sector do this to a limited extent. Countries can also engage in hedging strategies, as practiced by Mexico, which purchases put-options to lock in the price of some of its oil sales up to a year ahead. These provide considerable insurance, but they incur transaction costs and only offer a relatively short period of protection.

Absent this insurance, fluctuations in resource revenues will impact countries’ expected wealth, and policy should ensure that these impacts do not have disruptive consequences arising from a sharp fall in foreign exchange receipts and/or government revenues. Access to international capital markets is, in principle, one way to manage this—borrowing when revenues fall. However, this option may be extremely expensive or simply unavailable if, for example, revenues fall during a time of global economic crisis. The alternative is then to build a stabilization fund, providing governments with their own buffer.

The cost of placing revenues in a stabilization fund is that they need to be held in liquid assets, likely to have a relatively low return. The benefit depends on whether there are alternative ways of handling revenue uncertainty (as outlined above), and on the costs associated with not stabilizing. Are resource revenues a sufficiently large share of economic activity, exports, or government revenue to significantly destabilize the economy? Are other policy tools (such as monetary policy) available and effective to counter economic shocks? Finally, there are difficult issues surrounding the operation of such a fund; above all, how to make the judgement as to when to expand and when to draw down the fund, i.e., on whether prices are abnormally high or low. Typically the decision is based on some moving average of past prices, although one of the most successful stabilization funds, Chile’s Social and Economic Stabilization Fund, uses an independent panel of experts to provide an informed judgement.

Conclusions

Implementation of resource revenue management is context specific and depends on politics as well as economics—but clarity on the economic principles matters. For developing countries, we suggest the key principles are: First, to use a high (and rising) share of resource revenues for building assets, rather than for current consumption. Second, to integrate these with national development plans for building

human and physical capital in the country. Efficient domestic investment strategies involve planning ahead, anticipating bottlenecks that will be encountered during a resource boom, and making public investments that will support private sector activity in a resource abundant economy. Third, natural resource funds should be used in support of this domestic investment strategy, rather than as ends in themselves; long-run asset accumulation is better done in the domestic economy than through “inter-generational” offshore funds; parking and stabilization funds are appropriate where they meet well-defined objectives that support domestic economic growth. With the commodity super-cycle coming to a close, now is an

appropriate time to prepare for the next cycle.

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Seven Questions on Financing for Development

Amadou Sy



Now that the Third International Conference on Financing for Development (FfD) has concluded in Addis Ababa, Ethiopia, in July 2015, policymakers are getting ready for the next United Nations General Assembly in New York in September 2015, which should

result in a global agreement on the post-2015 Sustainable Development Goals (SDGs). The third and final meeting of this critical year for the development agenda will be in December in Paris, France, with the United Nations Conference on Climate Change (COP 21). As policymakers are setting the global development agenda, it is important that the rapid pace they have set be matched by economists. This is important as the results of their research can guide policies and, perhaps more importantly, help improve their effectiveness. The following seven questions aim at informing researchers about some of the current issues in the Financing for Development program.

Question 1. Financing for Development: What is at stake?

Shortly before the Addis Ababa Financing for Development meeting, IMF Managing Director Christine Lagarde announced a number of measures to assist developing countries in their pursuit of the post-2015 Sustainable Development Goals. The IMF pledged to (i) expand access to all of its concessional facilities by 50 percent; (ii) apply a

zero interest rate for low-income countries struggling with natural disasters and conflict; and (iii) scale-up its support for raising domestic revenue potential and pay greater attention to equity and inclusion.

The measures taken by the IMF are part of a broader effort to formulate, finance, and implement a new agenda for sustainable development, which aims at “overcoming poverty and protecting the planet” (AfDB, ADB, EBRD, EIB, IADB, IMF, and World Bank 2015). The proposed 17 Sustainable Development Goals (SDGs) and 169 targets seek to address a broad range of challenges, including climate change, employment, infrastructure, and inequality that will require an unprecedented surge in financing and investment.

In a report entitled “From Billions to Trillions,” referring to the needed resource flows, which surpass existing development flows, seven multilateral development institutions, including the IMF, have called for a paradigm shift to come up with a wide-ranging financing framework to channel domestic and external finance from both public and private sources, toward the SDGs. The challenge will be two-fold. Policymakers will need to efficiently deploy \$135 billion of official development assistance (ODA) currently available. In addition, they will have to find ways to attract and use effectively \$1 trillion of non-ODA resource flows for development, which include philanthropy, remittances,

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South-South flows and other official assistance, and foreign direct investment.

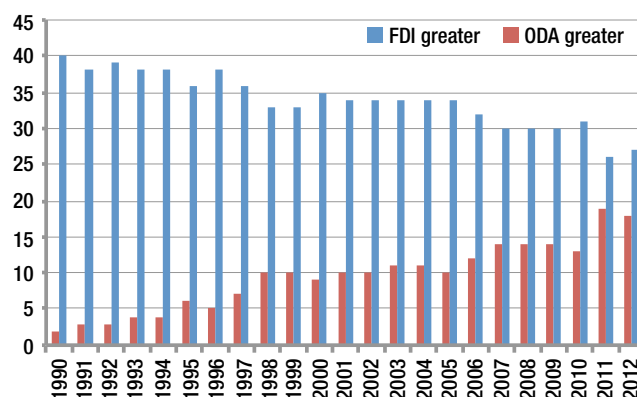
Given the wide scope of the SDGs, which require environmental and infrastructure investments and the diversity of financing flows, such a framework is of concern to both developed and developing economies. However, Africa is among the regions with the most pressing needs. In anticipation of the SDGs, Africa has already established a common position on the Post-2015 Development Agenda, based on six pillars, with the aim to speak with one voice and facilitate the discussion toward a global consensus on the SDGs. The first five pillars cover a number of specific priorities. For instance, Pillar One focuses on structural economic transformation and inclusive growth while Pillar Two highlights science, technology, and innovation. These objectives face major financing gaps as domestic resources are not sufficient to cover the costs associated with the SDGs. This is why Pillar Six, finance and partnerships, is so important and must be linked with the first five pillars.

Question 2. How large are financing flows to Africa?

External financial flows to sub-Saharan Africa (defined as the sum of gross private capital flows, official development assistance (ODA), and remittances to the region) have not only grown rapidly since 1990, but their composition has also changed significantly. The volume of external flows to the region increased from \$20 billion in 1990 to more than \$120 billion in 2012. Most of this increase in external flows to sub-Saharan Africa can be attributed to the increase in private capital flows and the growth of remittances, especially since 2005.

In 1990, the composition of external flows to sub-Saharan Africa was about 62 percent ODA, 31 percent gross inflows from the private sector, and about 7 percent remittances. However, by 2012, ODA accounted for about 22 percent of external flows to Africa, a share comparable to that of remittances (24 percent) and less than half the share of gross private capital flows (54 percent). Also notably, in 1990, foreign direct investment (FDI) flows were greater than ODA flows in only two countries (Liberia and Nigeria) in sub-Saharan Africa excluding South Africa, but 22 years later, 17 countries received more FDI than ODA in 2012—suggesting that sub-Saharan African countries are increasingly becoming less aid dependent (see Figure 1).

Figure 1. Sub-Saharan Africa: Number of Countries Where FDI Is Greater than ODA (1990–2012)



Sources: IMF, World Bank, and authors calculations.

Question 3. How do countries differ: Who gets what?

A closer look at the data indicates therefore that, clearly ODA is not dead, though its role is changing. For instance, middle-income countries (MICs) are experiencing the sharpest decline in ODA as a share of total external flows to the region, while aid flows account for more than half of external flows in fragile as well as low-income countries (LICs) and resource-poor landlocked countries.

Much has changed in external financial flows to sub-Saharan Africa since 1990. Total external flows grew more than six times during this period, from \$20 billion in 1990 to more than \$120 billion in 2012. ODA, which accounted for just under two-thirds of total flows in 1990, is now much lower and comparable to remittance flows. Private capital flows are now the single-largest source of external financing for the region, with more than half of the total flows.

The reality, however, is that changes in both the scale and composition of external capital flows have not benefited all sub-Saharan African countries equally:

- Fragile countries and LICs, not surprisingly, are regional laggards in terms of access to both external and domestic finance.
- Even resource-rich countries, which are able to attract large volumes of private capital flows, fare relatively poorly when external financing flows are scaled to the size of their economies. In addition, these countries, although they raise more domestic government revenues than other countries, do so mostly because they benefit from fiscal revenues linked to volatile commodity prices.

- Francophone countries both in the West African Economic and Monetary Union (WAEMU) and the Central African Economic and Monetary Community (CEMAC) are not able to attract the same level of private capital flows as other sub-Saharan African countries.
- Remittances are high for MICs.
- When external financing is contrasted with domestic financing, it seems that sub-Saharan African countries do not appear to have a natural hedge to the risks of reversal of external financial flows.

In sum, the claim of the demise of aid is still premature; the growth of private capital flows has benefited few countries; remittances have become significantly more important for some countries; and the rise of external flows means that sub-Saharan African countries will have to manage the volatility associated with such flows.

Question 4. Why is there a focus on financing infrastructure?

There is a consensus among African policymakers that the continent's economic growth and transformation is significantly constrained by its limited infrastructure. Inadequate infrastructure—including unreliable energy, an ineffective urban-rural road network, and inefficient ports—is one of the largest impediments to Africa's international competitiveness.

Infrastructure is not only one of the areas where Africa is lagging the most behind other regions (together with health and primary education) but it is also one area where the divide between African countries is the largest. The infrastructure deficit is particularly high for sub-Saharan low-income countries even when compared to that of other low-income countries (see Yepes, Pierce, and Foster 2008 and reproduced in Foster and Briceño-Garmendia 2009, 1–2).

Improving infrastructure can benefit the continent through a number of channels, including better performance in the agriculture sector and increased regional and global trade. Increasing investment in rural infrastructure such as irrigation, roads, and energy can help reduce Africa's dependence on rain-fed agriculture, improve access to markets for agricultural produce, and increase resilience to climate change. Through better and more affordable information, communication, and technology (ICT) infrastructure, farmers can register their land and have access to credit, use land and water more efficiently, obtain weather, crop, and market information, and trade food and animals.

Better information, communication, and technology infrastructure cuts across sectors by allowing the rapid and free flow of information. Similarly, more reliable electricity provision can significantly reduce the cost of doing business for all sectors, including the manufacturing sector. Well connected infrastructure networks can benefit a broad range of sectors by enabling entrepreneurs to get their goods and services to markets in a secure and timely manner by facilitating the movement of workers. They can also help increase intra-regional trade (which is the lowest globally) and participation in regional and global value chains,

In part, thanks to the above benefits, improving infrastructure can increase per capita annual growth by up to one percentage point (see Boopen 2006, Calderón 2008, Estache and Wodon 2011, Briceño-Garmendia and Domínguez-Torres 2011). To put things in perspective, the latest World Bank forecast for the region puts real GDP growth at 4 percent in 2015 (World Bank 2015). However, accounting for the continent's 2.6 percent population growth results in a per capita income growth of only 1.4 percent.

African policymakers are well aware of the potential for infrastructure to support the continent's accelerated integration and growth, technological transformation, trade and development. The continent's long-term vision as articulated in Agenda 2063 is that, in about 50 years, African infrastructure will include high-speed railway networks, roads, shipping lines, sea and air transport, as well as well-developed information, communication, and technology infrastructure and a digital economy. The vision plans for a Pan African High Speed Rail network that will connect all the major cities of the continent, with adjacent highways and pipelines for gas, oil, water, as well as ICT broadband cables, and other infrastructure. Infrastructure will be a catalyst for manufacturing, skills development, technology, research and development, integration and intra-African trade, investments, and tourism. Building a world-class infrastructure together with trade facilitation should see intra-African trade growing from less than 12 percent currently to about 50 percent by 2045 and the African share of global trade rising from 2 percent to 12 percent (see African Union 2014).

Building African infrastructure will, however, require substantial financing. A World Bank comprehensive study estimates that sub-Saharan Africa's infrastructure needs are around \$93 billion a year (See Foster and Briceño-Garmendia 2009).

Question 5. What are the external sources of financing for infrastructure?

Traditional partners include official development financing (ODF) sources from aid donors and multilateral development banks such as the World Bank and the African Development Bank, as well as the private sector. A recent study of external financing of traditional partners as well as private sector participation in infrastructure (PPI) highlights three significant trends (See Gutman, Sy, and Chattopadhyay 2015):

- All major sources of external financing have appreciably increased their annual commitments. From \$5 billion in 2003, commitments have risen to almost \$30 billion per year in 2012.
- Official development financing investments, though not as dominant a source of infrastructure financing in sub-Saharan Africa as in the 1990s, has grown appreciably since 2007 and represents 35 percent of external financing.
- Private sector participation in infrastructure has been the largest financing source since 1999—accounting for more than 50 percent of all external financing. Its overall level has remained remarkably stable and unaffected by the recession in 2008.

In addition, official investments from China have increased from what was virtually insignificant to about 20 percent of these three main sources of external finance. The increase in Chinese financing is mirrored by the rise of other non-traditional partners. New and emerging partners (NEPs) in Africa are increasingly investing in the continent's infrastructure. These countries include Brazil, China, India, Korea, Malaysia, Russia, and Turkey—the so-called NEP7 economies. These countries were involved in 239 infrastructure projects during 2000–2010, of which 41 percent were not linked to Chinese stakeholders. In particular, Brazil and Korea accounted for about 15.9 percent and 8.8 percent of the number of projects, while India and Korea were involved in 6.3 percent and 5.9 percent of total (see United Nations Office of the Special Adviser on Africa 2014).

Question 6. What do we know about budget financing for infrastructure?

Although data on government spending on infrastructure are not readily available, some recent estimates are. IMF (2014) estimates that national budget spending by sub-Saharan African countries reached about \$59.4 billion or

72.9 percent of total funding for infrastructure in 2012. [IMF 2014 assumes that countries allocate 75 percent of total public investment to infrastructure. This assumption does not take into account infrastructure spending executed by public utilities and local governments.] These figures include official development financing of about \$8 billion by international financial institutions (IFI) such as the World Bank and African Development Bank. Excluding IFI contributions from national government budget estimates, spending on infrastructure projects amounts to \$51.4 billion (63 percent of total funding). Comparable estimates are also available from the Infrastructure Consortium for Africa (2014).

Domestic resources in sub-Saharan Africa have increased thanks to debt relief, increased revenue collection, gains from the commodity price boom, and, more generally, improved macroeconomic and institutional policies. The average tax-to-GDP ratio increased from 18 percent in 2000–2002 to 21 percent in 2011–2013. (In comparison, Ahmad (2014) notes that a rule of thumb for calculating the amount needed to meet the financing requirements for the 2014 MDGs was a tax-to-GDP ratio of around 18 percent, which would cover the provision of the MDGs, as well as operations and maintenance spending, and new investment in infrastructure.) This increase was equivalent to half of 2013 aid receipts (Africa Progress Panel 2014). However, increased tax mobilization has been driven by resource-rich countries and resource-related taxes. Tax mobilization remains low in spite of significant effort and recent reforms in non-resource-rich countries (Bhushan, Samy, and Medu 2013). For instance, the ratio of general government tax revenues to GDP in 2013 ranged from 2.8 percent in the Democratic Republic of the Congo to 25 percent in South Africa (one of the highest among all developing countries). Thus, in spite of good progress in raising fiscal revenues, African countries need to raise more domestic finance to meet their infrastructure gap.

Given the wide disparity among countries of tax-to-GDP ratio, many African governments still need to raise their fiscal revenues to meet the infrastructure gap. However, increasing tax mobilization over a certain threshold does not necessarily lead to adequate spending on infrastructure and revenue, and spending reforms may be needed. For instance, Ahmad (2014) notes that although Brazil's tax-to-GDP ratio was relatively high at 24 percent in 2013, taxes are heavily earmarked, and, as a result, spending on infrastructure is just 1.5 percent of GDP (both public and private).

Question 7. What do we know about private financing for infrastructure?

African countries also need to complement fiscal revenues and diversify their source of domestic financing. African governments are increasingly accessing international capital markets. Before 2006, only South Africa had issued a foreign-currency denominated sovereign bond in sub-Saharan Africa. From 2006 to 2014, in all, 13 countries have issued a total of \$15 billion in international sovereign bonds.

But are the aforementioned efforts sufficient to fill the continent's infrastructure spending needs, which stand at about \$93 billion per year with about 40 percent of spending needs associated with the power sector? Using their fiscal resources, African governments spend about \$45 billion per year in infrastructure—about one-third of which is contributed by donors and the private sector. Two-thirds of the public sector money is used to operate and maintain existing infrastructure and one-third is used to finance new projects. This leaves a financing gap of \$48 billion and begs the question of how to finance the difference. A more efficient use of existing infrastructure can reduce this gap by \$17 billion by reducing inefficiencies through measures such as rehabilitating existing infrastructure, targeting better subsidies, and improving budget execution. Should inefficiencies be addressed, the remaining infrastructure funding gap would then be \$31 billion a year, mostly in the power sector.

Given the relatively large size of the remaining infrastructure financing gap, efforts to mobilize domestic revenues should also focus on tapping the local institutional investor base, including pension funds, for infrastructure financing.

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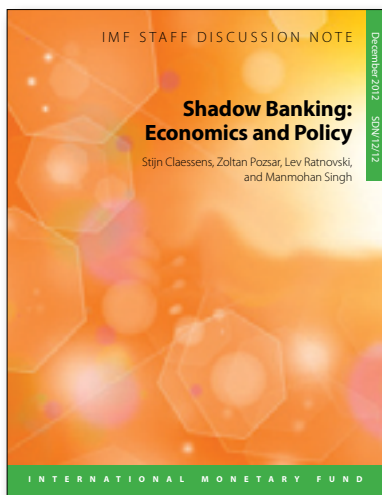
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