

# Economic Effects of Infrastructure Investment and its Financing

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*T20 Recommendations Report*

*Draft // Work in Progress*

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## 1. Overarching narrative

-- to be completed and revised --

"Thus far, our underlying narrative was "recoupling": Social prosperity (societal wellbeing) can become decoupled from economic prosperity (GDP); the G20 should focus on social prosperity; and the G20 should seek to recouple economic prosperity with social prosperity.

We are now in the process of evolving this narrative in the direction of "global paradigm change": The existing global paradigm – the interlocking economic, social, political and environmental systems – are not sustainable; the G20 should promote global paradigm change by promoting fundamental and consonant economic, social, political and environmental changes to address major global challenges, from climate change to financial crises."

- The ultimate goal of the policy recommendations in this Review is to serve the people and recouple economic and societal progress and to seek resilient and equitable societies.
- In the effort to achieve sustainable development, infrastructure investments are crucial and it will largely depend on the G20 countries to make these investments.
- The G20 should strive to make inclusive and environmental sustainable (infrastructure) investments financially attractive.

## 2. G20 Commitments and Initiatives

### 3. TF 4: Economic Effects of Infrastructure Investment and its Financing

#### Task Force Description

Infrastructure is crucially important to foster countries' economic development and prosperity. Investments in infrastructure contributes to higher productivity and growth, facilitates trade and connectivity, and promotes economic inclusion.

Global infrastructure demand is high. McKinsey has reported that from 2016 to 2030, there will be a need to invest on average USD3.3 trillion annually to keep pace with projected growth. Of which, 60% is accounted for by developing countries. Furthermore, Asian Development Bank has estimated that USD1.7 trillion is required every year to maintain rates of growth sufficient to alleviate poverty in the Asian region including investment needs for climate change mitigation and adaptation.

As the population of developing countries keep growing, it is imperative we need high-quality infrastructure that is sustainable, increases business activities, creates new employment, narrows income disparities and empowering gender participation. Quality Infrastructure is at the heart of the Sustainable Development Goals as it supports inclusive growth and enhances access to all. One cannot ignore the Paris Climate Agreement and the inter-relation between infrastructure, sustainability and climate.

This task force aims to propose ways of developing quality infrastructure investments which consider financial, climate, and urban planning challenges. By addressing the challenges of the inherent complexity of quality infrastructure investments, mobilization of long-term finance at reasonable costs, and reformation of existing urban management systems amongst other, the task force will create a corpus of knowledge including best practices followed in various G20 member countries to encourage quality infrastructure investments.

Source: <https://t20japan.org/task-forces/economic-effects-of-infrastructure-investment-and-its-financing/>

#### **Introductory Thoughts: “Sequencing of Economic and Social Development “**

*by Naoyuki Yoshino, Asian Development Bank Institute (ADBI), Lead Institution T20 Japan/ Dean,*

Proper sequencing of economic and social development is important for economic development. Various infrastructure investments are lacking in developing countries. Constructing physical infrastructure is not sufficient to generate economic growth. Infrastructure investment must induce economic activities not only for large businesses, but also for small businesses. Power, transport, communications, water supply and sanitation have to be provided to assist stable growth of the economy. Good infrastructure will invite housing starts and construction of office buildings in the region. Business sectors will start production, which will increase employment in the region. Small businesses can start their own restaurants. Railway station can be developed so that farmers can sell their own products at the station. Shopping malls can provide sales opportunities for SMEs in the region. These economic developments along infrastructure generate increased corporate tax, property tax, business tax, income tax and sales tax revenues. These increases in tax revenues are not generated by increases of tax rates, but arise from enhanced economic growth. If these

increased tax revenues were partly returned to infrastructure investors and operating companies, their rate of return will increase in comparison to the time when the revenue was only based on user charges. The following figures are the estimates of how much the spillover tax revenue would have increased the rate of return from infrastructure investment if they were returned to investors in infrastructure. The last row shows the percentage increase of the rate of return, which are about 39.0%-43.8%.

In order to increase spillover effects, financing for start-up businesses along road, railway, water supply and electricity supply have to be provided, such as finance through hometown crowd funding. SMEs must be able to borrow money by use of regional crowd finance since banks are reluctant to lend money to risky borrowers. Women must have easy access to participating in business supported by employment and women can start up their businesses supported by home town crowd funding, as evidenced increasingly in selected Asian countries. This development can provide opportunities to low income individuals.

An empirical study by use of 44 countries shows that secondary school education and university education will enhance spillover effects of infrastructure investment. Secondary school education will provide basic skills in the region and university education offer advanced skills. Internet and smart phones can provide education programs to remote areas so as to promote human capital development. Modern technological progress will enhance quality of education and interactive education programs can be created to remote area. Technological progress will allow people to work at home and, as a result, life styles may drastically change in many developing countries.

## **A. The way to increase rate of return on Infrastructure Investment**

### **Challenge**

*Following the description of PB:*

- High quality infrastructure will have large spillover effects (externality effects) by increasing private sector activities and employment.
- Property values will increase after the completion of the infrastructure investment. Sales of business will rise. New shops will open along railways and roads.
- Economic Effects of Infrastructure Investment and its Financing (Spill over Tax) (ADBI)
- Increase of property tax revenues, business tax revenues, income tax revenues and sales tax revenues will follow.
- Traditionally, all spillover tax revenues were collected by central and local governments. However, these increase of tax revenues became possible because of infrastructure investment.
- Operating companies of infrastructure were handled by State owned enterprises (SOE).
- There are two methods to measure spillover effects of infrastructure investment, namely by use of macroeconomic model and by use of microeconomic analysis.
- Measure of spillover tax revenues will be possible by use of satellite data.
- Spillover effects will become larger when SME and startup businesses are provided their loans.
- Connectivity increases effectiveness of infrastructure investment. Private participation in infrastructure investment for sustainable growth

## **B. Private participation in infrastructure investment for sustainable growth**

### **Challenge**

*Following the description of PB:*

- Large spillover effects can be achieved by supplying finance to startups and small businesses along railways and along roads.
- Part of spillover tax revenues were returned to infrastructure investors, the rate of return on infrastructure investment will rise substantially.
- Insurance and pension funds are sources of finance for infrastructure investment since infrastructure investment is long term perspectives.
- Tax has to be accurately collected after the completion of infrastructure
- Cross border infrastructure will be promoted by injecting spillover tax revenues.
- Bonus should be paid to operating companies to increase efficiency. -13-
- Hometown Investment Trust funds will provide financing for start up businesses.
- Participation by private investors will become possible when the rate of return from infrastructure investment were distributed.
- Spillover tax revenues will be injected to solar power and wind power etc.

## C. Policy Briefs / Literature for A and B

### Fostering the cross-border infrastructure for sustainable development and regional cooperation

PB T20 18, G20 Insights

- [Dimitris Psarrakis](#)
- [Li Xin \(Shanghai Institute for International Studies\)](#)
- [Maxim Vilisov \(DOC Research Institute\)](#)
- [Vladimir Yakunin \(DOC Research Institute\)](#)

Development of infrastructure is an important factor that allows achieving sustainable economic growth, and giving efficient impetus to provide steady ascension of social well-being indicators in long run. Globalization processes, supported by digital transformations, provide unique opportunities for further development of high-end solutions. The countries with emerging economies are interested in sustainable infrastructure development but due to their economic backlashes, do not have the resources needed to boost and support vital infrastructure projects. In these circumstances emergence of new kind of cross-institutional and cross-border regional entities (international network) aimed at development of territorial cohesion and fostering better level of cooperation within and across borders are highly anticipated.

## US

### The potential macroeconomic benefits from increasing infrastructure investment

Report (July 2017) from the Economic Policy Institute (EPI)

- [Josh Bivens - Economic Policy Institute \(EPI\)](#)

The United States economy has suffered from two glaring macroeconomic problems over the past decade. The first is a severe and chronic shortfall of spending by households, businesses, and governments relative to the economy's productive potential (or, a shortfall of aggregate demand). This demand shortfall has kept growth in both jobs and wages too slow. The second problem is a rapid deceleration in the pace of productivity growth.

[...]

This brief assesses the effectiveness of an increase in the nation's investment effort in infrastructure as a means to close the aggregate demand shortfall as well as a means to boost productivity growth. Its key findings are:

- **Infrastructure investment could be an extraordinarily useful tool for macroeconomic stabilization.** Most estimates of the output "multiplier" for infrastructure investment are substantially higher than for other fiscal interventions. If the fiscal boost of infrastructure investment were accommodated by monetary policymakers, each \$100 billion in infrastructure spending would boost job growth by roughly 1 million full-time equivalents (FTEs).



- While unemployment in 2016 was roughly on par with its pre–Great Recession level, this does not mean policymakers should stop worrying about macroeconomic stabilization and maintenance of aggregate demand. **Growing fears of “secular stagnation”—a chronic shortfall of aggregate demand relative to the economy’s productive capacity—seem justified by several data points.** Key among them is the unusually slow growth in nominal wages this late into an economic recovery.
- **Productivity growth has decelerated sharply in recent years.** Much of this deceleration is likely short-lived and tighter labor markets should be expected to push productivity growth back toward more historically normal levels. Since infrastructure investment can lead to these tighter labor markets, it could have an immediate effect in restoring productivity growth.
- Further, and more importantly, **a greater public investment effort can also provide a significant boost to productivity in the long run by boosting the public capital stock.** The rate of return to infrastructure investment is large; the median and average estimates of a review of dozens of studies on infrastructure indicate that each \$100 spent on infrastructure boosts *private-sector* output by \$13 (median) and \$17 (average) in the long run.

## China

### Infrastructure and urbanization in the People's Republic of China

WORKING PAPER NO: 632, 2017, ADBI Working Paper Series

- Zhigang Li (ADBI)

The recent experience of infrastructure investment in the People’s Republic of China (PRC) suggests an intertwined relationship between investment, urbanization, and economic growth. In one mechanism, urbanization generates demand for infrastructure investment, which then drives economic growth via various channels including reducing transaction costs and raising productivity. Another mechanism emphasized in this paper is that infrastructure investment can promote urbanization through facilitating economic agglomeration toward hub cities. This agglomeration process also raises productivity in the economy. The lessons from the PRC have implications for infrastructure financing. On the one hand, recent reforms have allowed the market to play an increasingly important role in funding infrastructure investment, helping improve the efficiency of infrastructure investment and the productivity of the economy. On the other hand, evidence in the PRC suggests a cross-province spillover effect of road infrastructure, supporting the central government’s role in infrastructure financing. Although the current infrastructure investment system is still distorted by local governments’ incentives and decisions, there is no evidence of over-investment in infrastructure at the aggregate level. Nevertheless, there is strong evidence that the marginal return to infrastructure investment in the PRC has been rapidly declining. Hence, it is urgent for policy makers to reform the existing system to base their investment decisions on the economic returns to infrastructure. The interregional flow of goods and production factors (labor and capital) is a fundamental force that drives urbanization, but the market may not be efficient in financing and infrastructure construction. This paper analyzes infrastructure-related institutions and the

interrelation between infrastructure and urbanization. It addresses the following issues: What is the relationship between infrastructure, growth, and urbanization? How efficient have investment and financing been for infrastructure construction? How can we evaluate the performance of infrastructure development? How and to what extent should the government be involved in infrastructure construction?

### [The economics of infrastructure in a globalized world: Issues, lessons and future challenges](#)

In *Journal of Infrastructure and Policy Development*, (2017) Volume 1 Issue 2, pp.254-271. doi: 10.24294/jipd.v1i2.55.

- [Timo Henckel](#) (Research Fellow, Centre for Applied Macroeconomic Analysis Australian National University)
- [Warwick J. McKibbin](#) (Nonresident Senior Fellow - [Economic Studies](#) Co-Director - [Climate and Energy Economics Project](#))

Although infrastructure is widely recognized as a key ingredient in a country's economic success, many issues surrounding infrastructure spending are not well understood. This paper explores six themes: the returns to infrastructure; the role of the private sector; the evaluation and delivery of infrastructure in practice; the nature of network industries, pricing and regulation; political economy considerations of infrastructure provision; and infrastructure in developing countries. This paper aims to provide insights into many of these questions, drawing on the existing literature.

In this paper, we argue that there is much room for China to strengthen its regulatory framework for public-private partnerships (PPPs). We show that infrastructure projects carried out through local government financing vehicles (LGFVs) are largely unregulated PPPs, and significant fiscal risks have already manifested themselves. While PPPs can potentially provide efficiency gains, they can also be used by governments to circumvent budgetary borrowing constraints. Therefore, effective PPP regulation is key to delivering PPPs' benefits while containing their potential fiscal risks. The authorities have taken concrete steps in order to establish a sound regulatory framework and foster a new generation of PPPs. However, to make the framework effective, we highlight a few issues to be resolved. Based on international best practice, we propose a four-pillar regulatory framework for China, which could be implemented gradually in three stages.

### [Regulating local government financing vehicles and public-private partnerships in China](#)

In *Journal of Infrastructure, Policy and Development* (2017) Volume 1 Issue 2, pp.190-215. DOI: 10.24294/jipd.v1i2.67

- Hui Jin (Fiscal Affairs Department, IFM)
- Isabel Rial (Fiscal Affairs Department, IFM)

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## **Green Infrastructure Investment**

### **Towards a comprehensive approach to climate policy, sustainable infrastructure, and finance**

G20 Insights, PB 2017

- [Céline Bak \(Centre for International Governance Innovation \(CIGI\)\)](#)
- [Amar Bhattacharya \(The Brookings Institution\)](#)
- [Ottmar Edenhofer \(Mercator Research Institute on Global Commons and Climate Change \(MCC\)\)](#)
- [Brigitte Knopf \(Mercator Research Institute on Global Commons and Climate Change \(MCC\)\)](#)

We propose a policy package of low-carbon growth stimulation through a steep increase in sustainable infrastructure, mobilizing sustainable finance, and adoption of carbon pricing to simultaneously achieve the objectives of the Paris Agreement and the Sustainable Development Goals

### **Innovative green-technology SMEs as an opportunity to promote financial de-risking**

G20 Insights, PB 2017

- [Venkatchalam Anbumozhi \(Economic Research Institute for ASEAN and East Asia \(ERIA\)\)](#)
- [Céline Bak \(Centre for International Governance Innovation \(CIGI\)\)](#)
- [Joël Ruet \(The Bridge Tank\)](#)
- [Elena Verdolini \(Fondazione Eni Enrico Mattei \(FEEM\)\)](#)

We recommend that the G20 target innovative green-technology SMEs as an opportunity to promote financial de-risking while addressing Paris Agreement commitments and UN Sustainable Development Goals. This should be achieved by creating signals for private investors through: (1) a reporting system that can help monitor the scale-up of green-technology SMEs; (2) the use of public funds to signal innovative green-technology SMEs to investors; and (3) the inclusion of SMEs in the design of green finance platforms. By implementing these recommendations, the G20 will ensure that innovative, low-carbon SMEs become attractive, low(er)-risk investment opportunities for the private sector.

## [Green Fiscal Reform for a Just Energy Transition in Latin America](#)

G20 Insights, PB 2018

- [Carlos Trinidad \(Sociedad Peruana de Derecho Ambiental: SPDA\)](#)
- [Rafael Soria \(Escuela Politécnica Nacional de Ecuador\)](#)
- [Ottmar Edenhofer \(Mercator Research Institute on Global Commons and Climate Change \(MCC\)\)](#)
- [Michael Jakob \(Mercator Research Institute on Global Commons and Climate Change \(MCC\)\)](#)

Green fiscal reforms would contribute to climate change mitigation, increase the economic efficiency of national tax systems and provide additional public revenues. Policy makers need to ensure that the overall political and macro-economic conditions are favorable for green fiscal reforms and develop comprehensive reform plans. Reforms cannot usually be introduced directly; they require gradual introduction and appropriate policy sequencing. To avoid adverse impacts for the poorest sections of the population, it is crucial to understand the distributional impacts of higher energy prices and design appropriate compensation schemes. To ensure that all relevant social groups are fairly considered, transparency and stakeholder participation are crucial. International fora, such as the G20, can play a crucial role in sharing experiences on different design options, carrying out monitoring and peer-review of green fiscal policies, providing financial assistance and building administrative and institutional capacities.

## [Alternatives to bank finance: role of carbon tax and hometown investment trust funds in developing green energy projects in Asia](#)

ADB Working Paper Series (2017), Working Paper no.:761

- Naoyuki Yoshino (ADB)
- Farhad Taghizadeh-Hesary (ADB)

The main obstacle to developing green energy projects is lack of access to finance. For larger energy projects (e.g., large hydropower projects), insurance and pensions are sustainable financing alternatives. Large energy projects are long-term investment projects; banks are not able to provide long-term loans because their resources (deposits) are short- to medium-term. Pension funds and insurance companies hold long-term savings, so these institutions could be a proper alternative for financing mega-size energy projects. On the other hand, because electricity tariffs are often regulated by the government, to increase the investment incentives the spillover effects originally created by energy supplies need to be used, and tax revenues refunded to the investors in energy projects. For smaller-size green projects, the paper provides a theoretical model for combining utilisation of carbon tax and a new way of financing risky capital, i.e., Hometown Investment Trust Funds (HITs). Because of the Basel capital requirement, and because most green energy projects from the point of view of financiers are considered to be risky projects, many financiers are reluctant to lend to them or they lend at high interest rates. The paper theoretically shows that by taxing

carbon dioxide (CO<sub>2</sub>), sulphur dioxide (SO<sub>2</sub>), and nitrogen oxides (NO<sub>x</sub>) and allocating those tax revenues to HITs, green projects will become more feasible and more interesting for hometown investors; hence the supply of investment money to these funds will increase.

### **Financing Renewable Energy: Who is Financing What and Why it Matters**

Journal Article, vol. 127, 2018 Technological Forecasting & Social Change

- Mariana Mazzucato University College London (UCL)

Successful financing of innovation in renewable energy (RE) requires a better understanding of the relationship between different types of finance and their willingness to invest in RE. We study the ‘direction’ of innovation that financial actors create. Focusing on the deployment phase of innovation, we use Bloomberg New Energy Finance (BNEF) data to construct a global dataset of RE asset finance flows from 2004 to 2014. We analyze the asset portfolios of different RE technologies financed by different financial actors according to their size, skew and level of risk. We use entropy-based indices to measure skew, and construct a heuristic index of risk that varies with the technology, time, and country of investment to measure risk. We start by comparing the behavior of private and public types of finance and then disaggregate further along 11 different financial actors (e.g. private banks, public banks, and utilities) and 11 types of RE technologies that are invested in (e.g. different kinds of power generation from solar radiation, wind or biomass). Financial actors vary considerably in the composition of their investment portfolio, creating directions towards particular technologies. Public financial actors invest in portfolios with higher risk technologies, also creating a direction; they also increased their share in total investment dramatically over time. We use these preliminary results to formulate new research questions about how finance affects the directionality of innovation, and the implications for RE policies

## **D. Implementations**

-- to be added --