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Aid and Infrastructure Financing

Emerging challenges with a focus on Africa

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Abstract

The central argument of this study is that given the magnitude of the investment in infrastructure that is required, especially in Africa, the role of foreign aid in the future should be distinctly different. While aid will be required to continue to fill the ‘savings gap’ in some small countries and land-locked countries, in most other countries aid can play a very different role in facilitating the creation of institutional mechanisms that help mobilize more funding from other sources. These include domestic revenues (which already fund a large proportion of infrastructure), investments by China and the other ‘BRICs’, sovereign wealth funds and infrastructure funds. There are already examples of aid playing such a leveraging role. What is needed is to take this to a new and higher level. The study provides an overview of evidence on infrastructure needs and also possible magnitudes of flows from different sources for investment in infrastructure.

Keywords: aid, infrastructure, Africa, finance, funds, private sector

JEL classification: F35, L9, N20, O16

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1 Introduction

Infrastructure has been central to the development debate since its inception.¹ In the very early days of foreign aid, donors were focused on infrastructure almost to the exclusion of anything else (the World Bank being a prime example). There was a good reason for this: most of the finance for infrastructure could only come from foreign aid (at least in the smaller and poorer former colonies), together with the then meagre public revenues of the countries themselves. While large developing countries had more domestic revenue with which to finance post-independence infrastructure investment, India (as well as China) still required considerable amounts of aid. Competition among donors, from both East and West (during the Cold War), resulted in the financing of large ‘prestige’ mega-infrastructure projects: dams being the classic example.

Nowhere is infrastructure of such importance as in Africa. The region is characterized by large and longstanding infrastructure deficiencies. These inhibit economic growth, regional integration, and poverty reduction (especially in remoter regions in spatial poverty traps). Numerous reports over many years have pointed this out, and attention (and financing) has at best been stop-go, especially during times of macro-economic crisis in the region, and in the early to mid-1990s when aid flows slowed down, aid donors placed more emphasis on supporting human development.

Yet infrastructure remains vital. A number of Millennium Development Goals (MDGs) are closely related to infrastructure services—especially concerning water and sanitation, and health services. The creation of livelihoods that lead to sustained reductions in absolute poverty, generate remunerative employment for young job seekers, and deliver shifts into high-value added agriculture, manufacturing and services, all require infrastructure investment. Moreover, adaption to climate change poses an urgent set of challenges in which infrastructure plays a key role; in flood control, protecting cities (and poor communities within them), and combatting the likely increase in the frequency of drought and desertification.

One bright spot in an otherwise challenging investment landscape is the range of financial options now available for infrastructure investment, compared to the past reliance on conventional official development assistance (ODA) from ‘traditional’ (OECD-DAC member) donors. Infrastructure development has changed significantly with a multitude of models involving international or bilateral donors, international or regional development banks, national and local governments, private-equity financing institutions, utilities multinationals, domestic private sectors, and citizen groups. Infrastructure is now seen as a desirable investment area for global investment funds, since some infrastructure potentially yields a steady and predictable return.

In that context, several questions arise with regard to the role of aid in infrastructure. How many and what kind of infrastructure projects should be funded by ODA? To what extent is aid the main source of infrastructure financing in Africa, and should it take a different role? What is the extent of other modes of infrastructure financing? In the

¹ Barro (2008); Aghion and Howitt (2009); Easterly and Serven (2003); O’Fallon (2003); Rodriguez (2007).

context of the changing development landscape, what should be the role of ODA in infrastructure? How, can more public and private infrastructure financing be made available to the smaller and poorer countries, especially the land-locked and small island states, which face challenging geographies and severe climate-change threats?

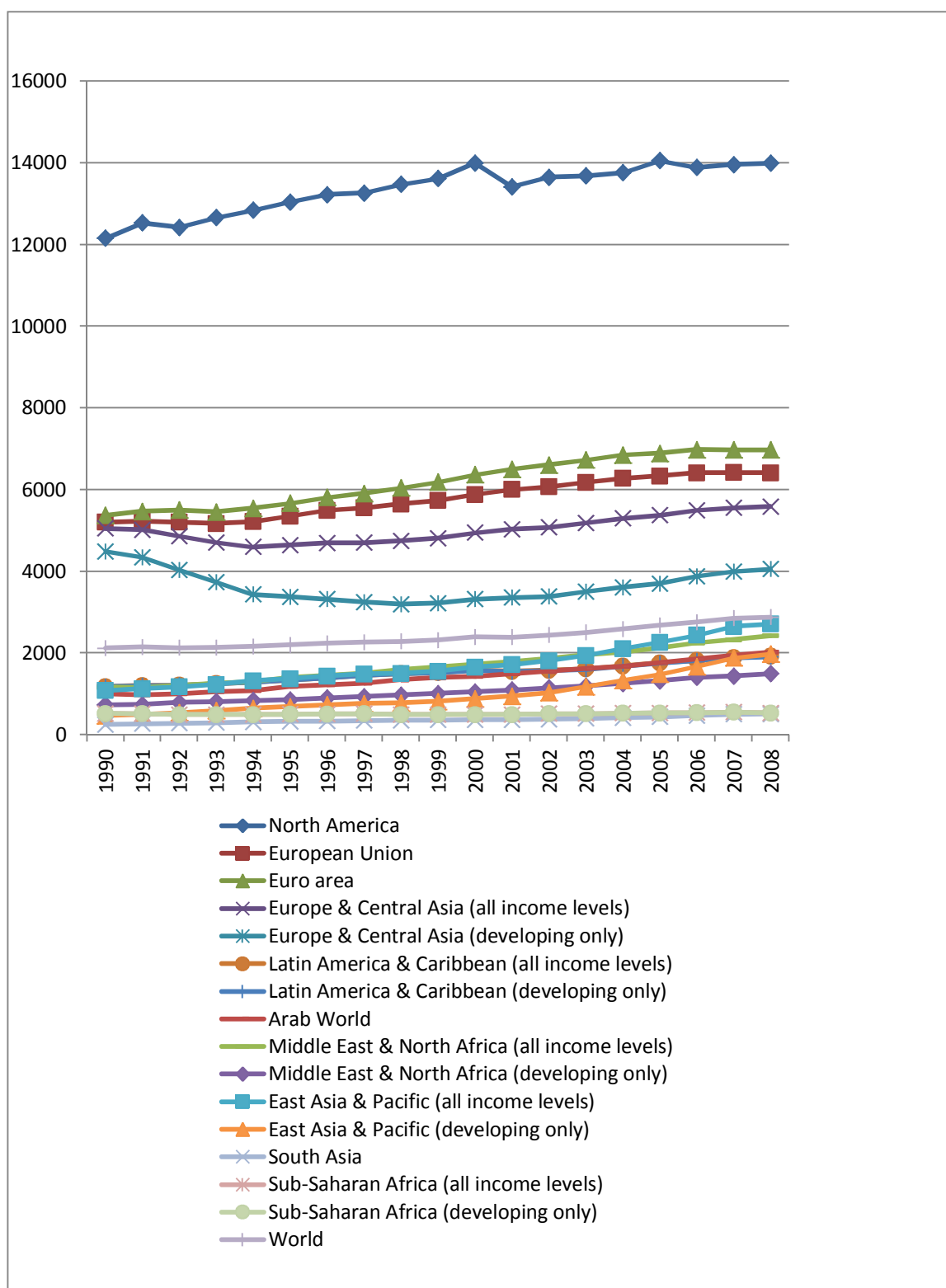
The aim of this study is to explore these questions with a view to identifying key challenges for aid financing of infrastructure, especially in Africa. Section 2 provides a brief summary of infrastructure needs. In section 3 the extent of ODA activity in infrastructure is discussed. Section 4 focuses on alternative mechanisms to finance infrastructure. Section 5 examines China's investment in infrastructure in Africa. The final section presents conclusions and recommends that there needs to be a game change in the way we think about the role of ODA in infrastructure financing; that there needs to be multi-lateral co-operation between African nations, traditional ODA donors (OECD-DAC) and other large investors including China, India and others; and that ODA can play a catalytic role in pump priming and 'investing in investors' by contributing to changing the institutional environment in Africa. This can facilitate other non-conventional infrastructure financial flows to become the main vehicles for future infrastructure financing.

2 Infrastructure needs

How much aid should be spent on infrastructure depends on the extent of 'need'. However, estimating the need for infrastructure finance can be subjective and any figures one can come up with would depend on the assessment of adequacy of existing infrastructure, cost effective alternatives and minimum acceptable standards. Africa's infrastructure deficit is evident from country diagnostic assessments such as Foster (2008) and Calderon and Serven (2008). These studies find that infrastructure levels in the low-income countries in sub-Saharan Africa (SSA) were significantly below the levels in other low-income countries for the following indicators: roads, mainline and mobile telephones, internet, electricity generation capacity, electricity coverage and population with access to improved water and sanitation.

On many indicators of infrastructure, Africa comes out as a region in need of infrastructure investing. This is the case with regard to various indicators such as access to road networks, ports, railways, electricity, mobile and landline telephones, internet, water and sanitation services. For example, Africa's infrastructure deficit is evident from electricity use per capita (see Figure 1). Worldwide, electricity use increased from 2,120 kilo watt hours per capita in 1990 to nearly 2,875 kwh per capita in 2008. In 1990, a person in any of the developing countries in SSA on average used 514 kwh of electricity as compared with 246 units per person in South Asia and 463 units per person in developing countries of the East Asia and the Pacific. By 2008, electricity consumption in East Asia and the Pacific increased by four times to 1,972 units per capita and consumption in South Asia also increased to 503 units per capita. However, in SSA, it has remained stagnant more or less and increased ever so slightly to 531 units per capita.

Figure 1: Electricity use kilo watt hours per capita



Source: World Development Indicators (2011).

Electricity transmission and distribution losses in the developing countries in SSA were around 10 to 11 per cent in 2008 as compared with a worldwide average of 7 to 8 per cent and about 6 per cent in high income OECD countries. Only about 12 per cent of all roads in Africa are paved as compared with nearly 40 per cent worldwide. There were

some 23 passenger cars per 1,000 persons in SSA as compared with some 131 cars per 1,000 persons worldwide. Africa's infrastructure deficit has also been noted in a study of benchmarking Africa's infrastructure against world-wide trends by Yepes et al. (2009): '... Africa lags behind all other regions of the developing world in its infrastructure endowment, except in ICT'.

Further, Foster and Briceno-Garmendia (2010) note that Africa's economic geography also presents a major challenge to the development of much needed region-wide infrastructure such as transnational roads, electricity and telecommunication networks further disadvantaging some of the smaller as well as land-locked nations. They also find that not only Africa's infrastructure is deficient but also that it is the most expensive in terms of unit costs as compared with global averages.

Fay and Yepes (2003) provide a model to estimate demand for infrastructure per capita as a function of income per capita, the price of infrastructure services, and the shares of income from agriculture and industry. Using this model, they project infrastructure stocks and expected annual investments for the period 2005 to 2010. Their estimates suggest approximately US\$370 billion or approximately 1 per cent of world GDP for new investments and a further US\$480 billion or 1.17 per cent of world GDP for maintenance. In all low-income countries, they estimate a new investment of US\$50 billion or approximately 3.2 per cent of GDP and another US\$57 billion or 3.7 per cent for maintenance. The 'need' estimated for SSA was US\$13 billion each in new infrastructure and annual maintenance. Their estimates can be criticized for suggesting that there would only be a modest increase in the infrastructure indicators (see Table A1 in Appendix).

UNCTAD (2008: 93) estimated annual infrastructure investment needs in SSA for the period 2006-15 to be around US\$40 billion: approximately US\$23 billion for capital expenditure and US\$17 billion for maintenance and operations (see Table A2 in Appendix).

NEPAD-OECD (2011) suggests that Africa needs investment in infrastructure to the tune of US\$93 billion annually or an additional financing of US\$31 billion a year. This estimate is in line with estimates made by Foster and Briceno-Garmendia (2010) (see Table A3 in Appendix). Their estimates are that around US\$60 billion would be needed annually in capital expenditure, and US\$33 billion would be needed in operations and maintenance.

These projections do not fully factor in issues related to climate change adaptation and mitigation and the potential role that infrastructure can play in this. Climate change can impact on infrastructure planning in two opposite directions—in many cases, infrastructure development can contribute to the capacity of societies to adapt to climate change (and to some extent also their ability to mitigate climate change as in the case of improvements in energy efficiency of transport options due to better transport infrastructure or substitution possibilities of information and communication technologies (ICT) which can help in reducing unnecessary physical travel). In a small number of cases, additional infrastructure investments would be necessary because of climate change—especially with regard to water distribution networks and access to water or in terms of protecting coastal and riparian communities from potential seasonal flooding.

3 DAC-OECD aid and infrastructure

Infrastructure industries often involve natural monopolies where it is cost effective to have a single provider. Infrastructure development involves lumpy investment over a long period of time; maintaining the infrastructure also requires both financial and technical resources. Many infrastructure services also include some degree of public good or impure public good characteristics. The private sector provides some infrastructure—in colonial times foreign investors invested in infrastructure supporting their own mines and plantations—but it will typically underinvest given that private investors cannot internalize all of the resulting benefits. States have therefore been central to infrastructure investment and maintenance.

While these reasons justify a role for the state, many developing countries have lacked the resources to fund even a minimum of their feasible projects. The classic two-gap and three-gap models which became so influential in the earlier development economics debates, were developed in part to put a framework around the project financing initiatives led by the World Bank and the regional development banks, physical infrastructure being the core of their lending portfolios up to the 1980s (Chenery and Bruno 1962; Chenery and Strout 1966).

Where the state lacked resources or capacity, aid has been used to fill the financing gap. For example in 2009, of total ODA by DAC members, some 43 per cent was allocated to ‘social and administrative infrastructure’ and another 14 per cent was allocated to ‘economic infrastructure’. These figures need to be interpreted with caution because aid allocated to other purposes can also include infrastructure components and aid classified as ‘social and administrative infrastructure’ can include capacity building activities or institutional strengthening measures which may not contribute to an increased volume of infrastructure services. Notwithstanding these reasons for caution, ODA has been an important source of infrastructure financing in many recipient countries especially in Africa.

If we focus on the so-called physical infrastructure items alone, then the extent of ODA allocated to water and sanitation is 6 per cent, aid for transport and communications is some 7 per cent, and for energy around 3 per cent. Between 1986-87 and 2006-07, the share of aid allocated to social and administrative infrastructure increased from 25 per cent to some 37 per cent. For the same period, the share of aid to economic infrastructure decreased from some nearly 20 per cent to 12 per cent. Though in relative terms the extent of aid to economic infrastructure has decreased, in absolute terms there has been a significant increase as total net ODA (to all purposes) has nearly doubled from 1990 levels to 2006. Total net disbursements in 1991-92 were US\$130 billion and these increased to US\$303 billion by 2006 (both in 2006 prices). Thus, the amount allocated to economic infrastructure increased from about US\$26 billion in 1990 to approximately US\$36 billion in 2006.

Total ODA disbursements from all DAC members increased from US\$41 billion in 1986-87 to US\$59 billion in 1996-97 and further to US\$116 billion in 2006-07 (OECD 2010). The share of SSA decreased initially from 26.6 per cent in 1986-87 to 23.4 per cent in 1996-97, and increased to 31.3 per cent in 2006-07. This increase is partly due to countries such as Ethiopia and Rwanda coming out of internal conflicts that affected the

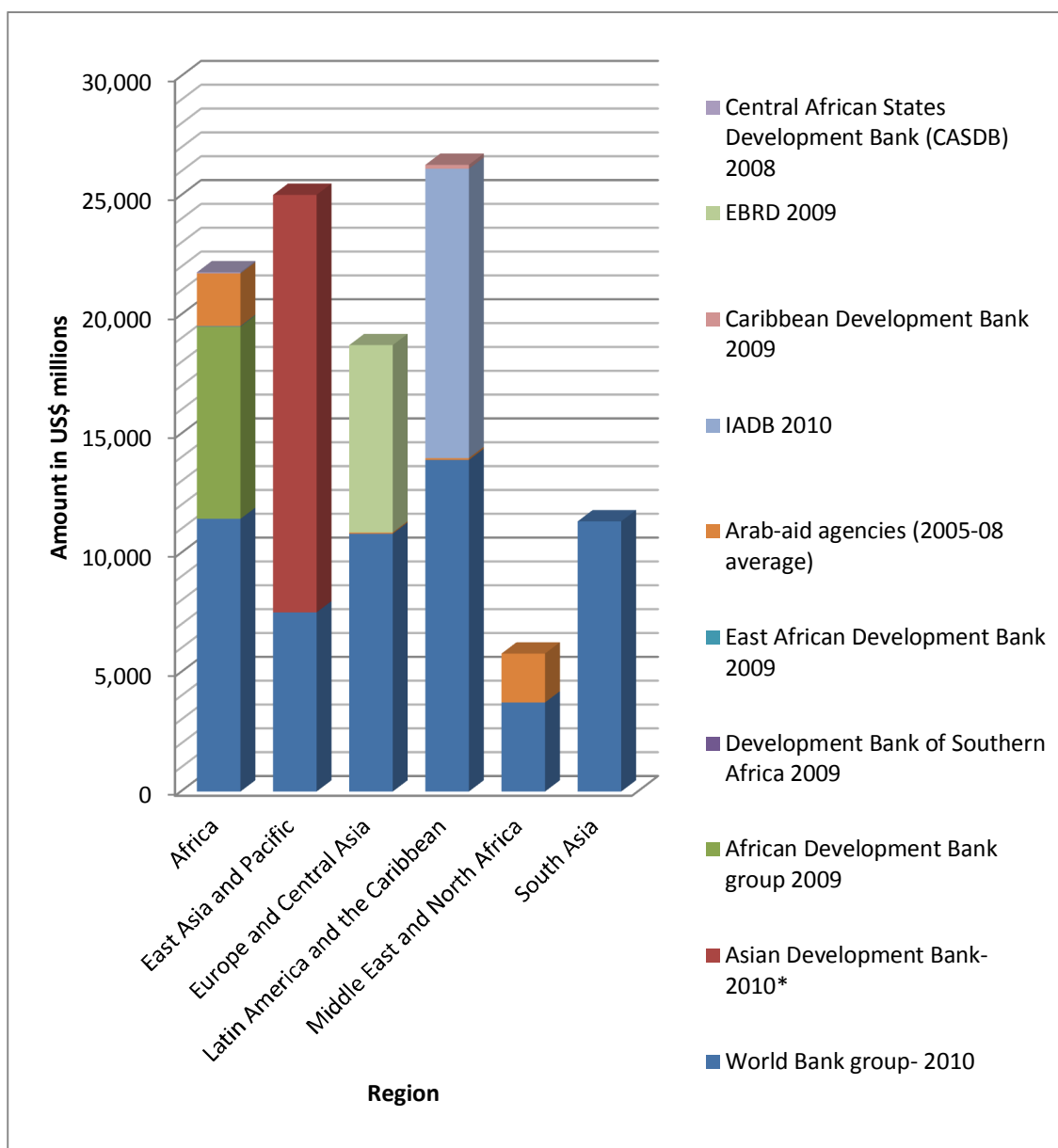
relationship between donors and SSA countries and partly also due to HIPC and MDG initiatives.

According to NEPAD-OECD (2011), though total ODA to Africa increased from US\$10.3 billion in 2000 to US\$28 billion in 2009, the proportion of aid allocated to electricity, transport, telecommunications, and water, has more or less remained stagnant at around 10 per cent of all aid. Underinvestment in these areas represents a major bottleneck on raising agricultural productivity, diversifying manufacturing, and developing high-value added service sectors (especially those that are ICT-intensive) (as we shall see later on, at around the same time, investment by China in the infrastructure sectors during 2001-09 increased many fold).

While these figures mainly relate to development assistance, multilateral and regional financial institutions have also been investing significant amounts in infrastructure through loan financing. For example, cumulative commitments by the World Bank over 1990 to 2010 were approximately US\$353 billion from the development lending (International Bank for Reconstruction and Development, IBRD) plus a further US\$168 from concessional lending (International Development Association, IDA) commitments. Of this, the combined total lending for energy and mining, transportation, water, sanitation and flood protection is US\$133 billion in terms of IBRD credit and US\$50 billion by way of IDA commitments. In 2010 alone, approved loan commitments by the World Bank group (combined IBRD and IDA) totalled approximately US\$58 billion. In addition, various other multilateral development banks provided approximately US\$50 billion. A significant majority of the portfolio is applied to infrastructure projects (see Figure 2).

For Africa, Foster and Briceno-Garmendia (2010) estimate that total spending on infrastructure was around US\$45 billion over 2001-06. Of this, ODA contributed around US\$3.6 billion. They note that the largest share of infrastructure finance in Africa comes from African taxpayers to the tune of around US\$10 billion in capital expenditure and another US\$20 billion in maintenance (see Table A4 in appendix). Thus, while we noted earlier the role for aid supposedly in meeting the financing gap in infrastructure investment, it turns out that domestic revenues are funding the lion's share. Although these revenues have increased in recent years (the result of donor-assisted revenue reforms that have raised the average tax/GDP ratio in aid-recipients) there is a limit to how much the region can contribute until economic growth raises the size of the tax base appreciably. Growth itself is partly a function of putting in place good infrastructure investment, so there is something of a virtuous circle available if more initial infrastructure finance can be found. This does of course require selecting the projects carefully to maximize their rate of return to growth, and linking up infrastructure to industrial policy (on the latter see Page 2012).

Figure 2: Loan commitments per annum by major development banks (in million US\$)



Note: Asian Development Bank spending shown under East Asia includes spending in South Asia.

Source: Compiled by authors based on various annual reports.

4 Other modes of financing infrastructure

It is difficult to estimate how much investment is taking place in infrastructure sector and how much of this is coming from ODA. The main reason is that in many bilateral or South-South co-operation projects, infrastructure is often a part of a larger investment project. Also, a significant amount of investment is made in kind by bilateral donors by non-DAC donors such as China and India as part of larger co-operation package (Brazil could also become a bigger contributor). By combining different sources, we can get an

approximate picture of what is happening especially in Africa with regard to infrastructure investment.

In many African countries, over a third of all investment in infrastructure comes from domestic sources—much of it from the state but a significant proportion also from the ‘domestic’ (or indigenous) private sector; ODA from DAC members contributed approximately another third or less. The remainder of the investment comes from various other international sources.

With the evolution of legal and institutional mechanisms, infrastructure previously thought to be entirely in the domain of the state has become attractive to the private sector over the last decade.² While privatization got off to something of a rocky start in Africa (non-transparency often being the core problem) it does offer considerable potential to mobilize capital that is not otherwise available for investment. While privatization or divestment in the form of outright sale and transfer of management and ownership from public to private sector can be a driver of investment, this accounts for a small share of overall investment in infrastructure by private sector. For example, in the case of electricity, private sector involvement can include ownership or management and running of power generation facilities such as gas or coal-based thermal plants or hydro-electricity generation or in the distribution and billing of customers and end users. Various models of public private partnership (PPP) or private finance initiatives (PFI) models include mechanisms such as ‘build-operate-transfer’ (BOT), ‘build-own-operate-transfer’ (BOOT) or ‘build-lease-transfer’ (BLT). We now discuss these in more detail.

4.1 Private sector participation

The World Bank’s database on participation by private sector in infrastructure (PPI) indicates that globally, investment by the private sector in infrastructure in developing countries increased from around US\$20 billion in 1990 to US\$154.4 billion in 2008 (in real terms). Almost 90 per cent of this investment is in physical assets, whereas 10 per cent is in the form of payment to government. The overall number of new PPI projects peaked at around 350 in 1997, but since 2000 the number of new projects annually has been around 220. The median project size increased from around US\$150 million in 1995 to around US\$270 million in 1997 which then decreased to around US\$80 million in the early years of the millennium to increase back to around US\$300 million in 2008. Figures are not yet available for 2010 and beyond but in the aftermath of the global financial crisis, it is plausible that the median size would have decreased. A PPI update of September 2010 confirmed that PPI investments in the first quarter of 2010 were down by 25 per cent compared to the previous year. Such is the impact of the ongoing global economic slowdown, and another ‘credit event’ of the type experienced in 2008, in which the supply of risk capital fell away rapidly, remains a threat.

² Private sector participation does not mean privatization nor does it mean that such public services should be provided on the basis of user charges only. Where state alone does not have the capacity to provide services, there is a role for involving private sector. However, such projects should be designed carefully to ensure that access to services for the poor households and other vulnerable groups is protected.

One important trend is the increasing concentration of PPI projects in a few countries, especially in BRIC countries themselves. Since 1997 until 2008, in every year, PPI investments in Brazil, Russia, India and China (BRICs) and other emerging economies such as Mexico and Turkey accounted for at least 50 per cent of all PPI investments worldwide. Though SSA accounts for a relatively smaller share of overall PPI portfolio worldwide, in absolute terms annual investment by PPI in this region has been around US\$10 billion and this is very significant compared to overall infrastructure investment in Africa.

The International Finance Corporation (IFC), the private sector finance arm of the World Bank group, committed investment of approximately US\$1.5 billion in infrastructure sector in 2010. This constituted 12 per cent of total commitments (in all industries including infrastructure) by IFC in that year. Geographically, IFC commitments include US\$3 billion in Latin America and the Caribbean, nearly US\$3 billion in Europe and Central Asia, US\$2.4 billion in SSA, around US\$1.5 billion each in East Asia and the Pacific and Middle East and North Africa regions, and US\$1 billion in South Asia. The IFC is redirecting itself to more of a poverty mandate, but it is not clear what this means yet for the type and regional distribution of its investments.

In 58 IDA countries, loan commitments in 2010 were to the tune of US\$4.9 billion. IDA has been a longstanding instrument for infrastructure investment, including some of development's success stories (India, South Korea, and Taiwan), for example. Future IDA replenishments are however vulnerable to the rapid recent fiscal deterioration in the OECD-DAC group. This is a potential threat to the smaller and poorer countries, and they need to diversify their infrastructure finance to reduce this risk as they build the infrastructure necessary to join the middle-income group of countries, that benefited from past IDA financing.

4.2 Other financing mechanisms

The nature of infrastructure financing has changed considerably with several different formats or modes entering the picture—these include the following:

- (a) sovereign wealth funds (SWF);
- (b) infrastructure funds—mainly in the form of private equity funds specializing in infrastructure sectors emerged during the period 2000-08. However, the financial crisis of 2008 has had some impact on this sector;
- (c) private flows in terms of FDI in LDCs and developing and transition countries by multi-national corporations (MNCs) based in developed countries, cross-border mergers and acquisitions (M-As); and
- (d) Bilateral investments by developing countries such as China, India and Brazil (BRICs).

4.3 SWFs

A sovereign wealth fund is a surplus of resources owned by a government, and used for overseas investment. A majority of SWFs are held by natural resource-rich nations including Abu Dhabi, Saudi Arabia, Kuwait, Russia, Norway and Botswana and also non-mineral nations such as Singapore and China. According to Sovereign Wealth Fund Institute data, the global pool of SWFs increased from approximately US\$3,265 billion in September 2007 to US\$4,772 billion in December 2011. Nearly 58 per cent of SWFs are based on revenues of oil and gas sectors. The largest SWF is that of the Abu Dhabi Investment Authority which is estimated to be worth approximately US\$627 billion.

In Africa, the two biggest SWFs are Libya (US\$65 billion) and Algeria (US\$57 billion). Libya has made considerable investments, but has been beset by non-transparency and misuse of funds. One of the earliest SWFs to be established from Africa is the Pula Fund set up by Botswana based on diamond and mineral revenues (with a 2011 net worth of nearly US\$7 billion).

Table 1: Prominent sovereign wealth funds (and net worth in billions of US\$)

Prominent oil or gas based SWF			Non-oil based SWFs		
	Year of inception	Net worth as of May 2012		Year of inception	Net worth as of May 2012
UAE - Abu Dhabi Investment Authority	1976	627	China - SAFE Investment company	1997	567*
Norway - Pension Fund	1990	611	China Investment Corporation	2007	439
Saudi Arabia SAMA Foreign holdings	***	532	Hong Kong Monetary authority	1993	293
Kuwait Investment Authority	1953	296	Singapore Investment Corporation	1981	247
Russia - National welfare fund	2008	149	China - National social security fund	2000	134
Qatar Investment Authority	2005	100	Singapore - Tamasek holdings	1974	157

Source: Based on data from SWF Institute (2012).

SWFs do not usually invest directly or completely in infrastructure projects but can provide equity capital or invest in special purpose vehicles (project organizations set up to deliver specific infrastructure projects). For example, the Abu Dhabi Investment Authority has benchmark ranges for different elements in its portfolio: some 46 to 70 per cent in equities; 10 to 20 per cent in government bonds; 5 to 10 per cent each in credit, alternative investments and real estate; some 2 to 8 per cent in private equity and

some 1 to 5 per cent in infrastructure. Thus, its investment in infrastructure alone can range from US\$6 billion to 32 billion. The fund's overall investment tends to be mostly in developed countries (North America and Europe could account for anywhere between 60 to 85 per cent). Only 15 to 25 per cent is invested in emerging markets. Within Africa, its investments have mainly gone to South Africa, Egypt or Morocco. Its infrastructure investment group's strategy clarifies the position:

The Infrastructure Group was created in 2007 to build and manage a global portfolio of infrastructure investments, which are attractive to long-term investors such as ADIA due to their relatively stable returns. The Infrastructure Group's core focus is on assets with strong market-leading positions and relatively stable cash flows, including utilities, such as water, gas and electricity distribution and transmission companies, as well as transport infrastructure, such as toll roads, ports, airports and freight railroads. Its primary strategy is to acquire minority equity stakes alongside proven partners, with an emphasis on developed markets but an ability to look at emerging markets on an opportunistic basis. In keeping with ADIA's overall approach, the Infrastructure Group is a financial investor and does not seek to control or operate the assets in which it invests (ADIA 2012).

This example highlights two issues for infrastructure investing in Africa. First that at present only a few countries are able to attract investment by SWFs. And second, the fact that they are able to attract such investment suggests that with the right kind of policy instruments, it should be possible to attract such investments to fund infrastructure improvements in other parts of SSA as well. As the Deloitte (2008) study notes, while it may be relatively easy for SWFs to acquire certain assets fairly quickly, their absence from acquiring insurance firms suggests that it may be far more difficult to attract such funds to invest in services.

An IMF (2008) survey classified SWFs into five categories, namely, stabilization funds, savings fund for future generations, reserves, development funds, contingent pension reserve funds. Stabilization funds are common in the case of natural resource-rich countries whose government revenue can fluctuate due to commodity price fluctuations. Of these, infrastructure investment projects are likely to be most attractive to a savings fund for future generations such as the Norway Pension Fund or Alaska Fund (as they produce a steadier stream of income, for instance tolls from roads) though other funds also may invest in infrastructure from time to time.

SWFs can be an ideal mechanism for natural resource-rich countries such as those having a significant natural capital in the form of sub-soil assets as shown in Table 2.

For the eleven countries with sub-soil assets greater than a billion US dollars, the annual stream of resource rents would be substantial to pool into an SWF. Investing a portion of such SWF in infrastructure can be a major driver for infrastructure investments in such countries. By creating conditions for investment in infrastructure, especially by resource rich countries among themselves or in regional and trans-boundary projects, it may be possible to attract a steady stream of investments from the rents generated from sub-soil assets such as oil and minerals. This is also closely related to strategies to avoid Dutch disease effects and subsequent 'resource curse' problems in such resource rich nations. At present, such efforts essentially focus on macro-economic measures and

transparency initiatives such as Extractive Industries Transparency Initiative (EITI) rather than link resource wealth to regional development. While EITI may be helpful in improving the accountability of resource based income, this is not sufficient to ensure that such income streams are effectively invested. Solow-Hartwick sustainability rule requires that resource rents are invested. Creating SWFs, thus can help resource rich nations to increase their adjusted savings and at the same time increase the capacity to fund infrastructure projects.

Table 2: Wealth of nations: African countries by value of sub-soil assets for year 2000

	Sub-soil wealth per capita US\$	Population	Sub-soil wealth total million US\$
Algeria	11670	30,385,000	354,593
Nigeria	2639	126,910,000	334,915
Egypt	1544	63,976,000	98,779
South Africa	1118	44,000,000	49,192
Gabon	24656	1,258,000	31,017
Congo Republic	7536	3,447,000	25,977
Tunisia	1610	9,564,000	15,398
Cameroon	914	15,117,000	13,817
Zimbabwe	301	12,650,000	3,808
Morocco	106	28,705,000	3,043
Zambia	134	9,886,000	1,325
Botswana	246	1,675,000	412
Benin	15	6,222,000	93
Namibia	46	1,894,000	87
Côte d'Ivoire	2	15,827,000	32
Kenya	1	30,092,000	30
Burundi	4	6,807,000	27
Niger	1	10,742,000	11

Source: Based on World Bank (2006).

4.4 Infrastructure funds

Infrastructure funds are pooled resources which are mainly invested in infrastructure sectors (utilities) which provide steady and secure income. Some of these funds are listed on stockmarkets (and thus available to individual investors) and others are not listed. According to Standard and Poor (2009), the global listed infrastructure market is estimated to be over US\$1.79 trillion as of December 2008 as compared to a global equity market of US\$29 trillion. Energy, transport, and utilities are the main infrastructure sectors in which listed funds invest. A typical infrastructure fund may invest in stocks of companies providing economic infrastructure sectors such as airports, toll roads and bridges, gas, electricity and other utilities. Both individual and institutional investors may invest in infrastructure funds mainly to diversify their portfolio and to provide a stable and long-term yield and as an alternative to investing in stocks and bonds. Instead of being exposed to a single utility company or sector, by investing in infrastructure funds, investors can spread their risks over a range of utility

companies in different sectors and locations. Some of the funds are invested in public-private partnership (PPP) and private finance initiative (PFI) projects.

It is difficult to estimate the size of unlisted infrastructure funds but according to the Prequin Infrastructure Review of 2010, the capital raised by unlisted infrastructure funds peaked at US\$44 billion in 2007 but significantly decreased to US\$7.8 billion in 2009. This reflects the impact of the 2008 financial crisis, and the flight of risk capital (in line with findings in previous studies such as PWC 2009). The Review noted that as of March 2010, there were 105 infrastructure funds seeking to raise in aggregate US\$80 billion. While the aggregate amount of capital is decreasing, the total number of funds has been increasing suggesting that the average size of a fund is decreasing.

A survey of 14 infrastructure fund managers (Deloitte 2011) indicated that as compared with 2007, most infrastructure funds were shifting back to core infrastructure sectors: 'The precise definition of core infrastructure differs from fund to fund. Nonetheless, there remains a generally similar focus on regulated energy and water assets, airport and port assets that are either regulated or have positions of market dominance, and operating renewable projects that have contracted tariff protection arrangements'. The survey also indicated that in the view of these fund managers, internal rates of return were expected to be high in the case of investments in airports, ports, infrastructure services and telecoms and low in PPP/PFI projects, other regulated industries, and water utilities.

Most of the infrastructure funds have been investing mainly in the mature markets of Western Europe, North America and Australia. Few of these funds have been investing in emerging markets notwithstanding the fact that there can be significant growth in emerging Africa and its ability to absorb such funds and generate significant and steady returns. Getting the necessary institutional architecture in place and creating national and regional infrastructure investment opportunities, developing the necessary regulatory mechanisms for contract enforcement and reducing political and sovereign risks are the crucial priorities if infrastructure funds need to be attracted to investing in Africa.

4.5 FDI in infrastructure

UNCTAD (2008: 99) estimates suggest that globally the share of infrastructure industries (electricity, gas, water, transport, storage, and communications) in the inward FDI stock has remained at around 10 per cent. In the period 1990-2006, the inward FDI stock worldwide increased from around US\$25 billion in 1990 to US\$784 billion in 2006. Much of it, US\$578 billion, was in developed countries. In developing countries, inward FDI in infrastructure increased from around US\$6.7 billion in 1990 to US\$199 billion in 2006. In Africa, inward FDI in infrastructure increased from US\$0.132 billion in 1990 to US\$12.5 billion in 2006. Though this is a significant increase in Africa, much of this increase is likely to have been to replace dilapidated infrastructure (and thus, does not show up in the indicator of net increase in infrastructure per capita) and where it is indeed in new infrastructure that is likely to have been closely related to natural resource extraction activities and transporting such resources to the nearest port. Developed countries accounted for much of infrastructure-related outward FDI. Largest outward investments in infrastructure industries were from the UK (US\$208 billion);

France and Spain (US\$99 and 89 billion respectively), followed by the USA and Canada (with US\$49 and 41 billion respectively).

UNCTAD (2008: 101) also estimated the relative contribution of foreign, domestic private, and public sectors in infrastructure investment commitments during 1996-2006. In the case of Africa, the public sector accounted for nearly 52 per cent of all infrastructure investment; the domestic private sector accounted for around 12.5 per cent and foreign investment accounted for 35.5 per cent. In contrast, in Asia the corresponding figures were: 47.7 per cent from domestic public sector, 32.5 from domestic private sector, and 19.8 per cent from foreign investors. These are mere snapshots and some of the difference could be due to maturity of private sector activity in infrastructure investing for several decades now in Asia. However, this raises the need to create the necessary enabling environment such that a significant scaling up in infrastructure investment needed in Africa can take place with both domestic and external investors contributing to the increase.

5 China and other non-DAC donors

China provides a mix of finance to SSA, some with the characteristics of traditional aid, but much in the form of other finance that would not be classified as aid under OECD-DAC criteria. This is having a substantial impact on the stock of new infrastructure in the region.

China's investment in Africa also changed along with its trade.³ From the previous era of investing to win friends (for example, with the Tazara railway line⁴ between Tanzania and Zambia starting in 1970) more recent approaches have been 'strategic and resource based'. This seems to have been shaped by the formation of the Forum for China Africa Co-operation (FOCAC) and its first ministerial meeting in Beijing in October 2000. The second ministerial meeting was held in December 2003 in Addis Ababa. The most important meeting was perhaps the Beijing summit (or third ministerial meeting—FOCAC3) held in November 2006 which also celebrated 50 years since the establishment of diplomatic ties between China and African nations. This meeting is important because the financial relationships between China and Africa entered a new era after this meeting. The declaration of the Beijing summit called for '... a new type of strategic partnership'. Eight development pledges were made by China, many of which specified targets to be reached by 2009. Kragelund (2010) assesses these development pledges and finds that most of these have been met.

The cumulative aid from China to Africa for the period 1957 to mid-2006 was estimated to be around US\$5.7 billion (Bräutigam 2008: 198). Elsewhere, the same author quotes Chinese premier Wen Jiabao's statement that '... China had disbursed a total of US\$30 billion in aid to all developing countries since 1950, of which about US\$13 billion was in the form of grants' (Bräutigam 2009: 165). Her own estimates of China's official

³ For instance, exports as percentage of GDP remained less than 10 per cent until 1980; between 10 and 16 per cent until 1990; increased steadily to above 20 per cent in 1994 and reached above 34 per cent in 2004; remained above 30 per cent until 2008 and then to around 27 per cent in 2009 in the aftermath of the global financial crisis (World Bank 2011). Also see a previous analysis in Wang (2007).

⁴ See Monson (2011).

development aid including debt relief to Africa for the year 2007 were US\$1.4 billion and expected to rise to US\$2.5 billion by 2009 (ibid 2009: 168). She finds that this is much smaller than USA's commitments in Africa in the same year of US\$7.6 billion or the EU's commitment to Africa of US\$5.4 billion (ibid 2009: 172).

However, as Lum et al. (2009) note in their report to the US Congress, 'China's foreign aid is difficult to quantify'. They report a study by New York University's Wagner School to the effect that China's foreign aid and assistance in Africa, Latin America, and Southeast Asia grew from less than US\$1 billion in 2002 to some US\$27.5 billion in 2006 and US\$25 billion in 2007. Foster et al. (2008) noted that both FDI and bilateral trade between China and Africa increased fourfold between 2001 and 2006. They found that China's financial commitment to infrastructure projects in Africa increased from around US\$1 billion per annum in 2001 to at least US\$7 billion in 2006, and dropped back to US\$4.5 billion in 2007. Power and transport are the main sectors attracting Chinese investment in Africa though China has been a significant contributor to other sectors including roads, water and ICT.

The Chinese government announced at the Beijing summit that all interest-free government loans to highly indebted poor countries would be cancelled. FOCAC reports that by the first quarter of 2009, China has cancelled 150 debts (see also Xiaocong 2010).

One issue is the linkage to development of the infrastructure that China funds. Stadiums and other prestige projects have a political impact but are of doubtful developmental value. Some observers have argued that African governments are not doing enough themselves to identify infrastructure projects with high social returns that China's financing could contribute to.

This may be the result of the sharp decline in the number of countries producing national plans, which featured in the policy-making of earlier development decades. While not without their problems, such plans did at least have a much greater focus on economic growth, sectoral investment, priorities, and structural change than the first, or even, the second generation of PRSPs. The latter have, overwhelmingly, a social sector/human development focus which, while it has considerable merit, leads to a lack of policy focus on poverty reduction via generating more remunerative employment. The latter can only come from growth and structural change, backed by high-quality infrastructure investment of the type that national plans can identify and prioritize. It is noticeable that Botswana's success partly rests on the importance it continues to give to national plans in the policy-making process, which have guided the use of Botswana's resource rents to encourage the economy's diversification (with appropriate and supporting goals for infrastructure projects). In the absence of such plans, the inclination is to default to stadiums and other prestige projects. Though some countries developed 'public investment programmes' in the 1990s, few of these have been fully implemented and were largely overtaken by or subsumed into PRSPs. For bilateral donors such as China, hard infrastructure projects such as energy and transport sectors may be easier to deal with than 'soft' and long term issues such as poverty reduction or human development. In summary, governments need to develop capacity in this area if they are to maximize the social gains from Chinese and other foreign investments as well as traditional ODA.

5.1 China's policy banks

In 1994 China set up three policy banks, namely Export Import Bank (Exim Bank), China Development Bank (CDB—initially set up as State Development Bank), and the Agriculture Development Bank. Exim Bank and CDB both have a significant international role. Exim bank provides export and import credit, loans for offshore contract projects and overseas investment by Chinese companies, international guarantees, on-lending of loans, international inter-bank services and syndication of loans. For 2009, the Exim Bank provided loans to the tune of RMB12.57 billion (US\$1.84 billion) for overseas construction contracts and RMB 53.998 billion (US\$7.9 billion) for overseas investment projects. From its balance sheet (in English) it is difficult to isolate how much of its overall portfolio relates to Africa.

Both the Exim Bank and CDB have been actively supporting China's 'go global' strategy to support enterprises to undertake international projects. In 2009, CDB has been involved in several important strategic projects such as the Sino-Russia petroleum project, the Sino-Brazil petroleum project, the Sino-Venezuela co-financing fund phase 2, and the Sino-Turkmenistan natural gas project. By the end of 2009, CDB's international business covered some 78 countries and a total portfolio which included outstanding foreign currency loans to the tune of US\$97.4 billion. This is estimated to have increased to US\$134 billion by 2010 (CDB Annual report) mainly by supporting Chinese mining and energy firms in their activities abroad (Downs 2011). CDB has committed US\$1 billion to support the development of small and medium enterprises (SME) in Africa. From the annual reports, it has not been possible to isolate specifically how much of CDB funds flow to Africa for infrastructure. Our estimate suggests that CDB loan portfolio to Africa increased significantly during the last eight years. However, there is need for further research in this area.

5.2 CAD fund

Based on an announcement at the Beijing summit (FOCAC3), the China Africa Development Fund (or CAD Fund) was set up in June 2007 with the mission 'to serve China Africa co-operation, to promote mutual development, to achieve first rate performance'. With an initial start of US\$1 billion, the target was to reach US\$5 billion. It is the first equity fund set up by China and is managed by the China Development Bank (though the fund itself is independent). It invests in Chinese enterprises who undertake projects in Africa. The policy is not to acquire majority or largest shareholding. In addition to equity and quasi-equity investments, the CAD Fund can also invest in other funds that invest in Africa.

In 2009, its first representative office in South Africa was set up. The four priority areas for the CAD Fund are: (a) agriculture and manufacturing industries; (b) infrastructure and basic industries; (c) natural resources; and (d) industrial and trade parks. The first infrastructure project was the Ghana Power Station which commenced in 2008 and is being implemented with Shenzhen Energy Investment Company limited. The CAD Fund provided an investment of US\$11.5 million to create Africa's largest leather processing factory in Ethiopia which is expected to create up to 500 jobs (CDB annual report).

China's outward FDI has remained well below 1 per cent of GDP during the period 1982 to 2009 (see Figure A1 in Appendix). Since 2004, however, this has been steadily increasing to reach 1.2 per cent in 2008 and decreased again to 0.9 per cent in 2009. In comparison, its inward FDI which remained below 1 per cent in the 1980s climbed to its peak of over 6 per cent of GDP in 1993, and has since decreased to around 3 per cent for the years 1999 to 2006. With China's internationalization strategy, it can be expected that China's outward FDI will also gradually increase. This suggests that investments in construction and infrastructure projects are also likely to increase.

5.3 Other BRICs

India also has bilateral relationships with many African nations both as a member of the Commonwealth and in terms of shared history of colonies independence struggle. Thus the first phase of India's relationship with Africa focused mostly on political ties. In 1991, when India accelerated economic reforms, inward FDI was less than 0.03 per cent of GDP and outward FDI was almost non-existent. Throughout the 1990s, India's inward FDI remained below 1 per cent of GDP and outward FDI remained at less than 0.12 per cent (see Figure A1 in Appendix). Inward FDI crossed 1 per cent of GDP only in 2001 and this did not increase significantly until 2006 when it climbed to above 2 per cent of GDP to reach the highest level of 3.4 per cent of GDP in 2008, then dipping slightly to 2.5 per cent in 2009. However, India's outward FDI increased significantly between 2001 and 2006 by which year it had reached 1.5 per cent of GDP. Since then it has averaged at around 1.3 per cent for the years 2006 to 2009.

India's ties with Africa have always included education (scholarships) and technical assistance (since 1964, annually around US\$10 million). The Export-Import Bank (Exim) of India was established in 1982 and export credits issued by the Exim Bank for trade with Africa were estimated to be around US\$1.9 billion (Kragelund 2010: 9). Since 2004, the 'techno-economic approach for Africa—India movement' (TEAM-9) focuses on eight West African countries in the fields of ICT, infrastructure and agriculture. While China's investments have been focusing on infrastructure projects such as energy and roads, Indian firms have been focusing in ICT, health and education aspects. Africa is also an important market for higher education in India.

Brazil has also been increasing its outward investment in general and investment in Africa in particular. In the case of Brazil too, both inward and outward investments remained well below 1 per cent of GDP until 1996 (see Figure A1 in Appendix). Inward FDI began to increase significantly from 1996 when it was 1.3 per cent of GDP to reach 5 per cent of GDP in 2000. Since then, it has decreased to less than 2 per cent in 2003 and has since remained between 1.6 and 3 per cent in each year until 2009. Outward FDI peaked in 2006 at 2.6 per cent of GDP. However, the average outward FDI for the period 2000 to 2009 is just 1 per cent of GDP. Lapper (2010) noted that Brazil's investments in Africa followed those of other BRICs i.e., towards resource-rich nations such as Angola and Mozambique. While Brazil's external trade with Africa has been on the increase, it is not easy to assess Brazil's infrastructure footprint in Africa. Brazil's trade with Africa is smaller than both China's and India's; Brazil's investments in Africa appear to have focused mainly on energy and petroleum. However, Brazil can play a lead role in promoting agricultural technology, sustainable energy and alternative

and biofuels development in Africa (and do this carefully and avoid previous experiences when biofuel growth contributed to the spike in food prices in 2008).

6 Re-orienting the role of ODA for infrastructure in Africa: from AB to ABCDEF

Infrastructure is crucial to sustaining growth and reducing poverty in developing countries in general and in SSA in particular. The infrastructure needs of Africa are around US\$93 billion annually. Domestic sources seem to provide around US\$30 billion, roughly one third. The ‘savings gap’ approach would call for increasing ODA to meet the shortfall. As UNCTAD (2008: 94) noted:

The magnitudes of the infrastructure investment needs of developing countries are huge, and even with identifiable sources of finance the gaps remain enormous. Unless the current level of infrastructure spending in all infrastructure industries is increased to match projected investment needs, developing countries will face a serious challenge in meeting their targets for growth and development. This is particularly true for those countries and regions where public sector budgets are limited, private investment has fallen short of needs, and where ODA support is declining.

However, the discussions in this study suggest that while traditional approach focuses mainly on aid (A) and bank funds, World Bank and other development banks (B), in the new context, it is equally important to take into account the roles of China (C), domestic resources of the African nations themselves (D). In addition, ODA can play some role in attracting equity investment (E) and funds (F short for SWF and infrastructure funds). Already, private flows to Africa outperform ODA. This suggests that there is scope for attracting other forms of capital to invest in Africa’s infrastructure. At present, an estimation of the flow of funds is notoriously difficult because some are not demarcated by purpose or location and there could be some overlaps and double-counting. Notwithstanding these shortcomings, the various estimates discussed throughout the study can be summarized to give an overview.

When we compare Africa’s infrastructure requirements (see table A4 in the appendix) with the figures in Table 3, it is clear that infrastructure needs of Africa appear insurmountable if one considers only sources A and B—the traditional sources of development finance and not at all insurmountable once the other non-conventional sources are also considered. In this regard, ODA can play an important role in changing the mindset and facilitating the transition from AB to ABCDEF.

The central argument of this study is that ODA can be applied strategically to create the necessary institutional structures. In this regard, within Africa, several distinct roles can be envisaged for ODA with regard to infrastructure development:

- (1) In small and land-locked developing countries, ODA may be required to fill the ‘savings gap’ and invest in infrastructure directly. [Thus the main sources of infrastructure finance will remain A, B]. Examples could include Benin or Lesotho.

- (2) In resource-rich nations, ODA should strategically complement investment from China (C) and domestic public and private sectors (D). Thus, ODA should mainly focus on trans-boundary and national public goods and primarily on creating necessary institutions to channel resource rents into investments and increasing transparency in resource use. ODA can thus play a role in facilitating the creation of SWFs from the mineral revenues and the necessary institutions to apply some of these funds for infrastructure development. [Thus the main sources of infrastructure investment can include A, B, C, and D, and perhaps to a small extent F]. Examples might include Angola, Zambia or Ghana.

Table 3: Matching needs with sources: a summary of estimates

	Worldwide	Africa (mainly SSA)
Infrastructure needs		
Fay and Yepes (2003)	850	26
UNCTAD (2008)		40
NEPAD-OECD		93
Availability of funds/resources		
A. Aid – ODA	103*	38.7*
B. Banks – World Bank and other Development Banks	109*	22.0*
C. China		
Official development aid		2.5
Infrastructure investments		7.0
D. Domestic resources – public and private		30.0
E. Equity investments		
Private sector investment (PPI)	154	10
IFC	12.5*	2.4*
F. Funds		
SWFs	4,300*	na
Infrastructure funds	1,790	na
Listed		
Infrastructure funds-unlisted	45	na

Note: * indicates that only a proportion of these amounts are likely to be applied to infrastructure. na indicates that data pertaining to Africa is not available.

Source: Various estimates compiled by authors based on: World Bank (2010a, 2010b); Asian Development Bank (2011); African Development Bank (2009); Caribbean Development Bank (2009), Inter-American Development Bank (2010) and others discussed throughout the text.

- (3) In non-resource-rich nations, ODA may need to play both a ‘savings gap’ as well as a ‘facilitator’ role to attract equity investments. [Thus, the main source of infrastructure investments can include A and B as well as to some extent D, and E]. Examples might include Uganda, Ethiopia or Malawi.
- (4) In addition, ODA can play a role in creating strong and region-wide intermediary institutions which can make Africa attractive as a destination for

global SWFs and Infrastructure Funds. Even if Africa can attract a small segment of these global resources, that can provide access to significant volume of resources. The most important criterion for such funds is with regard to risks. Individual African nations may not be able to compete and become attractive destinations for such funds unless the underlying risks in terms of country governance, transparency, property rights guarantees, ease of transaction etc., are addressed. For individual countries to do this will be extremely difficult. However, ODA can play a role in creating region-wide institutions on the lines of the 'Emerging Africa Infrastructure Fund' to act as a refinancing window.

The Emerging Africa Infrastructure Fund (EAIF) is a consortium which can provide funding between US\$10 and 36 million for private infrastructure projects. Its existing portfolio already includes many transport and power projects with the overall investment commitment of about US\$410 million. The fund has been set up by Private Infrastructure Development Group (PIDG) by aid agencies of UK, The Netherlands, Switzerland and Sweden. DFID, The Netherlands DGIS, the Swiss Secretariat for Economic Affairs and SIDA contributed an equity of US\$150 million. Private sector lenders have provided a debt of US\$365 million. The Mauritius-based fund management company 'Frontier Markets Fund Managers Limited (FMFML)' manages the fund. EAIF offers US\$ and euro loans and exceptionally local currency loans.

7 Conclusions

Infrastructure investment is central to development and the reduction of poverty.⁵ This paper has discussed infrastructure needs, especially in Africa, and relative to traditional and non-traditional sources of finance. For infrastructure alone, Africa needs around US\$93 billion annually. In comparison, aid for all purposes (not just for infrastructure) is around US\$39 billion to the region. The World Bank, the African Development Bank and other development banks together provide around US\$22 billion (for all projects, not just infrastructure). At present, African domestic resources provide up to US\$30 billion for infrastructure. There remains a significant gap between what is needed and what conventional resources provide.

In comparison, the global volume of funds in sovereign wealth funds (SWFs) and infrastructure funds (IF) is truly staggering. Africa's infrastructure investment gap can easily be bridged if only a tiny proportion of those global funds can be attracted into the region. The rise in the world prices of Africa's commodity exports over the last decade has certainly helped to make the investor community more interested in the region, as has greater stability in macro-economic policy and the initiation of sector reforms.

Yet there is still a role for ODA. Capital markets and infrastructure funds cannot be expected to meet all of Africa's needs and they will tend to pick the lowest hanging fruit

⁵ Though our paper has some common aims with Schiere (2010), we differ in a number of ways. Schiere does not focus on infrastructure which is our main focus. Schiere's estimates focus only on DAC ODA, multilateral ODA and China ODA whereas we focus on multiple forms of development assistance and infrastructure financing to Africa. Schiere's figures of China's assistance to Africa are of US\$1.7 billion in 2008. Our estimates focus on various forms of flows from China. Schiere focuses only on China while our discussion also includes other BRICs. Our policy recommendations on the role of ODA are distinctly different from Schiere's recommendations.

—the most profitable sectors and the easiest countries. The main challenge to overcome is still the continuing high levels of political and sovereign risk in some countries. The private sector invests in Africa when the profit margins are sufficiently large to absorb the additional risk premia. However, Africa is very diverse and not all countries in Africa present similar risk levels in terms of political and country risks. When ODA raises economic growth, for which there is now robust evidence, it reduces political risk by increasing the chances of political stability and the avoiding conflict. ODA can also help build more robust macro-economic frameworks and construct the capacity of domestic institutions to attract and absorb infrastructure investments.

Second, even where political instability exists, it may still be possible to create insurance mechanisms, private and government participation, exchange reserve creation, measures to enhance the liquidity of funds as well as venture capital mechanisms, thereby reducing some of the hurdles to investment. Here too, ODA can play a significant role. Third, ODA can help in increasing independent assessments and information collection roles. Here, ODA can promote partnership between African higher education institutions, research centres and private sectors to create the necessary platforms for information sharing and knowledge creation.

Finally, this paper has emphasized the positive role that can be played by China and other BRICs, which have emerged as significant investors in Africa. At the moment, there is some suspicion and antipathy between aid donors and China. However, Africa needs both China and traditional aid donors. By improving tri-partite co-operation where this is possible, all parties can benefit. In the first instance, informal dialogue needs to take place between donors and China, perhaps through the OECD. Second, the OECD can also attempt to systematically collect and publish data on aid and ODA from non-DAC members such as China and India.

China can also contribute by improving the way its development co-operation statistics are reported by bringing them into line with OECD-DAC systems. Second, China's key international agencies such as the policy banks and CAD fund need to make data and information more easily accessible. Third, some comparative assessment of similar kinds of project may help demonstrate the advantages of respective development assistance models. More competition between donors and China can be a good thing. Perhaps, in the case of resource-rich nations, this is already happening. At present, lack of complete information leads to avoidable suspicion and doubts about credibility. Once this is addressed, the scene can be set for performance-based competition and strategic complementarity amongst the different development finance institutions.

We have briefly discussed how investing in infrastructure can help in both adaptation to climate change also help mitigate climate change (by reducing emissions per capita due to improved efficiencies). Infrastructure investment would be crucial for successful transition to 'green economy' especially for African nations. However, the issue is not merely about quantity of infrastructure but more importantly about quality of infrastructure, how it is owned and maintained. Much of our focus in this paper has been on how ODA should play a different role increasing the quantity of resources available for infrastructure investment in Africa. Many of these arguments apply equally and especially with regard to quality of services.

Appendix

Table A1: Infrastructure stocks projections 2000 and 2010 (in US\$ billion)

	Year	Electricity generation	Tele-communications Fixed or landlines	Tele-communications - Mobile lines	Roads	Rail	Water	Sanitation	Total
LIC	2000	500	26	9	1,001	142	139	147	1,968
	2010	660	67	47	1,143	146	168	182	2,417
	Growth rate per annum	3.2%	15.8%	42.2%	1.4%	0.3%	2.1%	2.4%	2.3%
MIC	2000	2,010	134	154	1,177	295	178	239	4,194
	2010	2,053	350	562	1,450	298	204	280	5,673
	Growth rate per annum	0.2%	16.1%	26.5%	2.3%	0.1%	1.5%	1.7%	3.5%
HIC	2000	3,530	213	337	3,951	364	152	261	8,804
	2010	3,920	290	437	4,587	343	157	271	10,005
	Growth rate per annum	1.1%	3.6%	3.0%	1.6%	-0.6%	0.3%	0.4%	1.4%

Source: Data from Fay and Yepes (2003: 9).

Table A2: Annual infrastructure investment needs 2006-15 (annual average-US\$ billions)

	Capital investment	Operations and maintenance	Total
Electricity	5.5	3.3	8.8
Telecoms	3.2	2.0	5.2
Roads	9.8	7.4	17.2
Rail		0.8	0.8
Water	1.8	1.4	3.2
Sewage	2.7	2.1	4.8
Total	22.8	17.2	40.0
Financing gap			23.5

Source: Data from UNCTAD (2008).

Table A3: Estimate of infrastructure spending needs per annum for SSA (US\$ billion)

	Capital expenditure	Operations and maintenance	Total
ICT	7.0	2.0	9.0
Irrigation	2.9	0.6	3.4
Power	26.7	14.1	40.8
Transport	8.8	9.4	18.2
Water supply and sanitation	14.9	7.0	21.9
Total	60.4	33.0	93.3

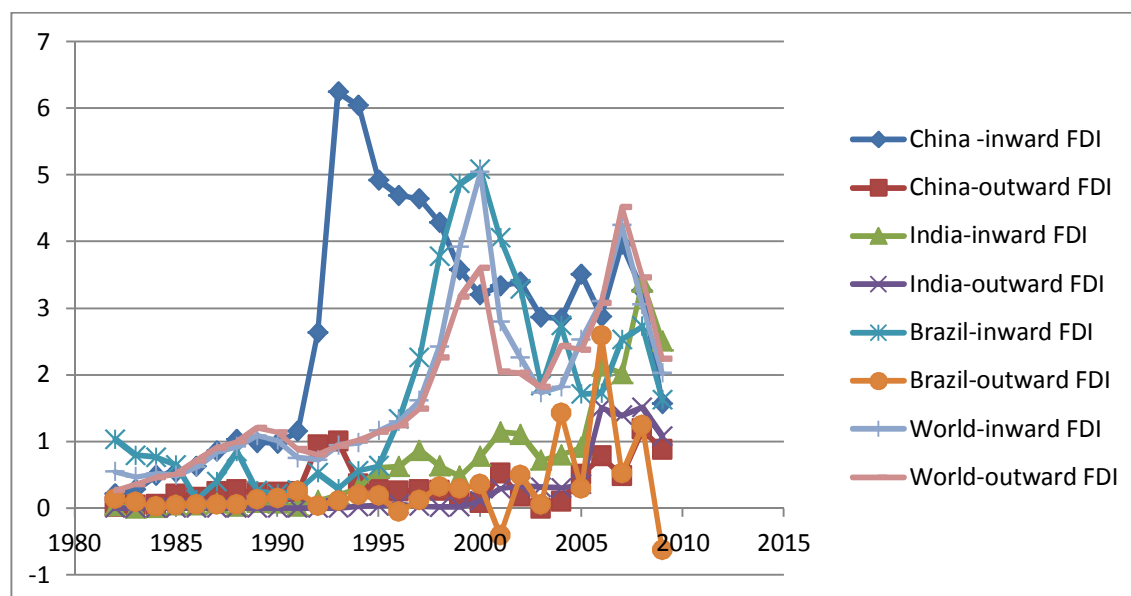
Source: Data from Foster and Briceno-Garmendia (2010).

Table A4: Infrastructure spending in Africa: average per annum 2001-06 (US\$ billions)

	Capital expenditure					Operations and maintenance	Total spending
	Public sector	ODA	Non-OECD financiers	Private sector	Total		
ICT	1.3	0.0	0.0	5.7	7.0	2.0	9.0
Power	2.4	0.7	1.1	0.5	4.6	7.0	11.6
Transport	4.5	1.8	1.1	1.1	8.4	7.8	16.2
Water supply and sanitation	1.1	1.2	0.2	2.1	4.6	3.1	7.6
Irrigation	0.3	0.0	0.0	0.0	0.3	0.6	0.9
Total	9.4	3.6	2.5	9.4	24.9	20.4	45.3

Source: Data from Foster and Briceno-Garmendia (2010).

Figure A1: Inward and outward FDI in China, India, Brazil and world average: % of GDP



Source: Based on data from World Development Indicators 2011.

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