

Beyond the Marshall Plan: A Global Structural Transformation Fund

BACKGROUND RESEARCH PAPER

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Justin Yifu Lin and Yan Wang*

“Make no small plans.

They have no magic to stir men’s blood”.

—Daniel Hudson Burnham (1846– 1912)

Abstract

The world economy is at a critical juncture where a grand scheme in addition to a paradigm shift is required to propel the “leaderless” economy back to its steady growth path. This paper addresses infrastructural financing issue from the angle of structural transformation as a growth-lifting strategy for global recovery. We proposed a win-win global infrastructure initiative -- a Global Structural Transformation Fund (GSTF) -- that could a) increase aggregate demand so as to create space for structural reforms in crisis-hit advanced countries and b) support green growth through investments in bottleneck-releasing transformative infrastructure projects in both advanced and developing countries. The traditional Keynesian stimulus directs spending toward

the domestic economy where the rate of return is low, while our proposal recommends a globally coordinated investment initiative directing global savings to where the developmental impact in terms of employment generation and rates of returns are higher. We propose to go beyond Keynesianism, go beyond infrastructure, and go beyond the Marshall plan.

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1. Introduction: The World Needs a Growth-lifting Strategy

The global economy has experienced the most tumultuous times since the Great Depression. Despite the coordinated policy response of the G-20 nations for expansionary monetary policy, the global economy, especially the advanced countries, has not fully recovered. Is the conventional Keynesian stimulus sufficient to propel this so-called “leaderless” global economy onto its steady growth path? A short answer is, no. Not only do we need a grand investment scheme but also a change of the mind-set.

What policies could constitute a win-win solution to avoid a protracted “New Normal” of slow growth, high unemployment, high volatility and low returns to financial investment? Based on the intellectual foundation of the New Structural Economics (NSE, thereafter) (Lin 2010, 2011, 2012), this paper addresses infrastructural financing issue from the angle of structural transformation as a growth-lifting strategy for global recovery. We present motivation and evidence to support a global infrastructure initiative – a Global Structural Transformation Fund (GSTF) that could motivate excess savings from the emerging market economies and Sovereign Wealth Funds, increase aggregate demand to enable structural reforms in advanced countries and support green growth through investments in bottleneck-releasing infrastructure projects in both advanced and developing countries.

Unlike traditional Keynesian stimulus, the global infrastructure investment initiative has several unique features: First, instead of increasing government spending to support consumption or by

“digging a hole and filling a hole” in advanced economies where the rate of return is low, our proposal emphasizes that any growth-lifting solution should focus on implementing bottleneck-releasing investments in developed and developing countries which will not only increase demand in the short-term but also raise longer term growth prospects. The traditional Keynesian stimulus directs spending toward the domestic economy, while this proposal recommends a globally coordinated investment initiative, directing global savings toward where the developmental impact of employment generation and social rates of return are higher. We propose to go beyond Keynesianism, go beyond infrastructure, and go beyond the Marshall plan. Such projects will increase demand and jobs in advanced countries and offset the contractionary effect when the advanced countries implement the needed structural reforms.

Second, investing in “bottleneck releasing” infrastructure could lead to high social and financial rates of returns, as well as employment generation and poverty reduction in the long term. Empirical literature has found supporting evidence for the contribution of infrastructure on long-run growth and development. Aschauer 1989 found that the stock of public infrastructure capital is a significant determinant of aggregate TFP in the U.S. and his estimate of the marginal product of infrastructure capital was as high as 100% per year. The average economic rates of return for the World Bank projects evaluated over the period of 1983-92 was 11% for electricity projects, and 29% for road building. Canning and Bennathan 2000 found that the estimated rate of return to electricity generating capacity could be as high as 100% a year (in 1985, for Bangladesh, Kenya, Bolivia and China), or as low as 10% or even negative in some countries. “In a limited number of countries we find evidence of very acute shortage of electricity generating capacity and paved roads, and large excess returns to infrastructure investment.” “To the extent that such high rates of return are not detected by a microeconomic cost-benefit analysis they point to

macroeconomic externalities associated with infrastructure”. (page 31, Canning and Bennathan 2000).

Another strand of recent literature has examined the effect of infrastructure on income inequality. The rationale is that infrastructure provision may have a disproportionate effect on the income and welfare of the poor by raising the value of the assets they hold (such as land or human capital), or by lowering the transaction costs (such as transport and logistic costs) they incur to access the markets for their inputs and outputs. These effects may occur through a variety of mechanisms documented in the literature, see for example, Estache, Foster and Wodon 2002, Estache 2003, and Calderon and Serven 2008.

Both arguments, macroeconomic externality, and income inequality, point to the need for public investment in providing certain types of infrastructure, because they represent either non-rival public goods as in the case of rural roads, or a natural monopoly as in the case of electricity generation and distribution systems. Without government intervention or public investment, the critical infrastructure for development would be undersupplied.

Third, investing in infrastructure alone is not sufficient to propel the growth engine and generate jobs unless it is combined with productive assets and human capital. A common misconception is that the lack of investment in infrastructure is always to blame where the private sector is not creating jobs – the causes may be related to inadequate agglomeration and cluster development, and other productive assets and human capital or capacity. **Our new idea** is to combine infrastructural building with green urban development, Eco-industrial parks and structural transformation to generate employment, revenue, growth and poverty reduction, making the environment more sustainable and the infrastructure financially viable.

Additionally, when reviewing the history of the Marshall plan, we notice that the Marshall Plan

had not limited to the reconstruction of the infrastructure only, independent of the industrial structure and international trade. And it cost only \$13 billion dollars, or around 1.1 percent of the US GDP during that period.¹ At the time of the Marshall Plan there was never an attempt to separate infrastructure from the industrial production and trade. Why do we limit ourselves to infrastructure only?

Fourth, there is a huge infrastructural funding and capacity gap in developing countries, especially in the area of renewable energy and green technology. The GSTF can help “crowd-in” funding and increase utilization of green technology by transforming existing cities into green cities, and building new clusters of eco-friendly industries. It will attract emerging market economies such as Brazil, China, India, and Arab countries to invest overseas and relocate some of their excess production capacity to low-income developing countries where there is a demand. This will also help the rebalancing or structural upgrading in their domestic economies, and make the needed restructuring less painful.

Fifth, infrastructure consists a spectrum of public goods, semi-public goods and private goods. Based on this classification consistent with the NSE, government budget and ODA should be used to finance the public goods such as drinking water and sanitation. Other Official Financing (OOF), and PPPI (including FDI) can be utilized for financing the semi-public goods ranging from electricity, roads, ports, airports and etc. GSTF is a bridge fund aiming to “crowd in” other official development financing (OOF) from Sovereign Wealth Funds, official entities in emerging markets and maintaining a positive rate of return. Community-Driven Development (CDD) and

¹ “FROM JUNE 1947 to its termination at the end of 1951, the Marshall Plan provided approximately \$ 13 billion to finance the recovery and rehabilitation of war-torn and postwar weary Western Europe. In today’s dollars that sum equals roughly \$ 100 billion, and as a comparable share of U.S. Gross National Product it would be in excess of \$ 500 billion.” (Source: Behrman, Greg (2007-08-07). *The Most Noble Adventure* (pp. 4-6). Simon & Schuster, Inc.)

self-discovery should be highly encouraged.

Sections below provide motivation for this global infrastructure initiative, by first examining the funding gap, then presenting a framework, and a concrete proposal, on the Global Structural Transformation Fund (GSTF), and last addressing the risk management issues.

2. Infrastructure Shortfalls are Staggering.

Infrastructure shortfalls in the developing world are staggering. Roughly 1.4 billion people have no access to electricity, about 880 million people still live without safe drinking water, and 2.6 billion without access to basic sanitation. Around 900 million rural dwellers worldwide are estimated to have no access to all-weather roads within two kilometers (MDG Working Group, June 2011).

Power shortage is clearly a bottleneck for development in Sub-Saharan Africa. Per capita electricity consumption in SSA (excluding South Africa) average only 124 kilowatt-hours a year, hardly enough to power one light bulb per person for six hours a day (See also Annex 1). Lack of infrastructure does not only impinge on the daily lives of millions of people it also renders firms less competitive. Power outages and water suspensions occur frequently, hampering productive activities. Enterprises in Tanzania, for example, face power outages 63 days a year. It is estimated that between 3 to 10 percent of total sales were lost to electricity outages in developing countries in recent years. And many economic activities are not even started since the required infrastructure services are not available. Lack of infrastructure, for example, has been cited as one major impediment of attracting foreign investment.

Estimates of the growth impact of infrastructure investment in developing countries support this

notion. Calderon and Servén (2010a) estimate that, on average, annual growth among developing countries increased by 1.6 percent in 2001-05 relative to 1991-95 as a result of infrastructure developments. This effect was particularly large in South Asia, reaching 2.7 percent per year. Calderon and Servén (2010b) find that if low-income countries in Sub-Saharan African were to develop infrastructure at the same rate as Indonesia, the growth of West African low-income countries would rise by 1.7 percent per year. An increase in the power generation in India to the levels in Israel and Hong Kong would enhance growth by 1.7 percentage points. Similarly, if Latin American countries can have the same level of infrastructure as East Asia's middle income countries, their annual growth will increase 2 percentage points (Guash 2010).

3. For Industrial and Emerging Countries: Opportunities to Reduce Excess Capacity and Create Jobs

Infrastructure investment in developing countries could mitigate some of the post-crisis ills that advanced countries currently face, and would help create jobs and generate growth in advanced economies. Most of the capital goods, such as turbines or excavators, required to build electricity, sewage plants or roads are produced in the United States and Europe. Infrastructure investments in developing countries would, first, increase demand for manufactured goods in advanced economies. For every dollar invested in developing countries, imports of capital goods increase by 50 cents. About 70 percent of traded capital goods from developing countries are sourced from high-income countries. This implies that a one dollar increase in investment in developing countries tends to result in a 35 cent increase in exports from high-income countries.

Second, infrastructure investments can also create jobs and improve competitiveness.² For the U.S., it has been estimated that US\$1 billion in new investment spending in transportation, schools, water systems, and energy could create 18,000 jobs (Heintz, Pollin and Garrett-Peltier, 2009), of which about 40 percent would be in construction and 10 percent in manufacturing, the two sectors hardest hit by the recession of 2008-09. In addition, sustaining the manufacturing sector, which has been on a secular decline in the U.S. and several European economies, will be important to maintain large-scale employment opportunities, particularly in capital-intensive sectors where labor-productivity levels are consistent with the income levels of advanced countries.³ Maintaining infrastructure investment is also important in order to keep advanced countries competitive and to avoid further external imbalances in the future.

The global infrastructure initiative will help fully utilize the excess capacity as well as the excess savings in industrial and emerging market economies. In Japan, a huge amount of household savings is trapped in extremely low interest rates – well below 1 percent for 10 year government debt. In the US, the yield for 10 year Treasury Bond is close to 2 percent. In China, the nominal interest rate on 10 year government bond is 3 percent, with the real interest rate close to zero (see annex figure A1). Some countries have over-invested in infrastructure for the size of their economies. For example, Japan’s stock of infrastructure is equivalent to nearly 180 percent of its GDP. Over the past 18 years, growth would have “justified” investment of around 3 percent of GDP, but Japan spent 5 percent.

Comparatively, investing in the infrastructure of developing countries could have rates of returns ranging from zero to over 100 percent (Bai et al 2008, Canning and Bennathan 2000, and World

² Infrastructure in this context could also refer to investments in green technologies, which also have the potential to create jobs, including in manufacturing.

³ See Spence (2011) for a discussion.

Bank estimates). Annex Table A1 compares the estimated rates of return from infrastructure, based on a simple literature review, with the benchmark ten-year bond yields. In the current “low yields” environment, more and more SWF and government agencies and pension funds are seeking higher risk adjusted returns, and are more likely to invest in a Global Structural Transformation Fund (GSTF).

Moreover, as China’s labor cost is rising rapidly, there is an increased pressure for rebalancing and structural upgrading. The urgent need for reducing excess productive capacity will force some of the labor-intensive sectors out of business. The government has been encouraging enterprises to “go global”, and hence China’s outward FDI has been rising rapidly and creating opportunities for industries relocating elsewhere. According to our estimate, about 85 million jobs will potentially be relocated in the space of 20 years (see Chandra, Lin and Wang, 2012 on Leading Dragons).

The World Bank estimates that annual investments of more than \$1 trillion – about 7 percent of developing country GDP - are required to meet basic infrastructure needs in the medium term. Countries that grew rapidly – such as China, Japan and Korea – invested upwards of 9 percent of GDP every year for decades. Assuming that infrastructure financing in developing countries continues at historical trend levels, **there remains an infrastructure financing gap of more than US\$500 billion per year over the medium-term.**

If the funding gaps were to be closed, the associated demand for capital goods imports world-wide for infrastructure investment alone would increase by US\$250 billion, of which more than US\$175 billion would be sourced from high-income countries. Total capital goods exports from all high-income countries in 2010 are estimated to amount approximately to US\$1.4 trillion. Capital goods exports from high-income countries would therefore increase by over 12 percent,

creating much needed jobs in the manufacturing sector of advanced economies, reducing unemployment and increasing consumption. The jobs created in the manufacturing sector are likely to be stable and relatively well-paid which would increase the demand for housing. The reduction in excess capacities in turn would lead to a pick-up in investment. Growth would recover and fiscal revenues increase, ultimately leading to a decline in public debt burden.

4. How to Close this Funding Gap? Need a New Mind-set

A global infrastructure investment initiative could aim at closing this gap.

However, investing in infrastructure alone is not sufficient to propel the growth engine and generate jobs unless it is combined with productive assets and human capital. Therefore, we argue that, based on the New Structural Economics, infrastructure investment needs to be associated with zone- or urban-development and structural transformation in order for it to become self-sustainable.

Transforming “what the country has” to “What the country can potentially do well”

The New Structural Economics (NES) postulates that each country at any specific time possesses given factor endowments consisting of land (natural resources), labor, and capital (both human and physical), which represent the total available budget that the country can allocate to primary, secondary, and tertiary industries to produce goods and services. The relative abundance of endowments in a country are given at any given specific time, but changeable over time. In addition, infrastructure is a fourth endowment which is fixed at any given specific time and changeable over time (Lin 2012b, p.21).

This framework implies that at any given point in time, the structure of a country's factor endowments, that is the relative abundance of factors that the country possesses, determines the relative factor prices and thus the optimal industrial structure (Ju, Lin, and Wang 2011). Therefore, the optimal industrial structure in a country, which will make the country most competitive, is *endogenously determined* by its endowment structure.

Further, economic development as a dynamic process entails structural changes, involving industrial upgrading and corresponding improvements in “hard” (tangible) and “soft” (intangible) infrastructure, at each level. Such upgrading and improvements require an inherent coordination, with large externalities to firms' transaction costs and returns to capital investment. Thus, in addition to an effective market mechanism, the government should play an active role in facilitating structural transformation, diversification and industrial upgrading. (Lin 2012b, p. 14-15)

From the angle of land-based financing, investment on appropriate infrastructure and industrial assets would increase the value of land (a commonly acceptable principle). Land-based financing offers powerful tools that can help pay for urban infrastructure investment.⁴ And these options have been explored during China's experimentation on Special Economic Zones and the infrastructure around these zones (Wang Yan 2011).

Therefore, our proposition 1 is that

Other things being equal, a piece of land with proper level of infrastructure is always more valuable than a piece of land without. Thus it can be well used as collateral for infrastructure development loans. First, this proposition is confirmed by empirical evidence that infrastructure

⁴ For legal and typical land-asset based infrastructure financing, see policy note by Peterson, George E. 2008. “Unlocking Land Values to Finance Urban Infrastructure: Land-based financing options for cities.” Trends and Policy Options Series. Washington DC. PPIAF.

benefits the poor because it adds value to land or human capital and reduces inequality (Estache, Foster and Wodon 2002, Estache 2003, and Calderon and Serven 2008).

Second, since infrastructure is often sector-specific, the “proper” level of infrastructure must be affordable to the population and be consistent with the country’s existing or latent comparative advantage. Thus, market mechanism should be relied upon to have the right relative prices and to determine which infrastructure is “bottleneck releasing”. In addition, the government must perform the functions of providing information, identifying the comparative advantages and the associated appropriate infrastructure, and facilitating this process by developing **Special Economic Zones (SEZs)** in order to allow the self-discovery by the private sector. On the Growth Identification and Facilitation Framework see Lin and Monga (2011).

The role of Special Economic Zones has been well accepted and proven by the successful experiences of emerging markets. In particular, SEZs can 1) provide a bundling of public services in a geographically concentrated area, 2) improve the efficiency of limited government funding/budget for infrastructure, 3) facilitate cluster development, or agglomeration of certain industries, 4) propel urban development and conglomeration of services, and thus 5) they are conducive to growth, job creation, and income generation.

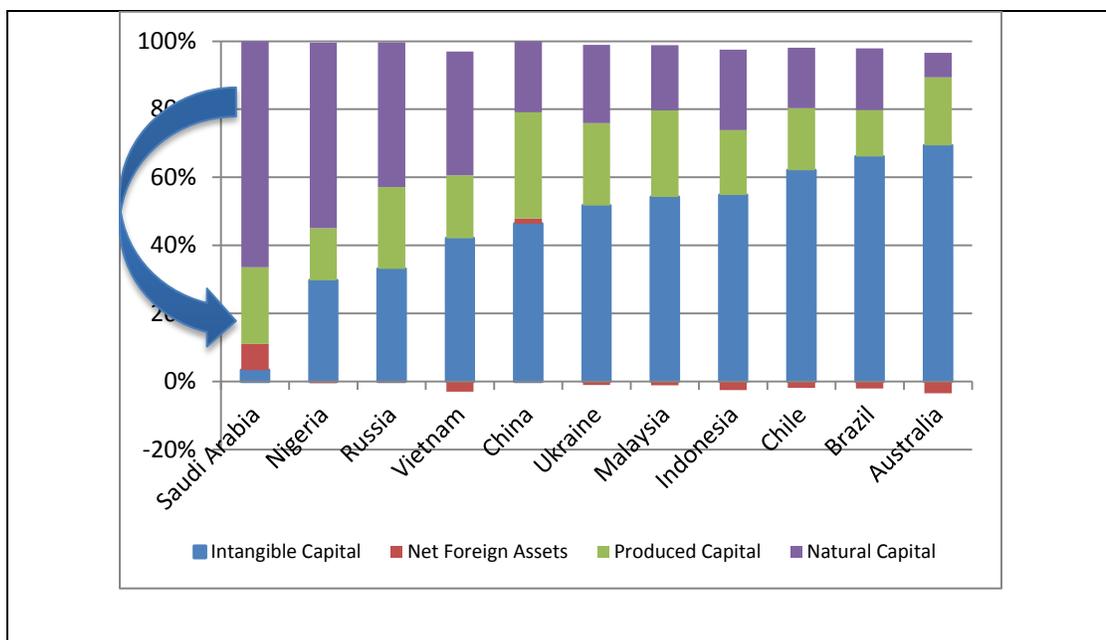
Therefore, our proposition 2 is that

Transformative infrastructure helps link a country’s endowment structure with its existing and latent comparative advantages, and translate them into competitive advantages in the global market. Thus, it can be made financially viable.

In other words, combining infrastructural building with industrial upgrading, as well as real estate development, can help make both financially sustainable. Potentially this approach has high rates of returns.

Based on these two propositions, any low-income country can have the ability to pay for its appropriate infrastructure in the long term, as long as they develop a strategy that is consistent with their comparative advantages. In other words, we should focus more on “what these countries have” rather than “what they do not have” (Lin’s farewell blog). The World Bank, and other development banks should try to help transform “what these countries have” to “what these countries can potentially do well”, i.e. to develop their existing or latent comparative advantages into competitive advantages in the global market. See figure 1.

Figure 1 Transforming “what the country has” to “what the country can potentially do well” : From Natural Endowment to Productive Assets



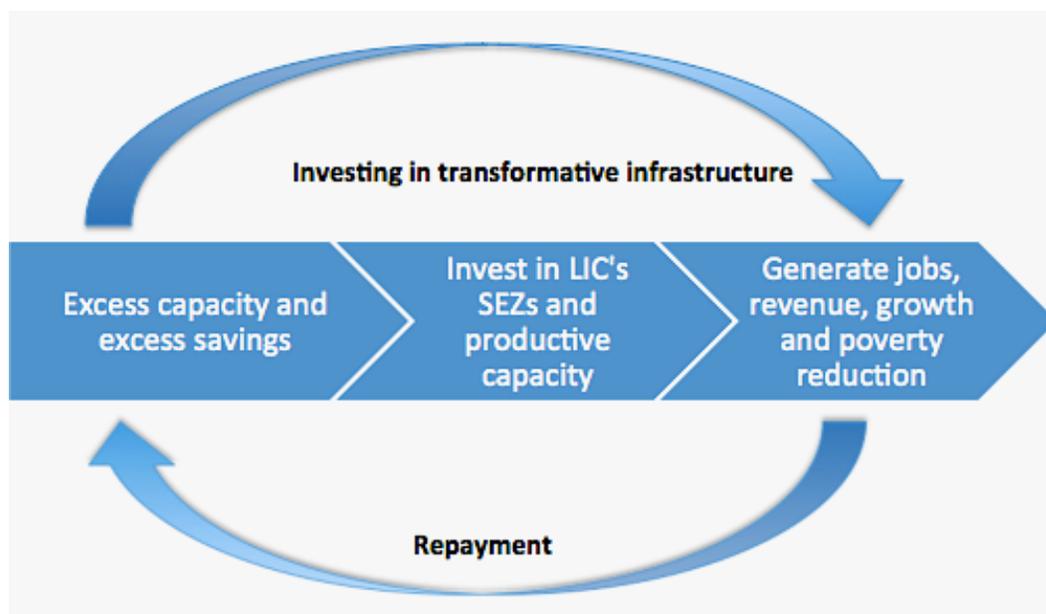
Source: Authors based on World Bank data from Changing Wealth of Nations, 2005. Here intangible capital includes human and institutional capital.

What these countries need is a bridge fund in the medium to long term for 10-15 years, in order to build a productive /export base. One example can show how quickly the return can be seen: Huajian Shoe Manufacturing Company established a large manufacturing facility in Ethiopia, trained workers and started exporting, all within the time span of 4 months. See also Sheng 2012 on Chinese OFDI in Africa, and World Bank 2012 on China's FDI in Ethiopia.

Based on the NSE, it is our view that IMF-WB's Debt Sustainability Framework must be significantly revised, because it still is a static model focusing on the short term only. This model has significantly constrained low-income countries' ability to borrow through nonconcessional loans backed by natural wealth and asset for larger and longer term infrastructure and industrial development packages. The demand from developing countries to revise this framework was made all too clear by the case of Ghana!

In the long term, if a country develops industries (and the specific infrastructure needed for that particular industry) **according to the comparative advantage** determined by the endowment structure, the country will become most competitive, generate the most profits (surplus), have the largest savings, and have the fastest upgrading of endowment structure, which will in turn build the foundation for the upgrading and diversification of industries to the more capital-intensive industries. This will become a virtuous cycle and infrastructure can be financially viable (see the framework below).

Exhibit 1. A Framework: Investing in transformative infrastructure is financially sustainable



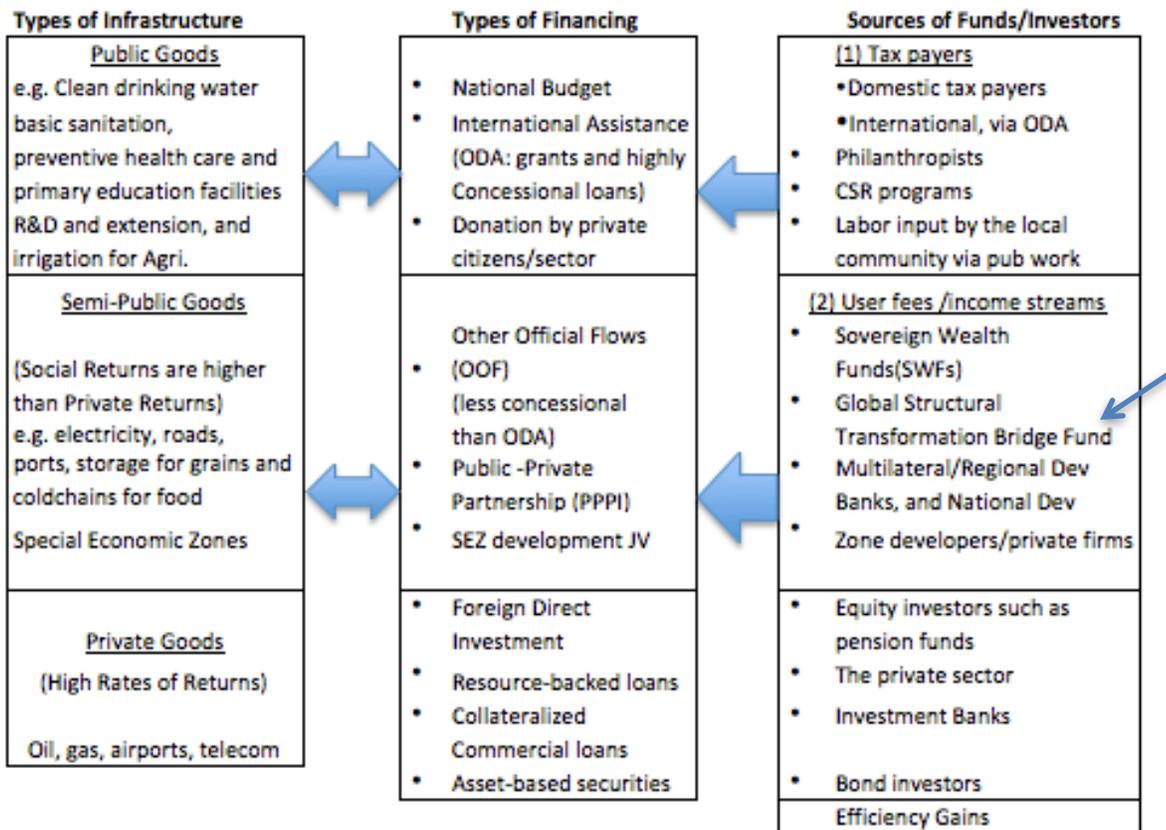
Source: Authors.

But how could the infrastructure funding gap be closed without putting an additional fiscal burden on the already cash-strapped governments?

Infrastructure consists a spectrum of public goods, semi-public goods and private goods (see Exhibit 2). It will require a combination of financing from both traditional and new sources, in particular the private sector. Infrastructure projects in developing countries are generally financed by a combination of domestic public financing, loans or grants from multilateral institutions and bilateral creditors (ODA and OOF), commercial loans including resource based loans (RBLs) and some limited private sector investment (PPPI).

First, domestic public financing has been the dominant source of infrastructure financing in developing countries, providing about two thirds of total infrastructure financing. Maintenance of existing roads, for example, should be financed by domestic public funding from vehicle taxes or gasoline surcharges, as is the common practice in middle-income countries. Second, Official Development Assistance (ODA) from traditional donor countries can be used to leverage other funding sources. But going forward, it is expected that traditional ODA is going to decline significantly stabilizing at its pre-crisis trend level. Therefore, the third and most important source of financing is Other Official Finance (OOF) and Public-Private Partnership in Infrastructure (PPPI). Depending on the characteristics of specific infrastructure, whether it is public-, or semi-public or private goods, various funding sources can be used (see Exhibit 2).

**Exhibit 2 Modalities for Infrastructural Financing and the Nature of Infrastructure:
Public or Semi-Public Goods?**



Source: authors.

Based on the above classification consistent with the NSE, **pure public goods (such as clean drinking water, e.g.)** can be provided by the public sector and special grant-based funds, and mass procurement of hand-held water pumps and other inputs. Local community’s participation and self-development efforts should be highly encouraged (as China’s successful labor-intensive methods of building water and irrigation in the 1950-60). Governments could use existing resources to attract additional financing, particularly from the private sector, for infrastructure development. These resources could include official development assistance (ODA), other official financing (OOF), and domestic public financing. ODA plays a particularly important role

in financing investment in low-income countries, representing only about 35 percent of new capital spending. On the contrary, in many middle-income countries, infrastructure investments are to a large extent financed by the public sector (Foster and Briceño-Garmendia, 2010).

Other Official Financing (OOF), and PPPI (including FDI) can be utilized for financing the semi-public goods ranging from electricity, roads, ports, airports and etc. This is an area where the OOF from emerging market and non-traditional donors can play important roles (see Box 1 and Annex 1). Here, nontraditional donors have, based on their own development experiences, utilized several instruments such as export credits, resource-based loans (RBLs), and resource-for-infrastructure (R4I) packages. In particular, R4I packages have gained acceptance by African countries with the total value of at least \$28 billion in nine African countries. Projects have included roads, regional railway lines, water supply, hydropower dams and plants, as well as other electricity power infrastructure. Some considered these as effective project financing and risk management approaches with the potential of significantly narrowing Africa's infrastructure financing gap, others raised concerns regarding the non-transparency of the terms and conditions, and the environmental and debt sustainability issues.⁵

5. The Proposed GSTF

Global Structure Transformation Fund (GSTF) that we propose is a bridge fund that belongs in the category of Other Official Financing (OOF), aimed to “crowd-in” other official development financing from Sovereign Wealth Funds, Central Banks and Public Pension Funds of Emerging markets and it should maintain a positive rate of return (higher than the yields of a

⁵ There is a heated debate on this sensitive issue. A fuller discussion will be found in an on-going World Bank study on “Resource for Infrastructure Deals”.

benchmark 10-year treasury bond). It should be invested in

- All infrastructural and industrial/service projects that are transformative in nature by adding values to land and forest (with positive output);
- Projects that are bottleneck releasing, and help diversify the economy;
- Projects that facilitate cluster development and agglomeration of various industries and services;
- Projects associated with renewable energy, green-technology and Eco-Industrial Parks (EIPs),⁶ and
- Projects that reduce transaction costs for the enterprises in general (both domestic and foreign) so that there is a “willingness to pay”. That is, in the long term there is a positive income stream, i.e. the Net Present Value of the net benefit is positive in the long term.
- Infrastructure in and around the Eco-Industrial Parks and Special Economic Zones (SEZs) is especially transformative because it can help “bundling public services” in a geographically concentrated area, and help reducing transaction cost and facilitate cluster development and scale economy. It can also facilitate urbanization, and industrial relocation and upgrading.

Governance: This new fund (GSTF) will be governed by the Board of Directors whose voting shares are determined by the equity shares held by various investors (government agencies as independent entities, Sovereign Wealth Funds, as well as public pension funds). The largest

⁶ On details of Eco-Industrial Parks see the case of Ulsan in Yusuf, 2013 “Five Cities Going Green: How are they doing it?”, The Growth Dialogue. Washington DC. Ulsan, Korea’s 7th largest city, used to be the most polluted city in Korea in the 1990s. In 2005, Ulsan established the first Eco-Industrial Park (EIP), aimed to transform the existing industrial complex to reduce environmental damage and eventually achieve zero emissions. The programs produced significant economic and environmental results with a 240,000-ton reduction in carbon dioxide emissions in the first two stages (page 48-49 in Yusuf 2013).

shareholder selects the Chairman of the Board (just like in any corporation). And therefore, a friendly competition could be generated among contributors/investors to this fund. See SWF Institute for a list of large SWFs as potential investors.

Advisory Groups: The Board will be assisted by the Economic Advisors Group and Investment Advisors Group. Initially, the International Finance Corporation (IFC) could serve as the advisor to the Board of Directors, because it has accumulated sufficient experience in running several global infrastructure funds.

Target: the expected rate of returns from the investment should be no less than the yield for the benchmark 10 Year US Treasury Bond (which is currently less than 2%). The yield for 10-year Japanese government bond is below 1 percent. In this way, it can attract central banks and foreign exchange administrations as well as Sovereign Wealth Funds to invest in this fund.

For risk diversification and management, the GSTF only provides **bridge financing** of a limited proportion of long-term projects. Bridge financing is commonly used when the cash flow from a sale of an asset is expected after the cash outlay for the investment of an asset. Another type of bridge financing is used by companies before their initial public offering (IPO) to obtain funding for the maintenance of operations. This financing is in essence a forwarded payment for the future sale of the new issue. Bridge financing may also be provided by banks underwriting an offering of bonds (including infrastructure bonds). For risk management, investment rules should be designed to prevent GSTF from overly concentrating in certain type of projects, or in certain countries or regions (see Section 6 on risk management). Official/Institutional investors such as central banks, foreign exchange administrations and SWFs can invest limited proportion in this and other types of infrastructural funds in order to diversify their risks.

The Multilateral Investment Guarantee Agency (MIGA) can serve as the insurance provider

for the political risks. Other risks such as exchange rate risk will be discussed below in section 6.

GSTF helps to attract nontraditional development financiers

The design of GSTF would be attractive to non-traditional development financiers.

First, non-traditional bilateral development financiers such as China, India, Arab countries and Brazil have emerged as major financiers of infrastructure projects in Africa. Overall, infrastructure resources committed to Africa by these countries jumped from US\$1 billion per year in the early 2000s to over US\$10 billion in 2010. China held a portfolio of some \$20 billion in active infrastructure projects in more than 40 African countries. Chinese financing for African infrastructure structure projects is estimated to have reached a record level of roughly US\$5.1 billion in 2009, though it fell to around \$2.3 billion in 2010. However, ICA reported that China's infrastructure commitments in Africa were \$9 billion in 2010. A new study found that China alone accounts for 34% of all aid to infrastructure in SS Africa, higher than other multilateral and bilateral donors. (C. Chen 2013)

In particular, China has been working on bottleneck-releasing sectors such as power generation and transmission. While "Donors have neglected power since the 1990s", (p.25, in Foster and Briceño-Garmendia 2010), 50% of China's commitment on infrastructure was allocated to Electricity (Box 1). A recent study found that China has contributed, and is contributing, to a total of **9.024 Gigawatt** of electricity generating capacity, including completed, on-going and committed power projects.⁷ The impact of this investment is likely to be transformative when one considers that the entire installed capacity of the 47 Sub-Saharan countries excluding South Africa countries is 28 Gigawatt.

⁷ The Hoover Dam in Colorado, by comparison, is a 2 Gigawatt facility, producing on average electricity for about 390000 US homes. See Chen 2013.

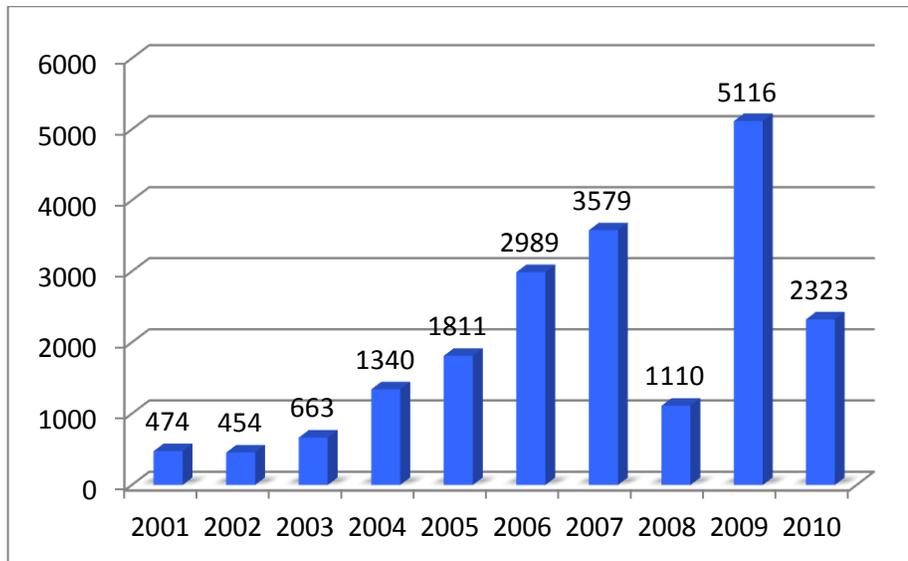
Box 1. Southern Partners are leading financier of Infrastructure in SSA

A new study ranks the donors/providers of infrastructure in Sub-Saharan Africa for the period 2001-2008 in Sub-Saharan Africa. China is shown to be the largest infrastructure financier followed by three multilateral organizations, IDA, EC and AFDF. In total there are three Southern providers in the top ten, **China, India and ISDB**. (Chen 2013)

China alone accounts for 34% of the total official financing amount on infrastructure in SSA, higher than any Northern partner. But China accounts for only 3% of the number of aid projects, indicating that the size of Chinese funded projects is larger. The United States is the 2nd largest bilateral infrastructure contributor, but its total aid volume during the period is far less than that of China. Northern donors together contribute 28% of the total aid amount in infrastructure, but 76% of the number of aid projects, far more than Southern providers and other donors. (Chen 2013)

It is estimated that as of December 2010, China held a portfolio of some \$20 billion in active infrastructure projects in more than 40 African countries. The amount was estimated at \$5.1 billion in 2009 and \$2.3 billion in 2010 (Chen 2013). Given that the annual number of projects fluctuates during the past four years, the average size of Chinese financing commitment per project has been skyrocketing indicating Chinese financiers' interest and capacity in financing large projects. See Box figure 1.

Box Figure 1: Chinese financing commitment in African Infrastructure, 2001-2010 (million USD)

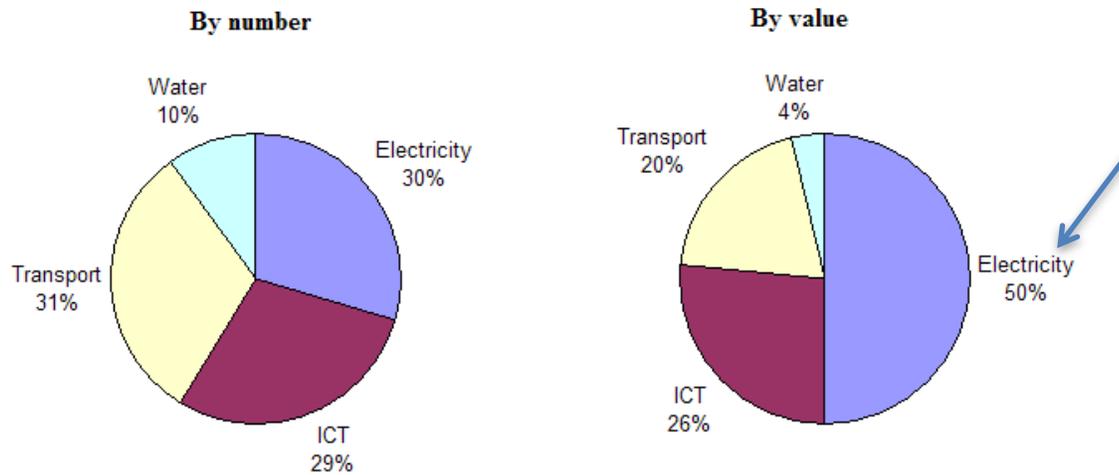


Source: Chen Chuan, 2013 based on World Bank-PPIAF Chinese Projects Database.

Sectoral Composition. During the period from 2001 to 2010, most of the Chinese financing commitment went to the electricity, ICT and transport sectors in Africa. Electricity alone accounts for 50 percent of the database by value, but 30 percent by number, indicating the large size of these power projects. See Box Figure 2.

Box Figure 2: Confirmed Chinese infrastructure finance commitments in Sub-Saharan

Africa by Sector 2001-2010



Source: Chen Chuan, 2013 based on World Bank-PPIAF Chinese Projects Database.

Note: For detailed see Annex 1.

Second, these emerging financiers are seeking opportunities to increase their investment and diversify their portfolio into different types of projects, thereby increase their risk-adjusted returns. In particular, China has been supporting several Special Economic Zones aimed to improve investment climate and attract outward investment into these low-income developing countries if there is a need. While there is widespread suspicion on China’s motivations and criticisms of its record of following international standards, some studies have shown that the investment has generated employment opportunities.⁸

⁸ A few studies have found that China’s Outward FDI has contributed to employment generation in both developing and industrial nations, see for example, Shen 2013, Weisbrod and Whalley 2011, Mlachila and Takebe 2011, Rosen and Hanemann 2011, and Derek Scissors 2012, and World Bank 2012 on “China’s FDI in Ethiopia”.

According to one of the studies by staff of the People's Bank of China, the estimated outward investment in infrastructure "will not be less than US\$100 billion annually (that is RMB630 billion yuan)" (Jin 2012). "Considering the increased potentials, China could well afford to have outward investment of RMB600 billion to RMB1000 billion yuan per year. Assume that this amount consists of 95% in loans and equity investment, and 5% in grant, this means that China's Ministry of Finance will need to budget RMB30 billion to 50 billion yuan for international aid. This number is only about 0.3 % to 0.5% of China's 2011 fiscal revenue, accounting for less than 0.1 % of GDP, much lower than the fiscal burden of the Marshall Plan (to the US Treasury)". (Jin Zhongxia 2012, page 62)

This paper is not going to speculate on the amount of China's outward investment, but the potential is huge. Depending on the design of the GSTF, especially the governance structure, it may attract a substantial proportion of China's OOF and outward direct investment (OFDI) on infrastructure and other SWFs, seeking a better risk-adjusted return.

Sovereign Wealth Funds

The potential for mobilizing funding from investors, such as, for example Sovereign Wealth Funds (SWFs) seems promising. It is estimated that SWFs hold more than US\$5.3 trillion in financial assets as of May 2013 and these assets are expected to grow rapidly in coming years (Noman 2011). Some SWF are already investing in infrastructure in developing countries. The China-Africa Development Fund, an equity fund which invests in Chinese enterprises with operations in Africa, reportedly invested nearly US\$540 million in 27 projects in Africa that are expected to lead to total investments of US\$3.6 billion in 2010. And the Qatar Investment Authority plans to invest US\$400 million in infrastructure in South Africa. Still, funds targeted

towards developing countries are only a fraction of available resources. Since 2007, about 166 infrastructure funds with approximately US\$110 billion in commitments were raised globally. Only 15 percent of the funds raised were targeted towards developing countries.

A key challenge for closing the infrastructure investment gap in developing countries, however, will be to mobilize private sector financing, in particular through private-public partnerships. These partnerships are generally established through a long-term contract between government and a private investor. The investor finances at least part of the investment, in return for future service fees that are collected from the users plus government subsidies if applicable. Private participation in infrastructure investments has played an increasingly important role in developing countries. However, it is concentrated in a handful of large emerging economies, such as Brazil, China, India, the Russian Federation and Turkey. It is also limited to a few sectors, in particular telecommunication (Estache 2010).

6. Risk Management

Since infrastructure assets are illiquid, upfront capital financing is large and repayments often take decades, investing in infrastructure entail significant risks for the investor. These risks include: higher-than-projected projects costs; shortfalls in projected revenues (for example, if the demand for the infrastructure services and user-fees are lower than projected); exchange-rate risks if infrastructure financing is provided in foreign currency and user fees are paid in domestic currency; force majeure; and political and regulatory risks.

For the GSTF, diversification is a major tool to reduce risks. Investment rules will be designed to diversify the asset between illiquid and liquid assets in advanced and developing countries, in “first round” infrastructure projects or securitized infrastructure-backed bonds and

Exchange Traded Funds ETF and REITs (that are liquid). These rules will also prevent the Fund from concentrating in a certain type of projects in certain regions or countries. There has to be a balance between “semi-public goods” with lower returns, and a variety of commercially-viable projects (with a steady income streams), so that a positive rate of return (higher than a benchmark US Treasury Bond) can be earned. See table below.

Exhibit 3. An illustrative Balance Sheet for the Fund.

Assets	Liabilities
Liquid Assets x%	Account payable
Infrastructure ETFs	Taxes payable
REITs	etc
Other government bonds /local currency bonds	
Illiquid Assets x%	Equity capital
“First round” transformative infrastructure projects (bridging financing aimed to crowd-in other financiers), x%	Paid-in capital
Equity holdings in Eco-Industrial Parks or Special Economic Zones (JV for Zone development), x%	Retained earnings
Commercial Real Estate with steady income streams, x%	Reserves
Equity holdings in toll roads, power stations, airports, sea ports and railways x%	
Equity holdings in National Infrastructure Development Banks x%	
Other innovative financial instruments x%	

Note: More details will be available in a separate paper on risk management.

Since infrastructure assets are illiquid, upfront capital financing is large and repayments often take decades, PPPs entail significant risks for the investor. These risks include: higher-than-projected projects costs; shortfalls in projected revenues (for example, if the demand for the infrastructure services and user-fees are lower than projected); exchange-rate risks if

infrastructure financing is provided in foreign currency and user fees are paid in domestic currency; force majeure; and political and regulatory risks.

Several mechanisms exist that can diversify some of these risks and make investments in developing countries more attractive. Government guarantees can insure against project-related risks, such as a shortfall in demand. But they are unlikely to mitigate investors' perception of governmental risk, such as policy reversal, regulatory failure, and concerns about the creditworthiness of the government. Multilateral institutions and donors are likely to be better positioned to assume these risks. The World Bank has increasingly made use of guarantees to catalyze private finance by mitigating the risk of default by governments. As of March 2010, it had approved 36 guarantees, totaling US\$3.8 billion in 28 countries (World Bank, 2010). MIGA, the arm of the World Bank that provides political risk insurance for foreign investments, recently adapted its products and expanded the potential applications of its guarantees in order to facilitate the underwriting of infrastructure projects.

Risks for the private sector could be reduced if private sector financing would be combined with public sector or donor funding. Initiatives in advanced economies, such as the National Infrastructure Reinvestment Bank in the United States and the new European 2020 Project Bond Initiative, are good examples.⁹ The Obama administration, for example, has backed the creation of a **National Infrastructure Reinvestment Bank**,¹⁰ which could issue infrastructure bonds, provide subsidies to qualified infrastructure projects, and issue loan guarantees to state or local

⁹ The European Commission launches a public consultation on the "Europe 2020 Project Bond Initiative" which aims at boosting the funding of projects with long-term revenue potential in line with the Europe 2020 policy priorities. Its objective is to help the private project companies to attract capital market funding from investors such as pension funds and insurance companies. The Europe 2020 Project Bond initiative has been identified in the Annual Growth Survey as a priority measure to enhance growth.

¹⁰ For more information, see <http://www.govtrack.us/congress/bill.xpd?bill=h112-3259>.

governments. President Obama suggested that loans made by this bank would be matched by private sector investments and that each project would generate its own revenues to help ensure repayment of the loan.¹¹ Furthermore, Europe is considering the implementation of a new European 2020 Project Bond Initiative, which would use public guarantees to leverage private sector financing from non-traditional investors, such as pension funds (European Commission, 2011). This initiative proposes to invest 1.5 trillion euros to 2 trillion euros (approximately US\$2 trillion to US\$2.7 trillion) in Europe's infrastructure over the period 2011-20.

Even more promising than guarantees that diversify risks, is the possibility of actually reducing the risk. This can span a wide range of actions, including improving a country's regulatory framework and implementing sound macroeconomic policy. In economies with high country risk, investors in infrastructure projects are often asking for real returns on equity in the order of 20 percent or more and a country risk premium of up to 5 percent on debt (Klein, 2005). Similarly, Guasch (2004) shows that regulatory risks to investments in Latin America can add up to 6 percent to the cost of capital. Analyzing credit spreads of infrastructure bonds, Dailami and Hauswald (2003) find that projects located in host countries with a stronger legal framework have lower funding costs and tighter spreads. In the end, only sustained macro-economic stability will earn the desired investment grade rating that is essential to attract the attention of the large institutional investors at attractive prices. Multilateral institutions and bilateral agencies could play an important role by building capacity and supporting improvements in this regard.

To attract private lenders to extremely high-risk investments, the International Development Association (IDA) offers Partial Risk Guarantees (PRGs) that provide a safety net for investors in case of a government fails to fulfill its obligations under a PPP agreement. PRGs have proven

¹¹ <http://www.whitehouse.gov/blog/2011/11/03/five-facts-about-national-infrastructure-bank>

invaluable to the Bujagali and Nam Theun 2 hydropower projects in Uganda and Lao PDR, respectively. In each case, the provision of the PRG was instrumental in catalyzing long-term commercial debt and mitigating risk for commercial debt without excessively increasing government liability. For Nam Theun 2, IDA's PRG was combined with MIGA and AsDB debt guarantee instruments to reassure foreign investments, namely the Thai government.

Box 2. Credit Guarantee and Investment Facility (CGIF)

Asian Development Bank recently introduced a credit guarantee and investment facility (CGIF) as a trust fund with capital contribution of \$130 million. The ASEAN+3 governments will provide a combined \$570 million to create the \$700 million facility. It will provide guarantees on local currency denominated bonds issued by companies in the Asian region. Such guarantees will make it easier for firms to issue local bonds with longer maturities. This measure would help unlock the region's vast savings for badly needed investment in infrastructure and other key investment areas. In addition, the initiative will help reduce the currency and maturity mismatches which caused the 1997-98 Asian financial crisis and make the regional financial system more resilient to volatile global capital flows and external shocks. (MDG Working Group on Infrastructure, 2011)

To reduce exchange rate risks, innovative finance mechanism can be explored under the umbrella of the GSTF. These may include, but not limited to, the "counterpart fund" as the one developed during the Marshall Plan, the Dim Sum Bond and other local currency bond, investing in

infrastructure asset based securities (ABS)¹², sub-sovereign bonds (Platz 2009) and investing in the equity of “infrastructure development banks” in individual countries.

Innovative knowledge hubs which build the required financial and technical capacity of government officials in developing countries and provide relevant expertise could be scaled up. In November, 2010, the World Bank Group launched in partnership with the government of Singapore the Infrastructure Finance Center of Excellence, which aims at building capacity in the public sector to better manage private-public partnerships.

7. Conclusion

Investing in productivity enhancing infrastructure projects is critical for generating growth and creating jobs, here and abroad. In the advanced economies, it can be a powerful instrument to raise growth, create much needed jobs, and enhance future competitiveness. For developing countries, it is a powerful vehicle for transforming their economies, enabling their businesses to work unimpeded without electricity shortages, communicate freely, expand their markets and, ultimately climb up the technological ladder. An infrastructure investment initiative to avoid a protracted “New Normal” with high unemployment and low growth in high-income countries is a “win-win” for the public and private sector.

In particular, we propose to set up a **Global Structural Transformation Fund (GSTF)** to mobilize vast savings from the official entities from emerging market economies, SWFs, public pension funds as well as the private sector. This design of this Fund is particularly attractive to the non-traditional official financiers with excess savings as well as excess productive capacity in

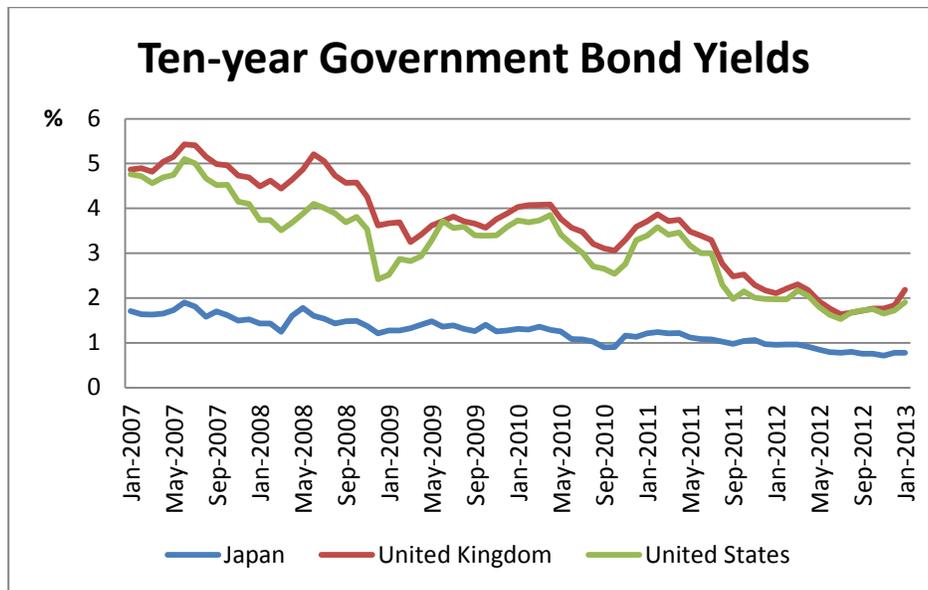
¹² At a later stage, asset-based securities (ABS) and collateralized debt obligations (CDOs) can be designed after more thorough analysis and research.

relevant sectors. In the face of required structural reform, the excess capacity in some emerging economies is in danger of being forced out of business. The GSTF can help develop infrastructure and facilitate relocating these industries where there is a need.

A global infrastructure investment initiative that closes the infrastructure financing gap in developing countries will be a “win-win” for the world as well. It would boost exports and unemployment in high-income countries while reducing poverty and enhancing growth in developing countries. Now is the time to develop pragmatic plans that put these ideas into practice and build the roads, ports, railways, and power plants needed to support jobs and prosperity in high-income and developing countries for a brighter future of all.

Annexes

Figure A1: Infrastructure Fund is more attractive in this environment of low yields



Source: Bloomberg.

Table A1. Rates of Return from Infrastructure vs. Yields from 10-Year Bond

		Annual Rate	Source: studies
Yields from 10-year bonds			
	Japan 2013	0.9%	Bloomberg
	U.K. 2013	2.0%	Bloomberg
	U.S. 10-year bond	1.95%	Bloomberg (May 2013)
	U.S. 20 year bond	2.77%	Bloomberg (May 2013)
	U.S. 30 year bond	3.77%	Bloomberg (May 2013)
Rates of Return from investing in Infrastructure			
Ave. ROR	Electricity projects	11%	World Bank 1983-92
Ave. ROR	Road Building	29%	World Bank 1983-92
Estimated ROR	Brazil	10%~57%	Canning 2000
Estimated ROR	China	20%~41%	Bai 2008, Canning 2000

Estimated ROR	India	24%~78%	Canning 2000
Estimated ROR	Kenya	50%~125%	Canning 2000
Estimated ROR	Mozambique	-7%~17%	Canning 2000
Estimate Long Run Elasticity of output with respect to the synthetic infrastructure index			
Elasticity	88 countries (1960-2000)	0.07~0.10	Calderon, Benito and Serven 2011

Source: Compiled by authors.

Annex 1.

China Financed “Bottleneck-releasing” Hydropower Projects in Africa:

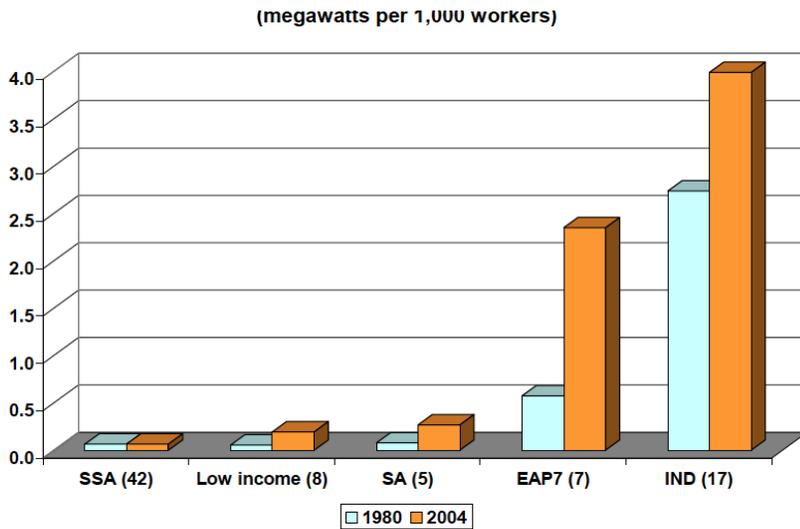
Updated to 2013¹³

This Annex provides an introduction to China’s engagement in Africa’s infrastructure investment. We focus on the power generating industry, a “bottleneck-releasing” sector among other sectors, as “donors have neglected power since the 1990s” (V. Foster et al 2010, page 25).

Power shortage has been clearly recognized as a bottleneck for development in Sub-Saharan Africa. Per capita electricity consumption in SSA (excluding South Africa) average only 124 kilowatt-hours a year, hardly enough to power one light bulb per person for six hours a day (See Calderon and Serven 2008).

¹³ The main contributors to this Annex is Victor Chuan Chen, for data before 2011, and Nan Hu, for updating data on hydropower sector 2010-2013, and Yan Wang for coordination.

Figure A2. Electricity Generation Capacity Compared, Medians by Group (megawatts per 1,000 workers)



Source: Calderón, César and Luis Servén. 2008.

The Chinese finance often goes to large-scale “bottleneck releasing” infrastructure projects, with particular focus on hydropower generation, roads, ports, and railways. In particular, 50% of all Chinese infrastructure commitments in S.S.Africa between 2001-2010 was on electricity – a clear bottleneck in nearly every African country. China is contributing to 9.024 gigawatts in power generation capacity in Africa, which is four times the generation capacity of the Hoover dam in the US (C. Chen 2013).

The approaches China has been using in development cooperation have expanded over the years. In addition to grants and non-interest loans, China has added the following instruments: concessional loans by China EXIM Bank, concessional export (buyer and seller) credit; nonconcessional loans, and equity investment by China-Africa Development Fund (CAD Fund),

and outward direct investment (OFDI). Since 2004, the EXIM Bank has used the commodity – based loans, or natural resource-backed loans and credit as in the “Angola model”. Since then, nine African countries have signed similar framework agreements with China with a total value of approximately \$28 billion. Since 2006, China Development Bank (CDB) has become increasingly active and today accounts for about 12.8% of the active portfolio. Funding provided by CAD Fund accounts for no more than 1 percent of the total infrastructure portfolio. Loans and export credits are the two main financial instrument used, with grant financing accounting for no more than 2 percent of the portfolio.

Utilizing China’s comparative advantage of low-cost labor and engineers, Sinohydro and several other state-owned companies are taking a lead in the global dam-building industry, with rich experiences of building large hydro dams in the domestic market. As of August 2012, Chinese companies are involved in at least 308 dam projects (mostly for hydropower generation) in 70 different countries. Africa is the second largest geographic concentration, with 85 hydro dams, representing 28% of all Chinese overseas dams in the world (International Rivers). The competitiveness of Chinese contractors has grown to be evident in their rapidly increasing share of the African construction market – amounting to 37% in 2009 – well ahead of contractors from all other nations (Chen 2013).

Based on the methodology developed by Foster et al. (2009), we conducted a thorough research on the power generation projects financed and constructed by China in Africa during 2010-2013. We used search engines, mainly Factiva, Google and Baidu, to search for the information and checked results through “triangulation” with other databases. Our results include 32 power generation projects in Africa between 2010-2013, with a total commitment value of US\$20

billion (See Table A2 below on **Chinese-funded Power Generation Projects in Africa 2010-2013**).

Case One: Bui Dam in Ghana

Bui Dam is a gravity roller-compacted concrete dam which is being constructed at the Bui National Park, located in Ghana. Upon its completion in 2013, the dam will generate 400MW of power and facilitate irrigation of about 30,000ha of land.

The total project cost was initially estimated to be US\$622 million, raised by \$168 million later. It is being financed by the government of Ghana's own resources (US\$60m) and two credits by the China Exim Bank: a concessional loan of US\$270 million at 2% interest and a commercial loan of US\$292 million. Both loans have a grace period of five years and an amortization period of 20 years. The proceeds of 30,000 tons per year of Ghanaian cocoa exports to China, which are placed in an escrow account at the Ex-im Bank, serve as collateral for the loan. Once the dam becomes operational, 85% of the proceeds of electricity sales from the hydropower plant will go to the escrow account. If not all the proceeds are needed to service the loan, the remainder reverts back to the government of Ghana.

The dam is being constructed by the Sino Hydro Corporation as part of an Engineering, Procurement and Construction (EPC) Turnkey Project Contract. Bui Power Authority (BPA) will own and manage the dam. Sino Hydro won the bid of the project with funding from the Chinese Ex-Im Bank in 2005, followed by an environmental impact assessment and a feasibility study. Construction on the main dam began in December 2009, its first generator should be online in 2012 and project completion is expected in 2013.

The Bui hydropower plant will increase the installed electricity generation capacity in Ghana by 22%, up from 1920 MW in 2008 to 2360 MW. Together with three thermal power plants that are being developed at the same time, it will contribute to alleviate severe power shortages that are common in Ghana. In addition to generating power, the Bui Dam will provide water for irrigation and also improve tourism and fishing sector in Ghana. The dam will also provide protection from a flood with the force of one in 10,000 years. It is also expected to generate several jobs.

Case Two: Merowe Dam in Sudan

The Merowe Dam, called by people as "Pearl of Nile", is a second dam built on the Nile River and the largest hydropower project at the time of construction. Built on the Nile's fourth cataract between 2003 and 2009, the dam has a length of 9.5 km and a crest of up to 67 meters, with a reservoir lake extending 174 km upstream and a capacity of 1,250 megawatts, which doubled Sudan's electricity generating capacity.

China Export Import Bank provided \$608 million of the total \$30 billion, with the rest being funded by Arab financiers and Sudanese government. China's Sino-hydro Corporation and China International Water & Electric Corp. (CWE) won the awards of contracts for the project and formed the management group CCMD JV on May 20, 2003. The construction of main work started in early December 2003. The dam was inaugurated on March 3, 2009, at which point the reservoir was full and all the hydro-electric generating capacity on-line.

The electrification level in Sudan is very low, even by the standards of the region. In 2002, the average Sudanese consumed 58 KWh of electricity per year, i.e., about one fifteenth of their Egyptian neighbors to the north, and less than one hundredth of the OECD average. The

government in Khartoum has announced plans to raise the country's electrification level from an estimated 30% to about 90% in the mid-term. Three new thermal power plants went into operation in the Khartoum area in 2004, increasing the installed capacity to 1315 MW. The Merowe dam with its peak output of 1250 MW will almost double this capacity. In addition, with a large reservoir of 8.3 billion cubic meters and an extensive irrigation network, it is estimated that the project has the potential of benefiting more than 3 million local people.

Case Three: Tekeze Dam in Ethiopia

The Tekeze Hydropower project in Ethiopia, located a tributary of the Nile, is the Project of the Year for renewable/sustainable projects. The \$360 million project, developed and built by the state-owned Chinese National Water Resources and Hydropower Engineering Corporation, now known as Sinohydro, adds 300 MW electric capacity to the country and was the largest public works project in Ethiopia's history at the time of construction.

According to the World Bank, in 2002, China Export-Import (Exim) Bank provided \$50 million in concessional financing for this US\$224 million dam. But a Taiwanese news source said the China National Water Resources and Hydropower Engineering Corporation (later known as Sinohydro) that built the dam, financed it entirely.

The Tekeze Hydropower project is the tallest arch dam in Africa at 188 meters. It includes a double curvature concrete arch dam, a method of design that minimizes the amount of concrete used. It created a reservoir 70 kilometers in length. An underground powerhouse containing four 75 MW Francis Turbines sits 500 meters downstream of the dam and is fed by a 75-meter-high intake structure connected by a 500-meter-long concrete-lined power tunnel.

Due to the lack of natural resources and the cost of imported fuels, power generation in Ethiopia comes primarily from hydroelectric sources. Tekeze Hydropower project lifted Ethiopia's generating capacity by 40 percent. Beyond serving as a significant renewable energy source, the project has allowed for sustained social and economic growth for Ethiopians. Local community infrastructure was greatly improved as a result of the project, including construction of more than 40 kilometers of roads and the first installation of communications links from the area to the outside world. Education and training was a determined focus during construction, which generated schools, vocational facilities and training programs for local workers.

Table A2: Chinese-Funded Power Projects in Africa 2010-2013

Country	Estimated End Date	Status as of 2013	Project	Chinese Financier	Contractor	Capacity (megawatt)	Project Value (\$ million)	Chinese Commitment (\$ million)
Benin (and Togo)	2013	Construction	Adjarala dam	Ex-Im	Sino Hydro	147	389	-
Botswana	2013	Construction	Morupule B power plant	ICBC	CNEEC	600	1600	825
Cameroon	2016	Construction	Memve'ele dam	Ex-Im	Sino Hydro	200	795	540
Congo	2011	Completion	Imboulou dam	Ex-Im	Sino Hydro, China National Machinery & Equipment Import & Export Corporation (CMEC)	120	280	-
Congo	-	Construction	Busanga dam	Chinese Government	Sino Hydro	240	660	-
Congo	2015	Construction	Zongo II dam	Ex-Im	Sino Hydro	257	376	-
Cote d'Ivoire	-	Construction	Soubre dam	Ex-Im	Sino Hydro	270	572	-
Equatorial Guinea	2011	Completion	Djiploho dam	Ex-Im	Sino Hydro	120	257	-
Ethiopia	2014	Construction	Gilgel Gibe IV dam	China Development	Sino Hydro	2000	1900	-

Country	Estimated End Date	Status as of 2013	Project	Chinese Financier	Contractor	Capacity (megawatt)	Project Value (\$ million)	Chinese Commitment (\$ million)
				Bank				
Ethiopia	2011	Completion	Finchaa-Amerti-Neshi dam	Ex-Im	Gezhouba	97	137	116.45
Ethiopia	2009	Completion	Tekeze dam	Ex-Im/sino hydro	Sino Hydro, Gezhouba	300	365	224
Ethiopia	2015	Construction	Genale Dawa 3 dam	Ex-Im	Gezhouba Group Company (CGGC)	254	408	408
Ethiopia	-	Agreement	Chemoga Yeda dam	Ex-Im	Sino Hydro	248	555	555
Gabon	2013	Construction	Grand Poubara dam	Ex-Im	Sino Hydro	160	398	398
Ghana	2013	Completion	Bui dam	Ex-Im	Sino Hydro	400	790	562
Ghana	-	Construction	Sunon Asogli Power Plant I & II	CADFund and Shenzhen Energy Group Co.	Shenzhen Energy Group Co.	560	560	-
Mauritius	2014	Construction	Terre Rouge dam	Ex-Im	China International Water & Electric Corp		112	-
Mozambique	2014	Agreement	Mphanda Nkuwa dam	Ex-Im		1350	2300	2300
New Papua Guinea	2016	Construction	Kaleta dam	China International Water and Electric Corporation	China International Water and Electric Company	240	526	-
Nigeria	2018	Construction	Mambila dam	Ex-Im	Sino Hydro and China Gezhouba Group	2600	1460	-
Nigeria	2014	Construction	Zungeru dam	Ex-Im	Sino Hydro and China National Electric Engineering Corporation (CNEEC)	700	1000	750
South Sudan	2019	Construction	Bedden dam	Bank of China	Gezhouba	540	1400	1400
Sudan	-	-	Dal-Kajbar dam	Chinese Government	Sino Hydro	360	750	-
Sudan	2016	-	Rumela dam	-	China Three	135		838

Country	Estimated End Date	Status as of 2013	Project	Chinese Financier	Contractor	Capacity (megawatt)	Project Value (\$ million)	Chinese Commitment (\$ million)
					Gorges Corporation (CTGC) and China Water and Electric Corporation (CWE)			
Sudan	2013	Completion	Roseires dam	-	CCMD	250	396	-
Tanzania	-	Construction	Mnazi Bay gas-fired plant	Ex-Im	China National Machinery & Equipment Import & Export Corporation (CMEC)	300	682	-
Uganda	-	Agreement	Karuma dam	-	China International Water & Electric Corporation	600	2200	1400
Uganda	2018		Ayago dam	Chinese Government	Sino Hydro	530	900	-
Zambia	2017	Construction	Lower Kafue Gorge Lower dam	CADFund and Sino Hydro	Sino Hydro	750	1940	1261
Zambia	2012	Completion	Kariba North Bank Extension Project	Ex-Im	Sino Hydro	360	400	340
Zimbabwe	-	Construction	South Kariba dam expansion	Ex-Im	Sino Hydro	300	368	-
Zimbabwe	-	Construction	Hwange power plant expansion	-	China Machinery Engineering Company	600	900	-

Source: Authors, checked against International Rivers website.

Annex 2. Africa's SEZ Infrastructure: Beyond the Financing Challenges

Africa has launched a new wave of special economic zone or industrial park initiatives in recent years. Countries like Ghana, Nigeria, Ethiopia, Tanzania, Zambia, Mali, Botswana, etc., either have built some SEZs or are in the initial stages of building SEZs at various scales. In today's new endeavors, many of the past lessons have been reflected at different degrees to increase their viability, but on the other hand, many new zones seem to still face multiple challenges. One of the big challenges is the infrastructure finance.

Africa has traditionally depended on official development assistance to meet its infrastructure needs. But a growing share of the region's infrastructure finance is now coming from nontraditional sources. Leading this trend are non-OECD financiers, chiefly China, India, and Arab countries. While Arab funds have been operating in Africa for decades, China and India began to step up their involvement in the early 2000s. Flows from these non-OECD sources are now broadly comparable to traditional development assistance in dollars committed.

Some of these funds are channeled into various SEZs infrastructure building, such as roads, ports, water, power, etc., through PPP arrangements (such as BOT, BOOT, equity investment), loans and development assistance. While these funds greatly alleviate the financial constraints of African countries, they also face many hurdles for their efficient use, especially in the SEZ context. Some of these challenges include:

- *Overall SEZ legal and institutional framework.* In many African countries, the current legal and institutional framework for SEZs is either outdated or does not

exist, even though the SEZ initiative has been launched or, even in some cases, the parks have been built and operational. This has created much confusion and deterred potential investors.

- *PPP legal and policy framework.* Important pre-requisites for a successful PPP include a clear policy framework, a legal system that ensure contracts are effective and enforceable, a long-term investment plan and an operating framework within government to properly manage the process. African governments have shown growing interest in the opportunities provided by PPPs to help fill the current infrastructure financing gap, but are also struggling to put in place the PPP related legal and regulatory framework and institutions to ensure their smooth operations.
- *Resettlement issues.* In many zones, state governments promised to provide the compensation in the case of land acquisition and resettlement, however, these promises were not or only partially fulfilled, which hinders the further financing/development of the zones.
- *Host government ownership & continuity.* This is especially a challenge for those local zones that face a new state government that does not fully recognize the potentials of the economic zones and or fully acknowledge the commitments made by the previous government.

Source: Draws on Zeng, Douglas Zhihua, "An Assessment of Six Economic Zones in Nigeria", World Bank, 2010; and Zeng, D. Zhihua, "SEZs in Africa", World Bank Blog: "Let's Talk Development": <http://blogs.worldbank.org/developmenttalk/sezs-in-africa-putting-the-cart-in-front-of-horse>.

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