

Key Points

- New or improved infrastructure creates new wealth around itself, which produces future taxes as a spillover effect.
- This new neighboring wealth is scientifically measured against a control zone to prove its sole attribution to the project.
- Economic corridors along transit routes can widen into economic and tax zones that catch this growing wealth and future taxes.
- The tax-collecting authority puts aside an agreed share of attributable new taxes in a project-specific trust fund.
- Trust fund proceeds can be used to close gaps in the viability/profitability of projects to help finance them.
- Private investors will be attracted to those projects which offer this back-end participation in future tax revenues from the benefiting zone.
- Tax-kicker bonds will be able to offer higher rates of return than traditional revenue-backed or project bonds.
- A model term sheet for this new instrument illustrates its key features: dual tranching, trust fund lockbox, independent certifier of participation due, and guarantees.
- Back-end participation is not a present transfer payment or credit so it should be budget-neutral and off national balance sheets.

Introducing the Tax-Kicker Bond: Budget-Neutral Financing of Private Infrastructure by Back-End Participation in Future Tax Revenue Growth

Grant B. Stillman, The Legal Adviser, ADBI

Introduction

Everybody is trying to think of ways to attract long-term private and institutional investors to pay for new highways, railways, bridges, or dams. Promising ideas have been tried; but they have not convinced pension funds or affluent individuals to invest, especially in emerging economies with untested issuers.

Yet higher returns from infrastructure projects are an ideal match for institutional investors—if projects are similar to those financed by benchmark United States (US) tax-free municipal bonds, an allowable asset class for decades. For their part, governments accept that they should no longer incur further direct debt on their balance sheets, widen their current account deficit, or increase external debt even for justifiable big-ticket investments. And most politicians are reluctant to impose new or higher taxes on present users or potential customers of future infrastructure.

Emerging economies may have projects with potential to make money. But governments still face pressure to put in scarce fiscal resources to close project viability gaps or to agree in advance to availability payments to the operator and its investors. Many consider this as passing the ultimate payer's responsibility back to governments without tapping new private money.

This brief shows the spillover effect of how infrastructure can create jobs, industries, and regional wealth. Revenue from property rates, income and business taxes, as well as sales or value-added tax increases along the periphery and adjacent areas of the infrastructure. Part of these increasing tax revenues can be later transferred to original private investors, which will increase the rate of return and make them more willing to lend in the first place.



Future tax-sharing or back-end participation does not increase current rates or impose new taxes or levies to get more money. Instead, it relies on new sources of wealth and future revenues growing after a project has been completed. Indeed, these revenues would never come into existence at those levels but for the implanted infrastructure. If governments accept that future revenues should be fairly shared with investors—who put up most or all of the original capital—persistent funding gaps can start to close. And more project bonds can show higher returns that reflect their full and long-term contribution to society.

The “kicker” bond being proposed here, with more elaboration and trials, could prove that new sources of future tax revenue are feasible to attract private investors with back-end participation in a budget-neutral way (Yoshino and Stillman 2017b).

Layout of Brief. Part 1 of this brief will explain a new way to attract private financing to infrastructure investment by injecting a share of future spillover tax revenues. This difference-in-difference method is described scientifically in Part 2. Next, proposals to turn existing economic corridors into tax catchment zones to better exploit the spillover effect are explored in Part 3. Various precedents and innovations from past successes—chiefly land value capture and subsidy bonds—are reviewed in Part 4 to draw forth instructive takeaway messages on how to structure the features of back-end tax participation. Finally, in Part 5, the proposal of the Asian Development Bank Institute (ADBI) for a new form of retail debt security instrument known as a tax-kicker bond is introduced. Tentative legal details of a possible Term Sheet for Back-End Participation in Future Tax Bond are assayed in the Appendix for practitioners.

Tour d’Horizon. It is not the purpose of this brief to rehearse the present environment and all the known weaknesses and solutions to encourage greater private sector participation in infrastructure projects. Suffice it to say here, the following points should be restated and borne in mind. (See generally Regan 2017 and ADB 2017a).

An overall framework must be in place which guarantees sufficient transparency, fairness, and predictability

for private actors in any country hoping to attract infrastructure. Obviously, for this concept to work the country or its subnational units must be able to assess and collect taxation from property owners, businesses, and individuals in a consistent and effective manner. Coordination ministries for planning or one-stop public-private partnership (PPP) centers are also desirable to streamline the permitting processes as more developed countries or cities have found to their advantage.¹

It should be realized that not all projects may be turned into a self-sustaining profitable infrastructure venture even with our tax injection and so state money, overseas development aid, and infrastructure lending banks may be the only solution. Developing countries which predominantly rely upon bank loans to finance infrastructure must be prepared to try different approaches to encourage reliance on project bond markets instead. It is time to realize that global infrastructure needs have begun to outstrip the ability of banks to supply most or all project finance capital. For this sea change to succeed, institutional investors and bond credit-rating agencies need to become better educated and open-minded about the potential of emerging country infrastructure investment (Kaga 2017).²

Finally, there is the oft-heard claim that not enough “bankable” or “well-prepared” projects are being brought to market; but we counter, is not this an excellent opening for experienced international financial institutions and the new specialized regional banks to offer their preparatory services for fees or as technical assistance?³

Part 1: New Way to Attract Private Financing to Infrastructure Investment by Injecting a Share of Future Spillover Tax Revenues

Need for Infrastructure Investment. In Southeast Asia alone, \$8 billion in infrastructure investments are implemented every year. However, it is estimated that at least \$210 billion worth of infrastructure investment is probably needed annually. India has announced a record goal to spend \$60 billion on infrastructure in

¹ On 15 August 2017, President Trump announced that he would sign an executive order effectively cutting in half the regulatory steps required to obtain US government approvals of major infrastructure projects that can satisfy all usual environmental standards.

² Also, the exciting exception of sukuk or Islamic bonds, which are working well in Malaysia, falls outside the scope of this brief.

³ In passing, we note that they could also be doing more to set up reputable bond credit-rating agencies and services in countries that do not have them yet, sponsoring open mutual funds that manage investments primarily in infrastructure for local currency and foreign savers, guaranteeing partially the repayment of bonds and their interest for credit enhancement, and piloting structured finance deals and private placements matching sophisticated and ethical investors willing to experiment with fledgling issuers who have potential to succeed with long-term encouragement as was done for social impact bonds. Possibly, the systemic effects of the collapse as a result of the financial crisis in the monoline insurance market for supporting project bonds also bears investigation.

fiscal 2017 alone; while the Philippines wants to spend the equivalent 7% of its gross domestic product (GDP) (Curran, Rodrigues, and Salna 2017). Clearly, public money is not going to be sufficient to satisfy all of Asia's infrastructure needs.

In many developing countries in Asia, we observe heavy traffic congestion in cities—highways, trains, and various modes of public transport are lacking. PPPs have long been promoted for infrastructure development in India, Thailand, and other places in Asia. However, most PPP projects turned out to be disappointing since the rate of return on infrastructure depends mainly on unpredictable user charges, such as train fares and highway tolls. When the global economic crisis hit the Asia and Pacific region, the private sector retreated from infrastructure investment entirely. Risks associated with infrastructure were so large that private and institutional investors were hesitant to put their money into infrastructure.

It is well understood that good infrastructure creates huge positive spillover effects in the region around a project (Figure 1). Railways and highways will bring manufacturing factories into the region by making the shipping of products faster and safer. Railways can connect manufacturers to markets and to ports. New industry creates jobs in the region. Eventually, service sector businesses such as restaurants and hotels will be constructed to meet the increased demand in the region. Neighboring farmers and small businesses can sell their products at the train stations and highway stopping points, from which new villages and cities eventually grow (Ambrose 2005: 167).

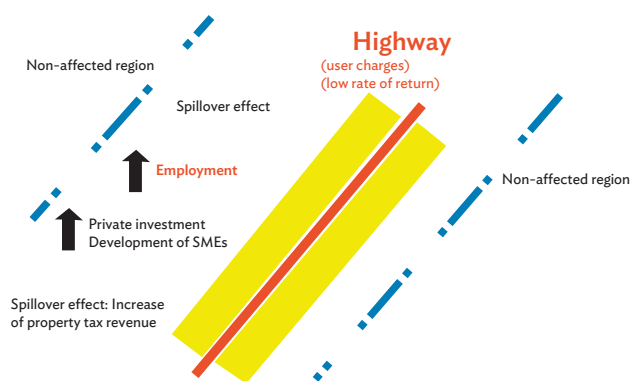
The spillover effects of infrastructure investment will over time naturally increase revenues from corporate, income,

and property taxes. The difference-in-difference method (Yoshino and Abidhadjaev 2017; Yoshino and Pontines 2015a, 2015b) can be used to compute the effect of spillovers on tax revenues in places where infrastructure investment occurred compared with ones where no infrastructure investment took place (see further Part 2).

A study by Yoshino and Abidhadjaev (2016) shows that good educational opportunities together with infrastructure investment create qualified workers who can earn more and enhance regional productivity. Currently, all these increases and new tax revenues are simply collected by the government and never returned or shared with investors in infrastructure. We have estimated that returning part of these additional tax revenues from spillovers to construction companies and investors could raise the rate of return on infrastructure investments by as much as 39% to 43% in the case of Japan and by 14% to 16% in the case of Uzbekistan.

Today, many developing and developed countries alike face an acute shortage of public funds to meet their huge infrastructure needs: some claim the global shortfall could be \$3 trillion annually (The Economist 2017b). To narrow the gap between investment needs and actual government disbursements, the rate of return on infrastructure investment has to be increased by bringing the spillover tax revenues generated by infrastructure development to the construction companies and investors. This part of the brief will address the importance of spillover effects from infrastructure investment and how to utilize additional tax revenues created by the externality effects of infrastructure to attract private sector finance.

Figure 1 Principles of Spillover Effects of Infrastructure Investment



SMEs = small and medium-sized enterprises.
Source: Yoshino et al. (2017).

Economic Effects of Infrastructure Investment. The increase in productivity is one of the economic effects of infrastructure investment. If infrastructure has a positive effect on productivity, private firms can increase output without changing inputs, and further can increase output by changing the amount of inputs to maximize profit. The former effect is called direct effect and the latter is said to be the indirect effect (Nakahigashi and Yoshino 2016; Yoshino and Nakahigashi 2004). In particular, the indirect effect reflects the benefits from infrastructure investment in the economic activities of private firms and can be said to be a spillover effect of infrastructure.

Table 1 shows the productivity effect of infrastructure based on Japanese macroeconomic data and assuming translog production function (Nakahigashi 2015). The direct effect of infrastructure investment is shown in the first row of Table 1. The second and third rows show the

Table 1 Spillover Effect Estimated from a Macroeconomic Translog Production Function in Japan

	1956–1960	1961–1965	1966–1970	1971–1975	1976–1980	1981–1985
Direct effect	0.696	0.737	0.638	0.508	0.359	0.275
Indirect effect (Kp)	0.452	0.557	0.493	0.389	0.270	0.203
Indirect effect (L)	1.071	0.973	0.814	0.639	0.448	0.350
20% returned	0.305	0.306	0.261	0.206	0.144	0.111
% increment	0.438	0.415	0.410	0.404	0.400	0.402

	1986–1990	1991–1995	1996–2000	2001–2005	2006–2010
Direct effect	0.215	0.181	0.135	0.114	0.108
Indirect effect (Kp)	0.174	0.146	0.110	0.091	0.085
Indirect effect (L)	0.247	0.208	0.154	0.132	0.125
20% returned	0.084	0.071	0.053	0.045	0.042
% increment	0.392	0.392	0.390	0.390	0.391

Source: Estimation by Yoshino et al., (2017) based on Nakahigashi (2015).

spillover effects on private capital and labor. In the 1950s and 1960s, both the direct effect and the indirect effects were very large. The estimated tax revenues generated by these spillovers are computed by setting the tax rate at 20%. Since the economic impact decreases as time goes on, the estimated amount of tax revenues diminishes, as shown in row 4. In the 1950s, it was 0.305; however, it was only 0.042 in the period 2006–2010. Suppose 20% of these tax revenues were returned to investors, then how much would their rate of return increase? The last row presents the incremental rate of return achieved by injecting 20% of spillover tax revenues. In the 1950s, the incremental rate of return would have been about 43.8% while it was about 39.1% in recent years. Thus, based on Japanese macroeconomic data and assuming a translog production function, injecting just 20% of the additional tax revenues generated by project spillovers would increase the total return on infrastructure investment by roughly 39% to 43%.

Infrastructure Financing through Private Funds. In recent years, PPPs, including the use of private funds, are being emphasized. Utilizing private funds to develop infrastructure has the advantage of increasing pressure to (1) shorten the period of construction and complete the project as quickly as possible (see discussion of US transcontinental railroad incentives in Part 4), (2) complete the project at minimal construction cost, and (3) operate the project profitably at low cost after completion. Despite these advantages, there have not been many PPP projects in Japan. In fact, the so-called third sector projects (a kind of PPP) that took place in

Japan in the 1980s and 1990s more often than not ran up bad debt for local governments. These third sector projects were jointly funded by the public and private sector. Many of them failed as a result of irresponsibility by both public and private sector operators. Weak governance and lack of profit incentives were another reason for the failures.

Bad memories of these third sector projects has made regional governments reluctant to pursue PPP projects. Private sector actors are also reticent since risks associated with infrastructure projects are large and the expected rate of return is typically not attractive enough. Various third party projects which combined public sector and private sector funds were created. However, the rates of return were simply too low. Many third party projects failed and created big losses for local governments. For these reasons, we believe that injection of spillover tax revenues will be an important means to make infrastructure projects viable enough to attract private capital.

Public–Private Cooperation in High-Risk Projects: Viability Gap Funding. Infrastructure projects pose a variety of well-known risks arising from (1) regime change, for example when a change in local administration causes stoppages before project completion; (2) cost increases, for example when extensions in construction period or delays in permitting processes and land acquisition create additional interest expense; (3) unexpected decreases in revenue resulting from incorrect fee setting and decreased traffic; (4) slower

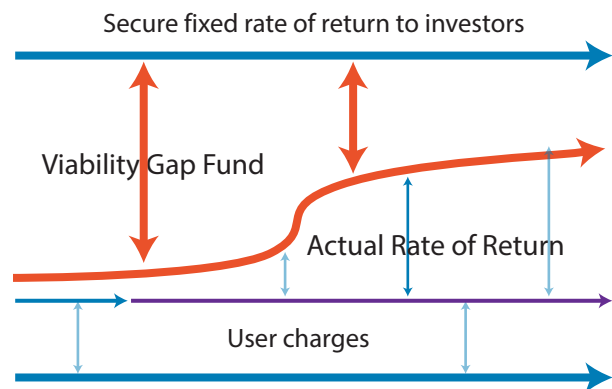
than expected take-up of the new infrastructure by potential users; (5) unanticipated expenses, for example when compensation is required for noise occurring after the completion of an infrastructure project; and (6) legal delays in land acquisition due to complicated, unclear, or contested ownership structures.⁴

Private investors have tried various solutions in order to avoid possible risks and to earn benefits. Some investors, however, may opt to force the transfer of risks onto the public sector. In these cases, it will be essential to clarify the risk-sharing between public and private sectors in advance. In particular, viability gap funding (VGF), which is the capital grant that the public sector guarantees private investors a certain rate of return to attract private finance, would be appropriate for infrastructure projects that are indispensable for the public, but are high-risk and low-earning. For example, government supplies 30% of the initial funding for a highway project, topping up the rate of return to private investors to close the (perceived) gap in a project's viability. Through the injection of funds from the public sector, the rate of return realized in the private investors would increase by 10/7 or about 1.428 times the actual return. So even in projects in which private funds are not usually involved because of low expected revenue, it could be possible to introduce private funding. However, in this case, if the ratio of the injection by the public sector is too high, it creates a moral hazard problem. The public sector secures a rate of return for private investors which exceeds the true revenues from the infrastructure project, which leads to the accumulation of debt by the public sector. On the other hand, when this ratio is too low, there is a possibility that the private sector could decide not to invest in the project at all.

However, it does not necessarily follow that the injection of VGF can always improve the efficiency of the infrastructure project. For projects whose only return comes from user charges (Figure 2), the gap between the government guaranteed return and the actual return would be very wide. Private investors can secure a high rate of return, but the government sector will accumulate debt every year for the life of the underperforming project.

Increased Rate of Return through Internalization of Spillover Effects. As we argue, infrastructure projects generate benefits in addition to operating revenues such as user charges and road tolls. For example, a highway may benefit a company through cost savings

Figure 2 Principle of Viability Gap Funding



Source: Yoshino et al. (2017).

and increased sales from faster transport of raw materials and final products as well as generate usage fees. Yoshino and Pontines (2015a, 2015b) analyzed the effect of injecting public funds in the development of the Southern Tagalog Arterial Road (STAR) highway project in Batangas Province in the Philippines. In particular, Yoshino and Pontines (2015b) evaluated how the opening of the STAR highway contributed to revenues from business and property taxes, using the difference-in-difference method to compare tax revenues in *areas affected by the project* with *unaffected areas* along the route shown in Figure 3.

Table 2 shows the change in tax revenues in three cities in Batangas Province before, during, and after construction of the highway. Construction took place during periods t_1 and t_0 . For Batangas City, the table shows that tax revenues increased from P490.90 million before the project (t_2) to P622.65 million in t_1 . Immediately after completion of the highway (t_2), tax revenues declined to P599.49 million as businesses took time to establish their presence and adjusted to utilizing the highway. However, by period t_4 , tax revenues had increased to P1,208.61 million. The spillover effects of the highway became very large a few years after the completion of highway. Similar increases in tax revenues can be observed for Ibaan City and Lipa City as greater economic activity in those cities added to tax revenues.

While construction companies may be mainly interested in building railways and highways, this study shows that the spillover effects from the development of such infrastructure are also very significant for the local economy. Infrastructure development can stimulate

⁴ The last point while important in many developing countries is beyond the scope of this brief.

Figure 3 Batangas Province and the Southern Tagalog Arterial Road Highway



Source: Yoshino and Pontines (2015a, 2015b).

Table 2 Calculated Increase in Business Tax Revenues for Tollway Beneficiaries Relative to Nonbeneficiaries

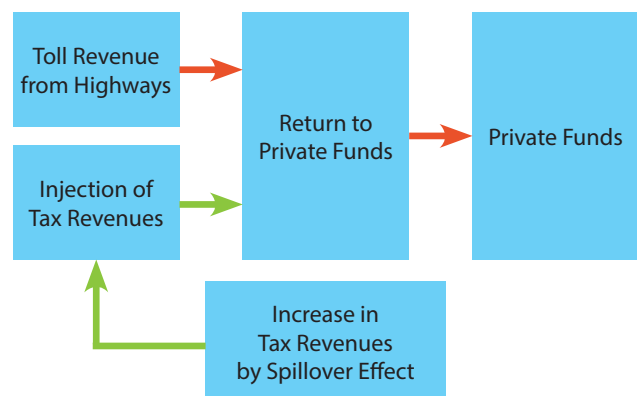
	t_{-2}	t_{-1}	t_0	t_{+1}	t_{+2}	t_{+3}	$t_{+4, \text{forward}}$
Lipa City	134.36	173.50	249.70	184.47	191.81	257.35	371.93
Ibaan	5.84	7.04	7.97	6.80	5.46	10.05	12.94
Batangas City	490.90	622.65	652.83	637.89	599.49	742.28	1,208.61

Note: For the period $t_{+4, \text{forward}}$ in the case of Lipa City and Batangas City is the average increase in business tax revenues in each province.
Source: Yoshino and Pontines (2015a, 2015b).

business activity in an area and create employment. Additionally, small and medium-sized enterprises (SMEs) in the area can open stores along new roadways and at new railway stations, increasing sales. If it is possible to confirm that the increase in tax revenue is due to the spillover effects of infrastructure, it might be possible to convince the tax-collecting government to return the increase in tax revenue to private investors and the public sector (Figure 4). By doing so, the rate of return to private investors is increased, and, as a result, it will become possible to attract private funds in new ways to various infrastructure projects (see five potential new ways in Box 1).

Note on Incentive Mechanisms for Infrastructure-Operating Entities. To enhance efficiency and increase the rate of return on infrastructure development, it is

Figure 4 Scheme for Injection of a Share of Tax Revenues Gained from Spillover Effects of a Tollway



Source: Nakahigashi and Yoshino (2016).

Box 1 Five Potential Ways to Make Tax-Sharing Injections Return to Original Investors



1. **Rebate check/transfer (to issuer or bondholder)**
2. **GDP-indexed availability payment**
(unfettered or with collars in band)
3. **Tax-injected into an open-ended viability gap fund**
(risk of raiding or underfunding)
4. **Deduction or tax credit to infrastructure developers on future years' tax returns**
(may not be of use to overseas investors who are not taxpayers in the host country)
5. **"Tax-Kicker" (back-end future-tax-participating) bond**

Source: Author.

also desirable to vary the dividend payment for private investors based on the project's revenues, including both user fees and spillover tax revenues. It is paramount for infrastructure-operating entities to make greater efforts to increase income.

Table 3 shows the payoff matrix depending on the presence or absence of effort by investors and the infrastructure-operating entity. If neither the operating entity nor investors make any effort, the operator gains 50 in revenue and investors receive dividend income r . It is assumed that the operator could increase operating income to 100 by improving the salary system, such as by paying staff bonuses based on the entity's revenue.

Furthermore, investors could raise their dividend income to ar ($a > 1$) by efforts to reduce costs and increase

infrastructure revenues, such as by increasing the number of highway turnoffs or the number of available cars. The lower right cell of the payoff table represents the revenue when both the operating entity and infrastructure investors make maximum effort to increase revenue and improve service. In this case, income of both the entity and the investors is higher than in the normal case. (The income of the entity increases from 50 to 100 and the income of investors from r to ar .) We believe this illustrates the importance of designing the dividend policy for investors and the salary system of the infrastructure-operating entity to better incentivize the entity and investors to improve revenues.

To reiterate, in the PPPs, as described above, it is necessary to improve the efficiency of infrastructure projects through private funds and to introduce mechanisms to benefit the staff of an infrastructure-operating entity, for example by paying staff bonuses tied to the increase in profit.

Table 3 Payoff Table for Infrastructure-Operating Entity and Investors

	Normal Case		Effort Case	
Normal Case	(50, r)		(50, ar)	
	Operating Entity	Investors	Operating Entity	Investors
Effort Case	(100, r)		(100, ar)	
	Operating Entity	Investors	Operating Entity	Investors

Source: Nakahigashi and Yoshino (2016).

Another idea could be to award the construction laborers or operating staff back-end participation points in the project they are building or running, which becomes a form of residual payment for blue collar workers that might even extend to generating income for them once they have retired (in a similar way that white collar, intellectuals and creative staff and their families often get to enjoy residuals through further royalties and equitable participations after they are no longer part of the workforce).

Future Prospects with Global Application.

Infrastructure investments are being promoted not only in Asia but also in the US under President Trump. However, the US administration and many in Congress do not want to increase government debt or tax average users or even ask for a greater contribution from high tax-bracket individuals or energy users. It is apparent that private funds would have to be injected somehow to cover the huge need for infrastructure investment. Bringing increased tax revenues from the spillover effects of infrastructure development, such as increased revenues from corporate, income, sales, and property taxes, will raise the rate of return above what can be gained from user charges alone. Long-term investors such as pension funds and insurance companies are growing in Asian countries. Infrastructure investment projects require long-term, patient, and increasingly ethical investors. If the rate of return on infrastructure was increased by injecting future spillover tax revenues generated in areas surrounding infrastructure investments, much more long-term private capital could be forthcoming for infrastructure investment. Incentives to improve infrastructure which will increase regional economic activity will be created. Greater spillover effects will raise the rate of return for private investors. The higher the expected rate of return, the more private funds would be attracted to the project at the outset.

Furthermore, fewer public sector funds would be needed for infrastructure investment which means the government could increase the total amount of infrastructure investment by attracting private finance when incremental tax revenues from spillover effects are used to raise their rate of return. This method of paying back increased tax revenues obtained from infrastructure investment will attract private long-term investors and require less government funds. And it will enhance the efficiency and the governance of infrastructure investment.

Part 2: The Difference-in-Difference Method in Detail

As we have seen, by using the difference-in-difference (DID) analysis method, a team of researchers led by Naoyuki Yoshino at the Asian Development Bank Institute has been able to compute in diverse settings, ranging

from Japan, the Philippines, Uzbekistan, and India, the increases in tax revenues flowing from the spillover effects of newly implanted infrastructure.

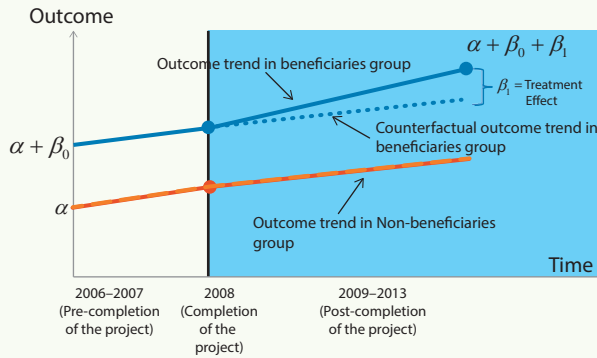
The findings show that after an initial spike around construction, there tends to be a lag of a few years until a noticeable share of income from new business activities and increasing profits start flowing into the hands of the tax collectors (Yoshino et al. 2017). Not only are there frequent adjacent economic spillovers in the project-affected areas but occasionally even spin-offs where unanticipated new opportunities, particularly in the fields of tourism and education, are opened up by transit infrastructure (e.g., access roads built for the Snowy Mountains hydroelectricity scheme fortuitously paved the way for a new and lucrative ski industry for Australia).

The DID method does what its name suggests. The impact of a policy or a project on a certain outcome can be estimated by computing a double difference, i.e., one over time (before and after) and one across individuals or entities (between beneficiaries, the affected or treatment group, and the nonbeneficiaries, the non-affected or control group). Specifically, in its simplest form, when data are available for the beneficiaries and nonbeneficiaries for two time periods (before and after the operation of an infrastructure project, such as the opening of a highway), the method produces impact estimates.

The key DID method assumption is that without the infrastructure project, the changes in outcomes (i.e., trends) between the beneficiaries and the nonbeneficiaries are the same over time. In effect, the project is the only factor that creates a trend deviation between these two groups. As can be seen in Box 2, the dotted line represents what would have happened in the beneficiaries group in the absence of the project (the counterfactual). Notice that this same dotted line trends parallel to the dashed line, which represents the outcome trend for the nonbeneficiaries group. Meanwhile, the part of the solid line that diverges from the dotted line, i.e., the trend of the beneficiaries group, represents the deviation between the beneficiaries and nonbeneficiaries that was assumed to be exclusively caused by the project.⁵

⁵ In practice, however, one can never test this assumption of the same trend between the beneficiaries group and the nonbeneficiaries group in the absence of the project.

Box 2 The Difference-in-Difference Method



To measure the impact of a policy or project, one can also easily use the DID method to estimate the following regression model:

$$Y_{it} = \alpha + \beta_0 A_i + \beta_1 + P_t \times A_i + \varepsilon_{it} \quad (1)$$

where

Y_{it} is the outcome variable of interest such as gross domestic product (GDP), GDP per capita, etc., for the i -th entity in the t -th period;

A_i is a binary variable that takes a value of 1 for an entity (e.g., household, city, municipality) belonging to the beneficiaries group, and a value of 0 for an entity belonging to the nonbeneficiaries group;

P_t is also a binary variable that takes a value of 1 for the period in which the policy or project was implemented or it takes a value of 0 for the period prior to the implementation of the policy or project;

$P_t \times A_i$ is the interaction term between the two binary variables;

ε_{it} is the error term which is assumed to be uncorrelated with constant variance σ^2 ; and

α, β_0, β_1 are the regression parameters to be estimated.

The parameter β_1 represents the impact of the policy or infrastructure project. The model can be enriched by including entity and time dummies. The main advantage of working with a regression-based approach to the DID is that other variables can be added to the right-hand side of equation (1), which control for possible violations of the assumption of the same trends between the beneficiaries and nonbeneficiaries group.

Part 3: Turning Economic Corridors into Tax Catchment Zones for the Spillover Effect

As of the middle of 2017, there could be almost 40 existing, in progress, or proposed economic corridors snaking and weaving their various ways across regions and even numerous countries. So much the better if they have logical geographic boundaries imposed by mountain ranges or follow the course of a mighty river basin or valley system. Most corridors in Asia are underpinned by some form of existing or proposed navigation along highways, railways, or waterways (Table 4)⁶ (Reconnecting Asia).

Many nation states, regional organizations, and international financial institutions have been calling for an evolution of these corridors from merely convenient transportation lines linked by friendship bridges into efficient trade and investment routes or belts, and ultimately sophisticated and integrated economic areas that encompass many countries and multi-sectors through increased interconnectivity (Zhang 2017). A

Table 4 Basic Characteristics that Typify Present Economic Corridors in Asia

Covers a small geographic space straddling a transport artery, e.g., road, rail, or canal.
Emphasizes bilateral rather than multilateral cooperation, e.g., strategic nodes at neighbors' border crossings.
Highlights physical planning so infrastructure development achieves positive benefits.

Source: Author.

number of ongoing scoping studies are looking at an area, city, or location and trying to match it with its assessed economic potential, such as a market niche or transit hub so that any planned investment and future economic activities are efficiently generated from that potential (The News International 2017).

Whatever the long-term goals may turn out to be, it seems clear enough already that these natural corridors could form the spines along which a broader swath of

⁶ Others might be busy sea-lanes, source-to-market pipelines, or power transmission grids and even fiber optic networks.

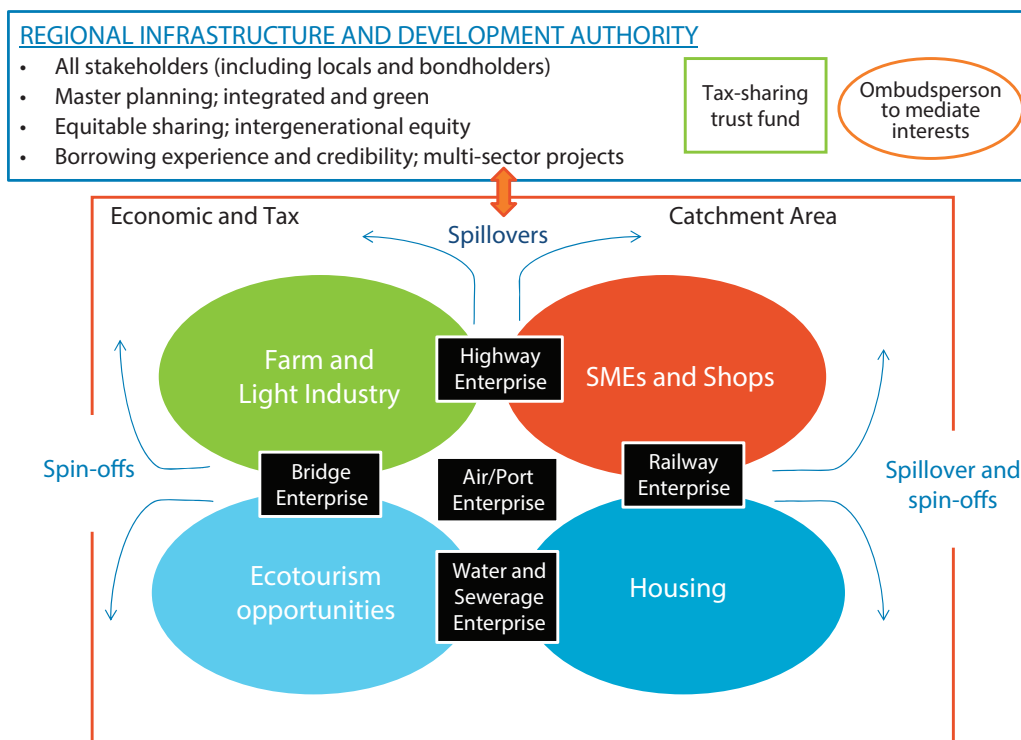
an economic catchment zone might expand in which taxes and newly generated jobs and wealth might grow as predicted by the DID method. For instance, a recent evaluation of cross-border transportation in the Greater Mekong indicates that economic corridors in that subregion as a whole show a positive net economic impact and can also contribute to vertical integration across borders in various industries (Fujimura 2017: 3).

Inside what we shall term these *economic and tax catchment areas or zones*, a responsible and dedicated *regional infrastructure and development authority* (think of a Tennessee Valley Authority or a Mekong River Commission for Sustainable Development) might be able to manage in a more integrated, greener, and higher-quality approach the development and holistic exploitation of the area and to reap the spillover and spin-off effects coming out of different projects rather than each new development being approached on an ad hoc basis (Figure 5). Many current infrastructure projects will set up a specific financing or construction entity or vehicle to cover just the immediate needs of that build but a standing regional authority can exist over a much longer time span and undertake many integrated

improvements. As an example of complex planning of hundreds of infrastructure projects within a region, the Aberdeen Roads PPP was the largest ever closing in Scotland involving major civil engineering across roads, rivers, underpasses, and wildlife bridges (Norton Rose Fulbright 2015).

Excluding the not insubstantial complications of international border crossings and sharing of resources and income from transnational natural feature, let's concentrate for ease of analysis on a potential authority controlling a river-valley strip within one province or local area. If that authority (or more usually the subnational political entity to which it belongs) had been allowed the power to raise and collect taxes from the properties, people, and businesses within that zone, it would become fairly easy for it to promise to share the tax with private investors at a later date. It might be possible for that zone to develop its own estimate of how much it expects in future tax or wealth growth and begin to offer that for most of its new back-end tax participation projects whether they be a highway, railway, bridge, or airport (Figure 5). Although not a recommended idea in theory, there might also be

Figure 5 Toward a New Unified Model



SMEs = small and medium-sized enterprises.
Source: Author.

a pragmatic opportunity to cross-subsidize the more profitable projects with those that are slower to show the promised return. For instance, if not in breach of a prior promise, spillovers or excessive windfalls from a successful road project might be paid into a regional viability fund or a general tax-sharing fund to be used to close a funding gap in that region's water and sewerage system that might not be so marketable or attractive to private investors.

An integrated authority has the ability to learn from each new project, gain a track record in the market and reap the rewards from any newly implanted infrastructure for itself, the community enjoying the services and other stakeholders. These are also excellent vehicles to convene together and give voice to the local people being served and the distant bondholders who want to be able to ensure their money is being well spent.⁷

As more DID analyses would be conducted within a particular catchment zone for various projects (assuming suitable non-affected control areas will be nearby for comparison), it might even become possible to derive an average for any expected rate of increase from implanted infrastructure that could be used for benchmarking or marketing purposes. Certainly, for the concept to ever work in practice one would expect to see individual projects (or the area's average) outperform the country's general GDP or annual increase in the tax categories dedicated to be sources for the future back-end participation.

Indubitably, each country has its own unique tax complications and where the designated types of taxes are collected centrally there must be a fair and justifiable procedure to share those taxes earmarked from the infrastructure spillovers back to the province, state, city, or authority, which may or may not be the issuer of investment securities or builder of the individual project. However, many jurisdictions have worked out ways of sharing taxes among different collectors and recipient entities and so the intellectual effort to incorporate regional infrastructure and development authorities should not be too difficult provided there be political will and a spirit of cooperation.

Part 4: Instructive Features from Past Innovations

Although this idea is new and untried, we have been able to draw upon useful elements from past experiences and prototypes to create its main features.

Let us remember from centuries past, railway companies in the US and Japan could mostly service their massive debt by selling or developing gifted real estate that was either adjacent to the tracks or part of their rights-of-way.

First Transcontinental Railroads across North America. By the middle of the 19th century, financiers knew that new railways could push up the value of land as much as four times from its unserved value (e.g., the price of land around the longest line in the world at that time, Illinois Central, went from \$1.25 per acre to \$6 in 1853, and then to \$25 in the year of completion in 1856 (Ambrose 2005: 32). The US Congress and states would readily provide inducements to investors by granting public lands along a planned route to the private company that would build the railway. As historian Stephen E. Ambrose perceptively noted, "*Far from costing the government anything, the granting of land meant that the alternate sections retained by the government would increase enormously in value as the railroads progressed and finally joined (Ambrose 2005: 80, emphasis added).*"

Ancillary sources of neighboring revenue were also relied upon, including mineral rights to coal and iron discovered on the land grants which could be exploited for immediate profits by the construction companies (Ambrose 2005: 95). In this respect, they might find a parallel in modern-day billboard concession ad revenues running alongside a highway. Together with city, county, and state governments directly investing in the stocks and bonds of private railway companies, the outright sale or mortgaging of gifted land formed one of the main sources of immediate revenue to service company bonds and pay its bills before passengers and freight could be carried for fares. Yet it must be allowed that not every piece of land was valuable or easily sold, particularly in desert areas or before the completion of

⁷ A common complaint of bond financing for infrastructure projects is that there is no convenient, single point-of-entry venue for the interests of diverse holders, as opposed to a closely monitored bank loan where the loan officers watch the building progress and business results and can adjust the terms and covenants of the loan as the conditions change (Norton Rose 2015). ADB's Midterm Review of Strategy 2020 also calls for affected persons and civil society to be more involved in the design and implementation of projects, and in monitoring the resultant activities and outputs (ADB 2014).

the railway (Ambrose 2005: 238). In the better lands of Nebraska, lots along the Platte River Valley were sold by the Union Pacific to settlers for between \$25 to \$250 on terms of one-third cash with balance in 2 years; they were also obliged to plant trees for shade (Ambrose 2005: 188).⁸

The pinnacle in American ingenuity for encouraging two private companies to race across the middle of the US during the Civil War was reached with the Union Pacific Act of 1862. As amended 2 years later, the main components of the innovative financing scheme are set out in Table 5.

The bonds written by the government on their own paper and loaned to the railway companies without payment⁹ were known as “US Government Sixes” or

“Currency 6,” which were highly negotiable and could be assigned to suppliers and vendors: six being a reference to the 6% annual interest guaranteed and paid by the government to whomever held the bonds every 6 months. Moreover, the companies were relieved from having to pay the interest as they had little or no revenue streams at that point—only bills and expenses—and in that sense they could be described as *subsidy* bonds, a term the US Supreme Court used throughout their later opinions (USSC 1896: 429, 433).

Upon receipt, the companies could sell them on the open market (at par or at a discount if already borrowed against [Ambrose 2005: 245]) for cash on hand or offer them in consideration to their construction suppliers (most laborers preferring to receive gold for a payday, whenever that rare event occurred).¹⁰

Table 5 Terms of the First Transcontinental Railroad Financing Scheme

Description of Feature	Original 1862 Version	Improved and Final 1864 Version
Right-of-way over public lands	200 feet on both sides of route	Same; no change
Land grants (checkerboard pattern with other lots staying in government hands)	5 alternate sections (square miles) each side per mile; or 6,400 acres per mile	Doubled to 10 alternate sections on each side per mile; or about 12,800 acres per mile
Materials for building track and/or sale to third parties	Earth, stone, and timber on rights-of-way and land	Plus coal, iron, and other mineral rights found under the land
Government-issued “Sixes” Pacific Railroad bonds loaned to participating private railway companies	In amounts of \$16,000 per mile on flat land; \$32,000 per mile of foothills; \$48,000 per mile in mountainous areas	In mountain areas, two-thirds of subsidy bonds could be advanced upon grading of the route before tracks were laid and completed ^a
Schedule and conditions for transfer of bonds	After every 40 miles of track approved by government inspectors	Handover reduced to every 20 miles of completed track
Obligor for semiannual interest payments of 6%	Government during tenor; but repayable by private companies in 30 years or less	Same; no change
Securitization of bonds	Government given first mortgage over built track, improvements, and all other assets of private companies	Government subordinated its priority in favor of the right of the companies to issue same amount of bonds so they could be reliably backed and easily sold
Services performed for government during 30 years	Carry mail, transport troops, and government stores; to be deducted from final principal repayments by companies	Same; no change

^a Additionally, an 1866 amendment to speed the closing years of the race allowed grading (ground preparation) up to 300 miles in advance of the continuous main track with part collection of the bonds after each 20-mile segment (Ambrose 2005: 254–255, 305). Source: Author after Ambrose (2005: 80, 81, 84, and 95); Cox (2015).

⁸ Even railroad surveyors speculated on the side, buying lots for themselves in unfounded towns for as little as \$2.50 and reselling them 5 days later for \$25 each (Ambrose 2005: 264).

⁹ As transfer of the certificates took place after track sections were laid, one could also view the consideration for buying the bond as being the work done by the company.

¹⁰ Being frequently cash-strapped, the Central Pacific Railroad Co. already had to borrow heavily against any money it expected to eventually receive from the periodic transfer of government bonds in any case; so these funds were often committed even before being paid to its account and usually well short of the expenditure requirements for forthcoming construction (Ambrose 2005: 149, 165).

Nevertheless, the subsidy only went so far and the US government expected the companies to repay in full all the principal amount of the government railway bonds and all the interest it had paid thereon in 30 years (or less) after track completion. In the event, the deal was on the whole advantageous for the US, as the following estimate of the final settlements of 1898–1899 shows (Table 6).

Table 6 Estimate of the Final Settlements for Government Bonds

Description of Pacific Railroad Bonds	Aggregate Amount in Historical \$
Initial loans by government of its bonds to railroad companies (RR coys)	64,623,512
Principal repaid to government by RR coys	63,023,512
Plus interest repayments by RR coys	104,722,978
Total railroad companies' repayments to US government at final settlement	167,746,490

Source: Author after Ambrose (2005: 377).

Importantly, being debt obligations owed by the companies themselves, the wealthy shareholders and promoters of the private railroads were generally protected from having to guarantee repayment to the government from their personal fortunes and were only liable to the extent of their equity shareholding.

Once the companies had a record of laying track, some net operating profits, and built or owned assets and equipment, they too were able to sell their own 30-year first mortgage corporate bonds in similar amounts on basically the same terms as the government ones (Ambrose 2005: 226). To aid uptake, a limited initial public offering was sold by the Union Pacific Railroad Co. to mostly East Coast investors at an original issue discount (\$0.90 on the dollar), with the company reserving the right to increase the price at their choosing. As interest was paid in gold, at the prevailing rate of premium on that precious metal those bonds could effectively earn annual interest on their offered cost of 9%. Another selling point was the not unreasonable expectation

that upon successful completion of the transcontinental railroad the government bonds along with the company-issued ones would trade above par. In the West, the Central Pacific Railroad Co. had a harder time selling its own corporate securities, which eventually had to rely upon a California state guarantee of the 7% interest promised on its first bond issue of \$1.5 million to make them more marketable even at the bargain offering price of half par (Ambrose 2005: 121, 124).

Finally, it should be noted there will always be promoters of these schemes who believe the best chance for a profit in return is during the construction phase (and from government availability payments) while others believe the project could be profitably run upon completion as originally planned (Ambrose 2005: 212, 227). Often their interests are not aligned resulting in tendencies to build quickly (sometimes cheaply or fraudulently) for immediate profit versus longer term with higher quality for sustained and efficient operations.¹¹ In that aspect, the use of specialized construction companies and operating companies which are geared to different expectations and income streams might be preferable to one entity as the build–own–operate bidder with its temptations to cut corners.

Once again it was a private company, Canadian Pacific Railway (CPR), that built Canada's first transcontinental railway between 1881 and 1885. That railway linked existing lines in what is now Ontario with the Pacific coast. CPR signed a contract with the Government of Canada to build the railway. As with the US, part of the reason for Canada building it was political and geo-strategic. The province of British Columbia joined Canada in 1871 on the promise that a transport route (wagon road) would be built linking it to the other provinces in the east. However, this promise was later upgraded to a railway. The government sought to link the two ends of the country and also to open up the prairies for settlement and farming. It was basically a nation-building endeavor to resist the pull of the already connected United States.

While Canadian Pacific was a private railroad company, it received considerable public support. This included C\$25 million in credit (which would be C\$625 million in current terms) and 20,000 acres of gifted land. The government also transferred to CPR existing publicly built and owned lines on which the government had already spent millions resulting in a hefty underwriting

¹¹ For instance, adding more and unnecessary miles to a route would increase the amount of bonds and land grants—good for constructors—but slow the directness of the railway, which is bad for operators and freight customers (Ambrose 2005: 271).

of their construction costs. Interestingly, the company was generously exempted from paying property taxes for 20 years. Nevertheless, during the latter stages of construction the company faced bankruptcy and would have failed but for a last-minute government loan guarantee and a bond offering through Barings in London (Berton 1974).

Private Companies Build Tokyo’s Rail Network by Linking Commuter Shopping Centers. During the past century, the megacity of Tokyo achieved transit-oriented development as private railway companies played an important role in both constructing lines and expanding cities along their metropolitan and commuter lines. These companies succeeded due to a business model where railway construction is endogenously financed by town development profits (Yajima et al. 2014: 44). For instance, Tokyu Corporation would reallocate any capital gains from its real estate holdings and development toward financing its railway operations (Suzuki et al. 2015).

Expansion History. Historically, Tokyo private companies had two main strategies regarding their railway business. First, they monopolistically ran lines which use stations on the Yamanote circular line, one of the busiest and convenient Japan Railway routes in Tokyo, as terminals. Private companies accommodate expanding lines and stations to developing towns along the lines and set up shopping centers on top of their stations, thereby managing railway construction along with town development in a sustainable way. Second, they utilized their lands so that the railway business and town development business positively affect each other. Usually, most commuters from the suburbs go to downtown office areas in the morning and return to the suburb in the evening, which makes their business insufficient because railways transfer less people from downtown area to the suburb in the morning and from the suburb to downtown in the evening.

To compensate for these inefficiencies, railway companies invite factories, research institutions, and universities as well as home developers to suburban areas so they can expand demand on commuting from downtown to the suburbs. Consequently, surprisingly large amounts of the private railway company’s revenue are generated from their real estate business. It is estimated that more than half of railway companies in Tokyo earn between 30% to 50% of their total revenue from businesses other than running railways (Yajima et al. 2014: 48).

The railway development history in 20th century Japan can be summarized in these phases (Table 7).

Table 7 Phases of 20th Century Japan Private Railways

Pre-urbanization: 1920s

- Some railway companies were merged. Railways were expanded.
- Railway companies focused on railway business.

First urbanization (light industry): 1930 to 1944

- Continued mergers and further expansions.
- Railway companies did not yet engage in department store businesses on top of stations.

Second urbanization (heavy industry): 1945 to 1979

- Railway companies started town development along their lines and department store and amusement park businesses in the countryside.
- Some companies also entered the hotel business.

Third urbanization (high technology industry and service industry): 1980s to present

- Some amusement parks and hotels begin to be closed.
- Department store businesses targeted the younger or the elderly.

Source: Author.

Government Contribution. The Japanese government has played two key roles in transit-oriented development. First, the government allows each private railway company to monopolistically run lines. Second, the government itself tries to achieve both town development and railway construction in suburbs to prevent population concentration in the downtown area.

After World War II, a large population moved to the metropolitan area rapidly, which raised the price of land significantly, resulting in that most households had difficulty in buying houses. Therefore, the government pushed new town development in the suburban areas as it encouraged railway companies to construct lines along the newly developed towns. Currently, the central government and the local government respectively pay 12% of the cost of constructing lines which run through newly established towns. In addition, the local government holds 10% of the share capital of any special company building new lines (Yajima et al. 2014: 55).

It is also worth noting that as baby boomer suburban-dwelling populations age and retire, they no longer consume, shop as much, or commute on the trains. The older established suburbs start to “hollow out” as it were—similar to what has been well observed in the Japanese countryside villages. Consequently, the strong and dependable revenue streams from Tokyo

department stores and passenger fares are starting to weaken.

One possible answer would be for the Tokyo railway-retail-property conglomerates to keep creating newer growth areas along their lines to sustain this model (c.f. Mori Building's business model of constantly making bigger, safer, and more integrated multipurpose skyscrapers in open patches of Tokyo land they want to keep developing).

Land Value Capture in Recent Years. A few other countries and economic zones in Asia have successfully used various land value capture (LVC) techniques more recently. Essentially, the host government already owns or fairly acquires the land which it then sells, leases, or trades¹² in various ways to fund projects (ADB 2017a: 60, Box 5.4). Notice though these traditional forms of LVC remain primarily public sector inspired and initiated projects although aiming for PPP involvement—the government must still find the money to pay for it but instead of using taxes or deficit financing exploits local land values.¹³

Over the last 10 years, for instance, land transfer fees paid by industrial developers to the People's Republic of China have been channeled as fiscal revenue supplying about one-third of local and provincial authorities' needs (ADB 2017b). Hong Kong, China has also been able to use LVC to improve its mass transit systems by selling public lands to the transportation authority at less than market value and allowing the authority to recapture the enhanced value in future resales after the new line is in place. The Republic of Korea passed a law in 1997 that requires appropriate land values to be used to finance transportation for new developments either large in scale or serving a high population density (ADB 2017a: 61, Box 5.4). India is reportedly considering a national framework to adopt a similar mechanism (Saxena 2017).

Takeaway Message One. The main message from these successful historical examples is that the planners behind earlier public and private projects fully realized that pure revenue streams from fares and tolls would never be enough to induce and complete the complicated and expensive infrastructure projects of past centuries. Governments and financiers used to take it as a given that extra sweeteners in the form of free land (including

its mineral rights and sales of timber) had to be added to the financing mix, which could be turned by private constructors and investors into much needed immediate cash or mortgaged as security for loans (sometimes even becoming early forerunners of mortgage-backed securities, such as "land-grant bonds" issued with packaged collateral from unsold land (Cox 2015). More so if the company was newly created or only in the sole business of trying to build a railroad and it did not have other corporate sources of revenues (income from finished projects) to cross-subsidize the interest servicing costs of its bonds and borrowings which fell due before project completion or customers started generating profits.

This lesson was forgotten when governments moved into the business of major project sponsorship and fulfillment: e.g., 25 years later the Trans-Siberian railway could only be done as a completely czarist government enterprise, sometimes resorting to convict, unpaid laborers. Governments which alone enjoyed the advantages to print money or borrow cheaply could readily cross-subsidize expensive public works until they returned future profits (or if they didn't could be offset by other successes in their portfolio; even waiting until it simply became an historical legacy taken for granted like the sewer system of the City of London).

These were also some of the earliest examples of bonds being subsidized or enhanced with regular interest installments being either paid or guaranteed by the deeper and more dependable pockets of federal and state governments.

Indeed, by using the public purse and future profits in expectation to pay off current project debts, governments were basically following the same concept of relying on future tax revenue streams being proposed here. When the postwar pendulum swung back during the Thatcher and Reagan privatization revolution, governments were irrationally exuberant in their expectations of the profitability of the private sector to create infrastructure out of thin air. They forgot to pass back the hidden but necessary windfalls (or were simply greedy and chose to keep them to themselves), except for the occasional incredibly successful crown jewels of the public sector, dependable and money-spinning brownfield assets, or a foolproof sector like telecoms.¹⁴

¹² Completely free or overly generous land grants are no longer possible or popular in many countries. Reportedly, a request from PRC contractors for development rights to land along a planned rail link under negotiation was turned down by Thailand earlier this year (Ono and Kotani 2017).

¹³ Complex questions raised by equitable land use and rezoning procedures from rural to urban, as well as avoiding insider unjust enrichment or fraudulent schemes remain outside the remit of this brief.

¹⁴ Until the 1980s most airport income would come from traditional landing and passenger-handling charges; however, since then about two-fifths worldwide is in the form of so-called "non-aeronautical revenues" from shops, food and beverages, airport car parking and car rental fees, and advertising and property income (The Economist 2017a).

With the exception perhaps of undeveloped parts of Africa—i.e., the parklands or nature reserves that are not environmentally protected—or possibly the deserted stretches of Central Asia hinterland, very few countries have any stock of available and undeveloped public lands that are not under the stewardship of traditional owners or nomadic people, which can be given away to constructors and their investors as was done in the US and Japan. Instead of the actual land being given away or shared (alternate blocks), or sold at a discount, perhaps the next best thing would be to look at the economic fruits or profits a prendre emanating from that land in the form of increased property, business, and income taxes that grow along with the communicating railroads and highways.¹⁵

United States Highway Trust Fund. The landmark Federal-Aid Highway Act of 1956 was the basis for the development of the postwar interstate highway system through the establishment of the Highway Trust Fund (HTF). Earlier, US highway programs were unreliably financed from the General Fund of Treasury and taxes on motor fuels and automobile products were not linked to funding highways. The Highway Revenue Act of 1956 enabled increased funding for building state highways through increasing some of the existing user taxes, as well as creating new ones. Imposition of taxes under this act supported the HTF through the middle of 1972. The duration of the HTF has been extended several times by subsequent legislation, which extended the imposition of taxes and the transfer of the taxes to the HTF and the payment of refunds.

The HTF is funded by the imposition of taxes on users of highways and the tax structure has changed several times. The Surface Transportation Assistance Act of 1982 and the Deficit Reduction Act of 1984 increased taxes on motor fuel. Then the Omnibus Budget Reconciliation Act 1990 (OBRA 90) increased per gallon tax by \$0.05 although half of the tax revenues went to the General Fund of the Treasury until its expiration in 1995. The Taxpayer Relief Act of 1997 redirected \$0.04 of General Fund tax from previous increase of OBRA 90 to the HTF fund. The so-called TEA-21 then extended the HTF taxes, thus extending the fiscal “life” of the HTF. Moreover, the HTF has an additional source of revenue. Since October 1984, the proceeds from fines

and penalties imposed for violation of motor carrier safety requirements are deposited in the highway account of the HTF (US Department of Transportation).

Most of the taxes credited to the HTF are paid to the Internal Revenue Service by the producers or importers in a handful of states where major oil companies are headquartered. User taxes are deposited through General Fund of the Treasury to HTF on a monthly basis. The amount in the HTF in excess of current expenditure is invested in public debt securities. Because of the uneven use of highways, some states pay more in user taxes than those states receive back; hence, TEA-21 included a provision called the minimum guarantee, to distribute additional funds to those states.

The HTF was set up as a pay-as-you-go fund ensured by the Byrd Amendment so that the unpaid commitments in excess of the amount available in the account must be less than the revenues anticipated following a 24-month period. If there is shortage of funds, then all highway programs for that fiscal year would be reduced proportionately. Currently, the HTF is the main source of funding for most highway development programs. The HTF comprises the highway account and the mass transit account. The majority of the HTF income comes from the motor fuel taxes and some from Fixing America’s Surface Transportation (FAST) Act transfers to keep the trust solvent through the end of FY2020. The FAST Act extends through 30 September 2023 the heavy vehicle use tax.

California Maintenance of Transportation. In California, the Internal Revenue Service collects \$0.18 per gallon of gasoline and \$0.24 per gallon of diesel and deposits 85% to the HTF highway account and 15% to the transit account. In addition, as of July 2014, California collects \$0.36 per gallon excise tax on gasoline and \$0.11 per gallon on diesel fuel, generating approximately \$3.0 billion a year. The excise tax on gasoline is composed of two taxes: the base state excise tax which is \$0.18 per gallon, and the price-base excise tax of \$0.18 per gallon—36% of state base excise tax revenue is divided among cities and counties, and the state receives 64%. The price-based tax revenue is first used to backfill weight fees that are diverted to the general fund. The remaining funds are allocated between local roadways (44%),

¹⁵ It is beyond the scope of this brief to treat the complicated social and legal issues involved in acquisition of land from private owners for rights-of-way. Certainly, we believe equitable, prompt, adequate, and effective compensation of land being subjected to eminent domain or forced acquisition with proper avenues of appeal and voluntary relocation is essential. For our part, we should like to encourage early sellers or first movers by offering them more attractive inducements to cooperate in the transfer of their land such as staying in possession, leasebacks, or offering them a larger immediate payout or future participation than those who delay the project and come along later under compulsory court order. This might be done with a sliding scale for the purchase plan rewarding the early and voluntary sellers. Also proper channels for the unwilling landowners and customary stewards to object must be created, potentially inside of a local infrastructure and development association or hometown trust before an independent ombudsperson.

new construction projects (Statewide Transportation Improvement Program, 44%), and highway maintenance and operations (State Highway Operation and Protection Program, 12%) (California Department of Transportation).

Takeaway Message Two. In postwar United States, the Highway Trust Fund demonstrated an effective way to ensure that a few cents on every tax dollar raised by gas sales were locked away for future use for the rehabilitation and maintenance of the interstate freeway system without the risk of raiding by the treasury for other purposes. A lock-box trust fund for the future tax revenues to be shared could similarly be set up as a way of encouraging private investors that the government's promises of back-end participations will be honored.

Build America Subsidy Bonds. As part of an emergency reinvestment package for local infrastructure after the global financial crisis, two innovative types of Build America Bonds experimented with subsidies on the interest issuers owed investors, as well as refundable tax credits for the bondholders.

Pursuant to the American Recovery and Reinvestment Act of 2009, the US government implemented a special financing program called Build America Subsidy Bonds (BABs) for public infrastructure. Issuers of BABs received a subsidy that was 35% of their total interest payments. During the program, from 2009 to 2010, the number of BABS issued totaled 2,275, which raised over \$181 billion for the construction of much-needed schools, bridges, and hospitals. The scheme was also an important stimulus package in much the same way as the New Deal public works program during the Depression.

Every state in the US sold BABs because they were less costly than normal tax-exempted bonds. State and municipal governments saved \$20 billion with 30-year subsidized BABs, on a present value basis, compared with their normal tax-exempted bonds. Indeed, the US Treasury Department concluded that permanently implementing a BAB program could be more efficient for public infrastructure projects and even lower government transaction costs in comparison with tax-exempted bonds (US Department of the Treasury 2011).

Takeaway Message Three. As we have seen, public subsidies on land, bonds, and interest as well as tax holidays, credits, and inducements have been effective historically and they continue to be an obvious choice for governments wanting immediate and attributable results. In late August 2017, for instance, the Iowa

Economic Development Authority and a local city council agreed to a \$188 million property tax abatement of 71% over 20 years as part of a package to entice Apple to buy land in that state to establish a \$1.3 billion data center (Nellis 2017).

Nevertheless, these types of immediate subsidy and tax credit measures suffer from two major weaknesses. They can be challenged as present transfer payments from one taxpayer category to another through government fiat and at the cost to other worthwhile spending priorities. And most of them must be recognized or carried on the government's national budgets as official commitments in the current fiscal year. The next innovation from Europe elegantly solved the off-budget sheet problem and points the way toward new budget-neutral techniques such as the back-end participation in future tax revenue growth we propose.

Gavi, the Vaccine Alliance, Monetizes Future Cash. For reaching the main health targets set in the Millennium Development Goals, a fund was established for the operation of the International Finance Facility (IFF). Donor countries offered support when the IFF sold its bonds on international markets. As a result of a decision by United Kingdom Chancellor of the Exchequer Gordon Brown in 2003, it was approved for front-loading of support; so funds could be immediately accessible for borrowers to access.

The International Finance for Immunization, which is the main charity project of the IFF system, has assets that are mandatory disbursement obligations from dependable donor countries, such as Brazil, France, Italy, Norway, Spain, Sweden, South Africa, and the United Kingdom. Critically, these countries' obligation guarantees were not recorded as government debt, meaning their obligations are classified as off-budget.

In 2006, the International Finance for Immunization issued its first bond in the amount of \$1 billion with an annual yield of 5.019%, being 31 basis points above the benchmark 5-year US Treasury bond. The novel idea was to sell these bonds to raise a total of \$4 billion over 10 years using government guarantees instead of collateral. The investments would be used to finance worldwide immunization through Gavi, the Vaccine Alliance (previously known as the Global Alliance for Vaccines and Immunization). Gavi estimated that 5 million fewer deaths of children over 10 years and 5 million fewer adult deaths could be achieved by this pledged bond value (The Brookings Institution).

Takeaway Message Four. In Europe, Gavi proved it was possible to estimate and monetize an expected future stream of government cash flows and bring them to the present day as capital for setting up a huge and vital social program *without having to carry them as government debt on their national balance sheets*. Backing these 5-year immunization bonds with government contributions pledged over 2 decades ensured the yield would be at least 30 basis points above similar-maturity US Treasuries, consequently, enabling new money raised from the markets to be spent immediately (Wood 2010).

Across various countries, the budget treatment and characterization of the government’s contingent promise to share future tax revenues that do not yet exist (and if the project does not do well may never become payable) is going to be important for the favorable reception and long-term acceptance of back-end participation.

Part 5: Introducing the Tax-Kicker Bond

If governments can accept the concept that future revenues should be fairly shared with investors—who put up most or all of the original capital—funding gaps can start to close. And more infrastructure project bonds from emerging countries can show higher returns that reflect their contribution to society and whet the appetites of overseas institutional investors.¹⁶

An infrastructure bond that can tap future tax revenues and share a fair proportion of the newly reaped revenue streams with the original investors could be worth considering (Figure 6). We have nicknamed it a “kicker bond” in honor of Oregon’s tax-rebate system (Oregon Department of Revenue 2015), in which budget surpluses are returned to state taxpayers.¹⁷

Demonstration and Phased Rollout. Of course, we appreciate that many pilots and demonstrations of the various aspects of this new instrument will first be required and as with the development of social impact bonds some will end in underperformance. Probably the initial experiments will have to be structured financial deals using bespoke contracts among known and sophisticated parties who are invited to participate and in that sense it would not be close to a truly negotiable bond sold and traded on the open retail markets. However, that is where we would eventually hope to arrive. So to commence that journey, we have commented on some of the key features that a full-fledged kicker bond should probably include and supplied a model term sheet which hints at many of the complexities yet to be faced in the real world.

Overall Key Considerations. The viability of any such issue will depend upon a number of key factors and risks which will vary between jurisdiction and project. Chief among them will no doubt be the following:

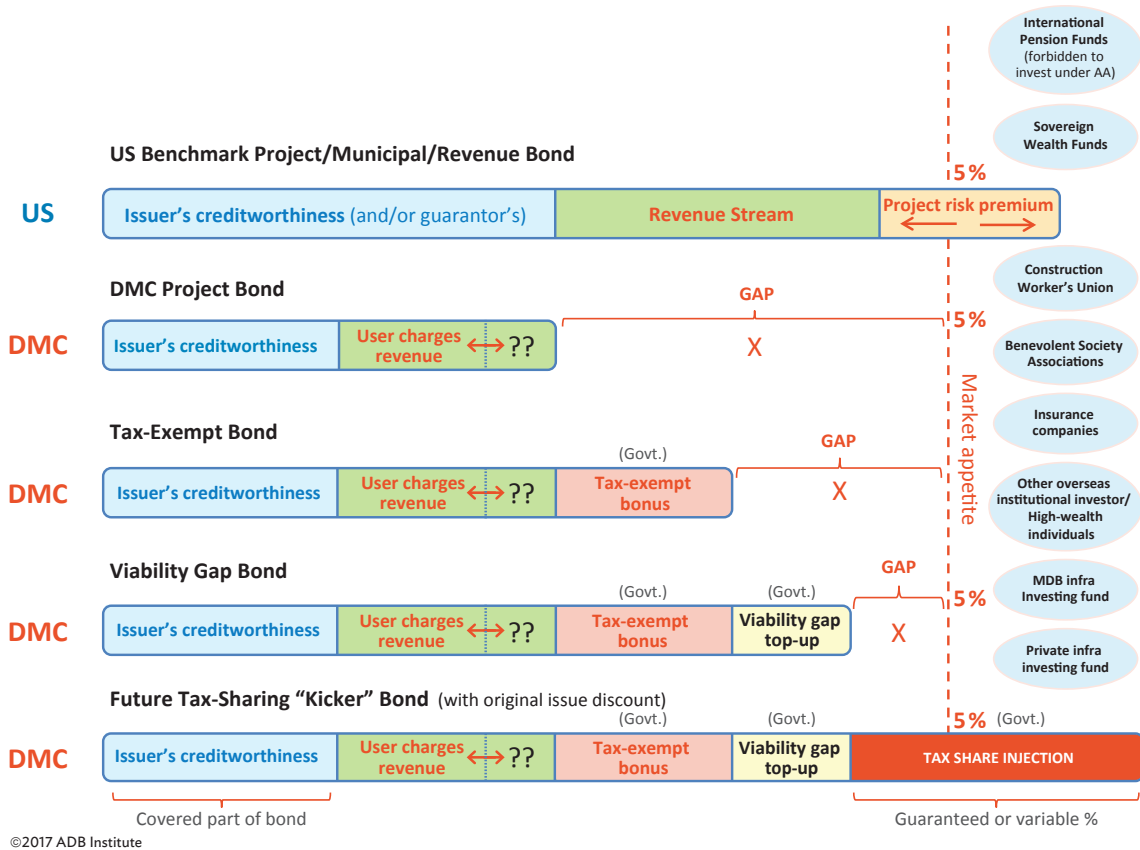
- specific nature of the project/sector or use of proceeds; unique engineering risks or doubts
- timing of the project, in that greenfield projects carry inherently more risk and uncertainty and will be penalized on pricing compared with operational (brownfield) projects with a known revenue track record
- credit rating of the issuer or special purpose vehicle (and/or its parents or joint venturers)
- sovereign state’s reputation and record; whether a member of the International Monetary Fund, track record in international borrowing and existence of a liquid yield curve
- tax collection authority’s history of successful collection of the taxes to be denominated as sources of designated revenue to share¹⁸
- extent and credibility of the limited or partial guarantees

¹⁶ International pension funds and other large institutional investors are often forbidden by government or market regulations and their investment strategy from buying debt if the instrument or counterparty falls below a certain credit rating, say an AA rating (Norton Rose Fulbright 2015).

¹⁷ Mind the gap. When we speak of gaps for infrastructure we must realize that it applies in at least three senses. First, an inadequate pipeline of well-prepared projects—in other words, a bankability or lack of bankable projects gap particularly in the emerging countries (Norton Rose Fulbright 2015). Then the well-known worldwide lack of debt finance from all sources to meet the demand—being the Asian Development Bank and the World Bank’s most common meaning of closing the gap in funding. However, there is also our chart’s sense in making an individual project more profitable and boosting the rate of return to a suitable level that closes the gap between the unimproved project and finding market participants who are ready and willing to invest at that coupon percentage. We show that here as a diminishing gap (marked with a negative cross) being bridged due to an accumulated build-up of tax exemption boosts, viability gap fund top-ups, and finally the tax share-injection we recommend to put it over the line. Along the market appetite dotted line, 5% is only meant as an indication of what present infrastructure bonds might return and not a guaranteed or floor percentage or an assumed worldwide average (Figure 6).

¹⁸ Worryingly, two of the most ambitious infrastructure-building countries—the Philippines and Indonesia—have some of the lowest tax collection rates in Southeast Asia, with Indonesia barely able to achieve 11% tax revenue of its gross domestic product in 2015 as estimated by the World Bank (Curran, Rodrigues, and Salna 2017). See further Rillo 2017.

Figure 6 Closing the Market Gap for Infrastructure Bonds



DMC = developing or emerging market country, MDB = multilateral development bank, US = United States. Source: Authors.

- historical uncertainty of the reliability of the type of revenue stream either globally or from the region and/or country
- marginal cost of alternative transportation and/or services if the pricing of the tolls or user charges goes too high
- level of leakages from the revenue stream of tolls and charges and the collection of designated taxes for future participation
- novelty and uniqueness of the deal; the more uncertainty the higher the costs for the issuer and government obligor

Dual-Pronged Approach. We expect kicker bonds will have to be tailored for each project and market environment and may end up looking quite different from our initial conception being proposed here. As a starting place, we are tentatively suggesting a dual-tranche approach which has met with some success around the world especially for social impact bonds and green bonds. For instance, ADB has found this approach

on more than one occasion to be an effective way to reach ethical, sophisticated private investors who have an appetite at different segments of the yield curve (ADB 2017c).

This bifurcation will also make it simpler to see how a traditional fixed rate revenue or project bond could operate in tandem with the untried floating rate back-end tax-participation note. Each tranche should be designed to support the other's features and amortization schedule. The terms and maturity dates are arbitrary in the example, but a spacing of 5 to 10 years would likely fit with the DID predictions of when noticeable increases in tax revenues are expected to occur after project completion.

Issuer. To demonstrate the full application of the concept, the fictitious issuer is imagined as being a conglomerate that will be able to raise its own money on the bond market, build the infrastructure, then operate and continue to own it indefinitely. Of course, some of the risks inherent in the tax collection and transference

aspects could be minimized if the ultimate (or end) owner were to be the government or a public municipal (or state-owned) entity.

Currency. For the purposes of the illustrative term sheet the easiest is picked starting in US dollars. If the kicker bond becomes successful in that currency or the euro it might be possible to incorporate other currencies. New instruments are most likely to be of interest to sophisticated or ethical investors and offering in US dollars reduces the complexities of hedging the bond, which is likely to be expensive. Of course, the revenues, taxes collected, and the other main sources of funds for repayment are going to be in the local currency where the project is built.

Tenor. If the country in which the project will be based has a benchmark 10-year bond issue and an established yield curve, it will be much easier to price the issue. Otherwise, the maturities may have to be reduced.

Another factor is whether 10 years could be considered too short for an infrastructure in an emerging country. The project will take on a refinancing risk and the investors will also have to price this based on the quality of the firm or subcontractors actually building the infrastructure project, as well as the site's risk of inherent delays.

Call Option. It is debatable whether this should be included as investors typically do not like such prepayment risks. So if the issuer prefers to have it, then it will have to pay for the option in the form of a higher yield. The transaction adviser can determine whether it is strictly necessary; however, the issue will probably have to be priced to call rather than to maturity.

Share of the Return and Special Issues. For the purposes of introducing the concept at its most attractive level, a half share (or 50 points of back-end participation) of the calculated designated future revenues has been assumed; however, other percentages are certainly possible (the initial ADB Institute studies planned for 20%) as would be a sliding scale depending on the timing and ramp up of each project as well as the government's desire to attract private investors. The

respective track records with other projects (if any) of a particular economic and tax catchment area, the regional infrastructure and development authority for that area, and the government's tax collectors could also be relevant in this important calculation. Depending on the level of the share, a standing charge may turn out to be unnecessary.

Limited Guarantees. The World Bank's commissioned Rothschild study into the efficacy of partial guarantees for credit enhancement shows that it can have a significant impact in allowing emerging borrowers to access long-term financing from investment grade investors, such as pension funds and wealth funds that may have restrictions on the class of asset (World Bank 2016). For instance, in March 2016, Kenya Power relied upon a partial International Development Association guarantee that allowed it to backstop its debt service at an attractive price without having to resort to a sovereign guarantee from its government (World Bank 2017).¹⁹

Therefore, as one of the more complex and uncharted relationships in this mechanism would be between the sovereign or tax collector and whether and how it will honor a promise to transfer an agreed portion of revenues into a trust fund for final payment to an issuer which may not necessarily be a state-owned enterprise; we should expect to see some form of investment guarantees for political risk and non-honoring of the secondary financial obligation in every kicker bond. The model term sheet also provides for another guarantee of the issuer's primary obligation on the principal to make the initial offerings even more attractive and safe; assuming the insurance will be available and at a reasonable cost to the issuer.²⁰

As the idea is to have the government and its tax collector secondarily obligated only to the extent of their promised tax injections into the Tranche 2 floating rate notes, they will not be giving any blanket guarantees as to the fixed project bonds which will have to rely on the revenue streams and interest servicing of the issuer. In that respect it was thought useful to include a statement that the Tranche 1 fixed bonds are not backed by the full faith and credit of the government, which frees it of carrying and reporting obligations on its national budget.²¹

¹⁹ ADB also offers a subordinated liquidity facility structured as a revolving irrevocable letter of credit for a fixed percentage of US dollar-denominated project bonds, which is commonly used in Europe for credit enhancement (ADB 2017a: 74, Box 5.9)

²⁰ As would be expected on a normal bond, if the issuer were a special purpose vehicle (SPV) with limited credit history, the joint venturers or parent of the SPV would also offer their assurances to provide capital protection to the investors.

²¹ This is similar to the distinctions found between, say a guaranteed California general obligation bond versus one of its unbacked state or lease revenue bonds (Office of the California State Treasurer).

Taxation. As this is a complicated consideration based upon the site of the project, jurisdiction of the issuer, and domicile of the bondholders, not many useful assumptions can be made in this generic example. Certainly, overseas investors will want to know whether they will be free from withholding taxes and the effect of the operation of relevant double tax treaties on the kicker bond.

As the main purpose of this type of instrument will be to kick in additional money from tax revenues to increase the effective rate of return to the original investors, it is assumed as self-evident that interest payments will be able to enjoy customary exemptions from being taxed at the municipal, state, or federal levels either in the hands of the issuer or when received by the bondholder.

Forms of the Kicker Bonds Trust Fund, Project Memorandum of Understanding, Bond Agreement, and the Tax-Participation and Trust Fund Agreement.

The basic contents of these key documents can only be sketched at this stage of the concept explanation and so no attempt has been made in this brief to supply detailed model agreements by way of attachments. Guidance as to the complexity can be gauged by reference to the legal

documentation required for social and development impact bonds, for instance, in jurisdictions like the United Kingdom, Australia, and the US.

Markets and Credit Rating Agencies. Choice of where the kicker bonds will be sold will also affect the deal structure and pricing dynamics. If demand outside the US is assessed as already strong enough, then a Eurobond or Regulation S issuance could be sufficient. A US 144A bond market registration allows issuers to sell also to investors in the US, which would be preferable should the plan be to reach the largest possible number of potential investors.

The demand for kicker bonds could be expected to depend heavily on how investment bankers, underwriters, and credit rating agencies compute rates of return and whether they will have confidence in the DID thesis put forward here. To that end, more research needs to be undertaken into what are the minimum protections, credit ratios, and guarantees large institutional investors in major markets can comfortably accept. It would also be helpful to inquire of the bond credit rating agencies what more they need and expect to help them improve the ratings of project bonds and emerging country issuers.

Further Reading

About recent survey of options for financing of infrastructure in Asia

Regan, M. 2017. Infrastructure Financing Modalities in Asia and the Pacific Region: Strengths and Limitations. ADBI Working Paper Series 721. Tokyo: Asian Development Bank (ADB) Institute. Available: <https://www.adb.org/publications/infrastructure-financing-modalities-asia-and-pacific>

About government financing (not private) of infrastructure in Asia

Rillo, A. D., and Z. Ali. 2017. Public Financing of Infrastructure in Asia: In Search of New Solutions. ADBI Policy Brief 2017-2. April. Tokyo: ADB Institute. Available: <https://www.adb.org/publications/public-financing-infrastructure-asia-search-new-solutions>

About public–private partnerships and engaging the private sector

Vandenberg, P. 2015. Engaging the Private Sector in Public–Private Partnerships. ADBI Policy Brief 2015-4. Tokyo: ADB Institute. Available: <https://www.adb.org/publications/engaging-private-sector-public-private-partnerships>

References*

- Ambrose, S. E. 2005. *Nothing Like it in the World: The Men Who Built the Railway that United America*. Sydney: Simon & Schuster UK.
- Asian Development Bank (ADB). 2014. *Midterm Review of Strategy 2020: Meeting the Challenges of a Transforming Asia and the Pacific*. Manila.
- . 2017a. *Meeting Asia’s Infrastructure Needs*. Manila.
- . 2017b. *How Can Asia Finance the Infrastructure It Needs?*. News release. 28 June. <https://www.adb.org/news/features/how-can-asia-finance-infrastructure-it-needs>
- . 2017c. *ADB Sells Dual-Tranche \$750 Million 5-Year and \$500 Million 10-Year Global Green Bonds to Spur Climate Financing*. News release. 2 August. <https://www.adb.org/news/adb-dual-tranche-global-green-bonds-spur-climate-financing>
- Berton, P. 1974. *The National Dream/The Last Spike*. Toronto: McClelland and Stewart.
- The Brookings Institution. *Global Health Financing Initiative: Snapshot Series*. International Finance Facility for Immunization. <https://www.brookings.edu/wp-content/uploads/2016/07/iffim.pdf>
- California Department of Transportation. <http://www.dot.ca.gov>
- Cox, T. 2015. *Railroad land grants*. COXRAIL.com. 25 October. www.coxrail.com/land-grants.asp
- Curran, E., J. Rodrigues, and K. Salna. 2017. *Philippines, Indonesia and India Have Got a Fed Problem*. Bloomberg Markets. 23 August. <https://www.bloomberg.com/news/articles/2017-08-22/yellen-risks-exposing-old-vulnerabilities-in-emerging-asia>
- Fujimura, M. 2017. *Evaluating Impacts of Cross-border Transport Infrastructure in the Greater Mekong Subregion: Three Approaches*. ADBI Working Paper 771. Tokyo: ADB Institute. <https://www.adb.org/publications/evaluating-impacts-cross-border-transport-infrastructure-gms>
- Kaga, R. 2017. *Asia faces challenges attracting infrastructure investment*. Nikkei Asian Review. 15 June.
- Nakahigashi, M. 2015. *Aging and Productivity Effect of Public Capital (in Japanese)*. In *Issues and Desirable Courses of Japanese Economy*, edited by N. Yoshino, K. Kameda, M. Nakahigashi, and M. Nakata. Tokyo: Keio University Press Inc. pp. 99–108.
- Nakahigashi, M., and N. Yoshino. 2016. *Changes in Economic Effect of Infrastructure and Financing Methods*. *Public Policy Review* 12(1): 47–68. Tokyo: Ministry of Finance, Policy Research Institute.
- Nellis, S. 2017. *Apple to build Iowa data center, get \$207.8 million in incentives*. Reuters Technology News. 25 August. <https://www.reuters.com/article/us-apple-iowa-idUSKCN1B422L>
- Norton Rose Fulbright. 2015. *A New Solution for Funding Infrastructure*. <http://www.nortonrosefulbright.com/knowledge/publications/127571>
- Office of the California State Treasurer. *Frequently Asked Questions*. <http://www.buycaliforniabonds.com/faq.asp> (accessed 10 July 2017).
- Ono, Y., and H. Kotani. 2017. *[Peoples’ Republic of] China and Japan set for another high-speed railway fight*. *Nikkei Asian Review*. 6 February. <https://asia.nikkei.com/Politics-Economy/International-Relations/Thailand-Malaysia-to-start-talks-for-high-speed-railway>

- Oregon Department of Revenue. 2015. 2015 Kicker Credit. Fact Sheet. http://www.oregon.gov/DOR/press/Documents/kicker_fact_sheet.pdf
- Reconnecting Asia. Competing Visions. <https://reconnectingasia.csis.org/analysis/competing-visions/>
- Regan, M. 2017. Infrastructure Financing Modalities in Asia and the Pacific Region: Strengths and Limitations. ADBI Working Paper Series 721. Tokyo: ADB Institute.
- Saxena, S. 2017. Transforming cities with land value capture. Asian Development Blog. 4 August. <https://blogs.adb.org/blog/transforming-cities-land-value-capture>
- Suzuki, H., J. Murakami, Y-H. Hong, and B. Tamayose. 2015. Financing Transit-Oriented Development with Land Values: Adapting Land Value Capture in Developing Countries. Washington, DC: World Bank.
- Yajima, T., H. Ieda, T. Yamazaki, M. Ota, H. Okuma, T. Nakano, and H. Suzuki. 2014. Transit Oriented Development in Tokyo. The Institute of Behavioral Sciences. Tokyo.
- The Economist. 2017a. Losing altitude. London. 12 August.
- . 2017b. How to build more efficiently. London. 19 August.
- The News International. 2017. ADB exploring new economic corridors in Pakistan. 1 June.
- United States (US) Department of the Treasury. 2011. Treasury Analysis of Build America Bonds Issuance and Savings. 16 May. <https://www.treasury.gov/initiatives/recovery/Documents/BABs%20Report.pdf>
- US Department of Transportation. Federal Highway Administration. <https://www.fhwa.dot.gov>
- US Supreme Court (USSC). *United States v. Stanford*, 161 U.S. 412 (1896).
- . *United States v. Union Pacific Railroad Company*, 91 U.S. 72 (1875).
- Wood, A. 2010. New Legal Structures to Address the Social Capital Famine. *Vermont Law Review* 35: 45–52.
- World Bank. 2016. Utilizing World Bank partial guarantees in support of sovereign or sub-sovereign commercial debt financings. Washington, DC. <http://documents.worldbank.org/curated/en/293331492579395041/Utilizing-World-Bank-partial-guarantees-in-support-of-sovereign-or-sub-sovereign-commercial-debt-financings>
- . 2017. Utilizing WB Partial Guarantees to Support Sovereign or Sub-Sovereign Commercial Debt Financing. News Release. 23 May.
- Yoshino, N. 2010. Financing Transport Infrastructure Investment. In *Southeast Asian Economic Outlook 2010*, edited by OECD. Paris: OECD Publishing.
- . 2012. Global Imbalances and the Development of Capital Flows among Asian Countries. *OECD Journal: Financial Market Trends* 2012(1): 81–112.
- Yoshino, N., and M. Nakahigashi. 2004. The Role of Infrastructure in Economic Development. *The ICAFI Journal of Managerial Economics* 11(2): 7–24.
- Yoshino, N., M. Nakahigashi, and V. Pontines. 2017. Attract Private Financing to Infrastructure Investment by Injecting Spillover Tax Revenues. *Nomura Journal of Asian Capital Markets* 1(2): 4–9.
- Yoshino, N., and U. Abidhadjaev. 2016. Explicit and Implicit Analysis of Infrastructure Investment: Theoretical Framework and Empirical Evidence. *American Journal of Economics* 6(4). DOI: 10.5923/j.economics.20160604.02.
- . 2017. An Impact Evaluation of Investment in Infrastructure: The Case of a Railway Connection in Uzbekistan. *Journal of Asian Economics* 49(1): 1–11.
- Yoshino, N., and V. Pontines. 2015a. Asia-Pacific Infrastructure Investments in Collaboration – The Economic Effect of Infrastructure Investment: Case of the Highway in the Philippines. GIE/AAA Special Kick-Off Edition. GIE Network Publishing.
- . 2015b. The Highway Effect on Public Finance: Case of the STAR Highway in the Philippines. ADBI Working Paper Series 549. Tokyo: ADB Institute.
- Yoshino, N., and G. B. Stillman. 2017a. Kick-start private infrastructure with future tax-sharing bonds. Asia Pathways blog post. 25 May. www.asiapathways-adbi.org/2017/05/kick-start-private-infrastructure-with-future-tax-sharing-bonds/
- . 2017b. New budget-neutral way to attract private investors for infrastructure. *Development Finance*. London. September 2017.
- Zhang, W. 2017. *A Sneak Peek at CAREC's New Strategy*. Manila: ADB.

* ADB recognizes “China” as the People’s Republic of China.
 In this publication, “\$” refers to US dollars unless stated otherwise.

Acknowledgments

Part 1 is an updated revision of Yoshino, N., M. Nakahigashi, and V. Pontines. 2017. Attract Private Financing to Infrastructure Investment by Injecting Spillover Tax Revenues. *Nomura Journal of Asian Capital Markets* 1(2): 4–9. My gratitude to Profs. Yoshino, Nakahigashi, and Pontines and the Nomura Foundation ©2017 www.nomurafoundation.or.jp/en for permission to excerpt and reprint.

Sections for Part 4 were contributed by Paul Vandenberg, Suguru Shimazaki, Gerel Enkhbold, Munkh-Erdene Batkhishig, and Prachi Gupta. The Illustrative Term Sheet benefited from the comments of Tony Tan, Alan Lok, Mary Leung, Sid Weeks, and Paul Previtera. I should also like to thank my colleagues in the infra working group, Matthias Helble, Wawan Juswanto, and Umid Abidhadjaev.



After reading the brief be sure to watch the related animeme, “Let’s Build a Highway—the Smart ADB Way” at <https://youtu.be/hHzhjqDT50>

Appendix: Illustrative Term Sheet of Back-End Participation in Future Tax Bond

ILLUSTRATIVE TERM SHEET FOR ACADEMIC PURPOSES ONLY

Fixed Rate Project Bond & Floating Rate Backend Tax-Participation Note (collectively the “Tax Kicker Bonds” or the “Loan”) due 2027

Issuer:	The Private Finance-Build-Own-Operate Highway Corporation (and as secondary obligor of the 2nd tranche the Government of the Emerging States, acting through its Tax Authority)
Currency:	United States dollars
Loan Amount / Tranches:	US\$ ____,000,000. The Tranche 1 Fixed Rate Project Bonds and the Tranche 2 Floating Rate Backend Tax-Participation Notes will be issued in registered, certificated form in two tranches, which are to be consolidated and form a single series of Kicker Bonds.
Borrowing Limit:	US\$ ____,000,000 in principal amount of the Bonds. Tranche 1 and Tranche 2 will each comprise US\$ ____,000,000 in principal amount
Coupon Rate/ Interest Payments:	<p>The Tranche 1 Fixed Rate Project Bonds will bear interest from the date of issuance at a rate of ____% per annum payable semiannually on each 15 January and 15 July. Any non-payment in a period will be carried forward.</p> <p>The Tranche 2 Floating Rate Backend Tax-Participation Notes will bear quarterly interest payments commencing 15 October 2022, reset annually based on the Backend Tax-Participation (as defined). In no event will the Tranche 2 Floating bear interest for any quarter at a rate less than ____% per annum. Any non-payment of the minimum rate in a period will be carried forward.</p>
Maturity Date:	15 July 2027 at price _____
First Interest Payment Day:	15 January 2018
Last Interest Payment Day:	15 July 2027 (10 years after expected settlement date)
Price:	The denomination of each Tranche 1 and Tranche 2 security is US\$100. Investors must subscribe for a minimum of 500 Bonds, i.e. US\$50,000, in principal amount, comprising an equal number of Tranche 1 Fixed Rate Bonds and Tranche 2 Floating Rate Notes.
Call Option:	The Fixed Rate Bonds are redeemable, in whole or in part, at the option of the Issuer, on or after 15 July 2022. A sinking fund payment on 15 July 2025 is calculated to retire approximately ____% of the Fixed Rate Bonds prior to maturity. The Floating Rate Notes are not subject to any mandatory sinking fund requirement.
Trustee:	Infrastructure Ventures Limited in its capacity as manager of the State Highway Kicker Bonds Trust Fund.

Independent Certifier:

An independent organization that is appointed to determine the Difference-in-Difference calculation between the Project economic catchment zone and the control zone and to calculate the outcome payments to be made by the Government to the Issuer and the backend tax-participations to the bondholders.

Status of the Bonds:

The Kicker Bonds shall rank at least pari passu with all other senior obligations of the Issuer other than obligations which are mandatorily preferred by law. The Bonds shall rank ahead of subordinated debt. The Bonds are not backed by the full faith and credit of the Government or its taxing authority.

The primary revenue stream backing payment of the Tranche 1 Fixed Rate Bonds consists of the user tolls and related highway lease income (e.g. from roadside billboards) generated by the Project and received by the Issuer as owner and operator, which goes first to paying the fixed interest to the bondholders and to retiring the Tranche 1 at maturity.

The assets available to the Issuer to be applied to the payment or repayment of amounts owing on Tranche 2 Notes are limited to the State Highway Kicker Bonds Trust Fund assets. In certain instances, the Issuer may be required to contribute general corporate resources to the Trust Fund from available monies at the end of its fiscal year as well. See the Bond Agreement for details.

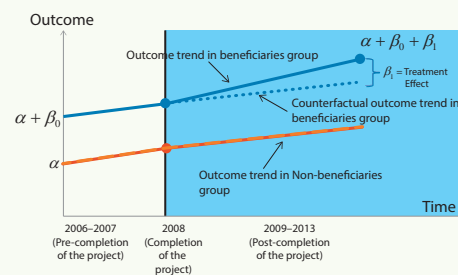
Purpose of the Loan:

The net proceeds from the Loan shall be used, together with cash of the Issuer, to finance the acquisition rights of way for, and the acquisition, construction and improvement of the State Highway Route C to D as prescribed in the Government highways act and Project MOU.

Special Issues:

The Government accepts and acknowledges in a Project Memorandum of Understanding that it would not receive the increases in tax and other impost revenues which will be generated in the economic catchment zone surrounding State Highway Route C to D without the introduction of this Project; therefore, it is prepared to give [half] of any of such designated revenues derived therefrom to Tranche 2 bondholders as below.

Box 1 The Difference-in-Difference Method



To measure the impact of a policy or project, one can also easily use the DID method to estimate the following regression model:

$$Y_{it} = \alpha + \beta_0 A_i + \beta_1 + P_t \times A_i + \varepsilon_{it} \quad (1)$$

where

Y_{it} is the outcome variable of interest such as gross domestic product (GDP), GDP per capita, etc., for the i -th entity in the t -th period;

A_i is a binary variable that takes a value of 1 for an entity (e.g., household, city, municipality) belonging to the beneficiaries group, and a value of 0 for an entity belonging to the nonbeneficiaries group;

P_t is also a binary variable that takes a value of 1 for the period in which the policy or project was implemented or it takes a value of 0 for the period prior to the implementation of the policy or project;

Government payments to the Issuer are a combination of a fixed standing charge and variable outcome payments based upon the expected Government revenues anticipated to be generated from income, business and property tax receipts in the economic catchment zone in comparison with a control zone according to the Difference in Difference (DiD) formula. See Box for details.

The Government has no obligation to make outcome payments if the trend is equal to or less than the control zone or does not outperform the greater of (i) both the regional share of Gross Domestic Product and the national GDP, and (ii) annual growth rate in net taxes collected from all sources in the control zone.

The key determinant of the level of Backend Tax-Participation received by the Tranche 2 bondholders is the amount of outcome payments paid by the Government to the Trust Fund under the terms of the agreement. At a Calculation Date the new tax revenue generated by the Project is determined according to the DiD formula. Data to determine the actual tax receipts of the Project's economic catchment zone and the control zone will be extracted from existing government datasets and verified by the Independent Certifier.

$P_t \times A_i$ is the interaction term between the two binary variables;

ε_{it} is the error term which is assumed to be uncorrelated with constant variance σ^2 ; and

α, β_0, β_1 are the regression parameters to be estimated.

The parameter β_1 represents the impact of the policy or this infrastructure project. The model can be enriched by including entity and time dummies. The main advantage of working with a regression-based approach to the DID is that other variables can be added to the right-hand side of equation (1), which control for possible violations of the assumption of the same trends between the beneficiaries and nonbeneficiaries group.

The standing charge is an amount of US\$__ million that will be paid in __ annual instalments at the fiscal close and then on _____ each year.

The outcome payment to be made by the Government following each Calculation Date is determined as:

- 50% of the first _____ in cumulative difference, plus
- 25% of the next _____ in cumulative difference, less
- All previous payments including the standing charge

Total Government tax-participation payments to the Trust Fund will vary depending on the measured DiD performance and are estimated to be between US\$__ million and US\$__ million in total; provided the Tranche 2 Notes do not terminate early.

Taxation:

These are tax-exempt bonds which means that, in the opinion of tax counsel, the interest earned on the security is exempt from Government income and personal taxes.

Documentation:

The Bond Agreement will be entered into by the Issuer and the Trustee acting as the bondholders' representative. The Bond Agreement shall regulate the bondholders' rights and obligations with respect to the Bonds. Prior to the closing the Issuer will have entered into the Tax-Participation and Trust Fund Agreement with the Government acting through its Tax Authority substantially in the form attached to the agreement.

Limited Guaranties:

AsPac Redevelopment Bank, an international financial institution, will enter into a limited guaranty with the Issuer to insure that the outstanding principal only on the Tranche 2 Notes will be repaid to the bondholders in the event the Government is not required to make any fixed or outcome payments into the Trust Fund according to the certified DiD calculation.

Worldwide Investment Guarantee Authority, a subsidiary of the Worldwide Global Bank, will insure the Project against political risk in the event the Government reneges on any of its tax-participation obligations or pledges due the Trust Fund or expropriates the Project or Trust Fund contrary to international law.

Lack of Secondary Market:

Prior to this private placement there has been no market for these types of Kicker Bonds. The Underwriters and Issuer are not obligated to make a market and there can be no assurance that an active public market for any of these securities will develop. If a market does develop, it may not be liquid.

IMPORTANT NOTICE:

THIS IS NOT AN ACTUAL INFORMATION MEMO OR TERM SHEET FOR ANY PROPOSED PROJECT, ISSUER OR PRIVATE PLACEMENT. ALL NAMES USED ARE FICTITIOUS. IT IS PREPARED PURELY FOR ACADEMIC PURPOSES TO INTRODUCE THE THESIS OF KICKER BONDS FOR INFRASTRUCTURE. [Asian Development Bank Institute, Prelim Ver. August 2017]



Contents

Introduction	1
Part 1: New Way to Attract Private Financing to Infrastructure Investment by Injecting a Share of Future Spillover Tax Revenues	2
Part 2: The Difference-in-Difference Method in Detail	8
Part 3: Turning Economic Corridors into Tax Catchment Zones for the Spillover Effect	9
Part 4: Instructive Features from Past Innovations	11
Part 5: Introducing the Tax-Kicker Bond	18
Appendix: Illustrative Term Sheet of Back-End Participation in Future Tax Bond	25

Asian Development Bank Institute

ADB, located in Tokyo, is the think tank of the Asian Development Bank (ADB). Its mission is to identify effective development strategies and improve development management in ADB's developing member countries.

ADB Policy Briefs are based on events organized or co-organized by ADB. The series is designed to provide concise, nontechnical accounts of policy issues of topical interest, with a view to facilitating informed debate.

The views expressed in this publication are those of the authors and do not necessarily reflect the views and policies of ADB, ADB, or its Board or Governors or the governments they represent.

ADB encourages printing or copying information exclusively for personal and noncommercial use with proper acknowledgment of ADB. Users are restricted from reselling, redistributing, or creating derivative works for commercial purposes without the express, written consent of ADB.

Asian Development Bank Institute

Kasumigaseki Building 8F
3-2-5 Kasumigaseki, Chiyoda-ku
Tokyo 100-6008
Japan
Tel: +813 3593 5500
www.adbi.org