Inter-American Development Bank

Financing Infrastructure:

On the Quest for an Asset Class

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DISCUSSION PAPER Nº IDB-DP-622

September 2018

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Abstract[1]

Infrastructure financing "gaps" remain large but institutional investors maintain trillions of dollars in low yielding government bonds. One of the G20's 2018 priorities has been to develop infrastructure as an *asset class*. Yet many argue the constraint is *deal flow*. In this paper we argue financing and the supply of viable projects are linked. For large, greenfield infrastructure in emerging economies banks, governments and multilateral development banks (MDB's) are key financiers. Institutional investors may also play an important role, we suggest refinancing through standardized infrastructure bonds may be the best route to a liquid global asset class. Regulation should ensure banks maintain adequate liquidity and capital, while allowing them to finance construction, and provide incentives to then refinance. We argue national infrastructure funds may assist standardization and provide a focal point for MDB's to facilitate project development and supply enhancements to attract private finance. A careful analysis of risks and an allocation to exploit comparative advantages in risk bearing, avoiding large public contingent liabilities are required.

JEL classifications: F33, F34, G15, G28, H54
Keywords: Infrastructure, Finance, Asset class, Multilateral Development Banks

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1. Introduction

Estimates suggest as much as US$100 trillion of professionally managed funds may be available for investment in long-term assets[2]. These funds are managed in pension funds, insurance companies and sovereign wealth funds. A large proportion of such funds is currently invested in very low yielding government bonds[3]. Only a small proportion appears to be invested in infrastructure[4]. At the same time, many suggest that there is a large infrastructure "gap", of between US$1 trillion and US$1.5 trillion per year. We take this to mean that there is a less investment in infrastructure than that estimated to be needed to ensure healthy rates of economic growth and to maintain high-quality infrastructure services at a reasonable level for growing populations[5]. Gaps are focused on greenfield projects in emerging economies (where population growth is stronger) and upgrading brownfield assets in advanced economies. Gaps are largest in the energy sector, followed by other sectors (such as water and sanitation, transport and communications). It is estimated that emerging economies will account for an increasing share of global infrastructure investment in the years to come[6].

Some research, particularly from investment banks, suggests that infrastructure might be considered as an *asset class*[7]. A set of securities composes an asset class if their returns have high covariances (higher than with other assets), and for that asset class to be of interest to investors it should expand the risk-return frontier. In other words, adding infrastructure assets to a market portfolio that previously excluded them should either boost yields for the same level of risk or reduce risks for the same returns. In practice there are relatively few listed securities backed by

[2] See Arezki et al (2017).
[3] Celik and Isakson (2013) suggest 38% of institutional investor funds is held in equity and the remainder in fixed income securities, the vast majority of which are public sector bonds with very little in infrastructure. There are problems with these portfolio shares due to complex, multi-layer investment structures.
[4] Or at least directly in infrastructure. Equity and corporate bond investments may include financing firms involved in infrastructure projects or providing infrastructure services including utility companies.
[5] This definition of a "gap" is silent on the reasons. Required returns for financing may be too high relative to what consumers or governments are willing to pay and/or projects may be too risky given the returns on offer. Or there may be an insufficient flow of new projects due to bottlenecks in project identification or development for political or other motives. See Reyes-Tagle (2018) Appendix 1 for a review of methodologies regarding how gaps have been estimated.
[6] IDB authors estimated in 2015 that that the infrastructure gap is around 2.5% of GDP or about US$150bn per annum alone for the Latin American and Caribbean region - Serebrisky et al (2015), figures based on 2013 GDP.
[7] See for example Andrews and Wahba (2009) who argue infrastructure may be an asset class. Idzorek and Armstrong (2009) also suggest listed infrastructure assets may enhance efficient frontiers with optimal allocations from between 0% and as high as 6% in a diversified portfolio of bonds, equity and real estate, relative to an estimated 1.5% currently. On the other hand Blanc-Brude et al (2016a) and Bianchi and Drew (2014) find that listed infrastructure equity type assets do not constitute a new asset class but may be spanned by existing assets.

infrastructure projects and so there has been interest in obtaining data and analyzing non-listed projects[8]. There is some evidence to suggest the performance of unlisted assets do not differ significantly from their listed cousins.

One positive question is whether the existing set of infrastructure assets currently constitutes an asset class. As the universe of such assets remains relatively limited, studies generally throw the net widely to capture as many assets as possible and some employ both listed and non-listed securities, in the latter case analyzing their cash-flows and even constructing *synthetic securities*. The results of such analyses are mixed. Some studies do indeed find infrastructure could be an asset class[9]. More specifically, some analysts suggest that infrastructure projects have reasonable returns but with low return volatility, that they are less sensitive to economic downturns and that they are a good inflation hedge[10]. Other studies find less evidence that the current universe of infrastructure securities should be considered as an asset class given their risk and return characteristics[11].

An alternative normative question is whether infrastructure securities could become an asset class[12]. The risk and return characteristics of securities backed by infrastructure projects depend critically on the financing structure employed. In this paper we reflect on financing structures that might give the best chance of infrastructure securities becoming an asset class.

If infrastructure is already an attractive asset class then given the low rates of return on government assets why haven't institutional investors invested much more and why haven't the identified gaps been significantly reduced? One view is that the constraint is really the supply of viable projects. But that supply may be limited by a set of obstacles that are themselves related to risks. These include political, regulatory, counterparty and demand risks as well as the risks surrounding project selection and construction. These risks may inhibit project development or, if

[8] See in particular Blanc-Brude et al (2016b) for a discussion and a proposal on data collection.

[9] Andrews and Wahba (2009) argue infrastructure may be an asset class. Idzorek and Armstrong (2009) also suggest listed infrastructure assets may enhance efficient frontiers with optimal allocations from between 0% and as high as 6% in a diversified portfolio of bonds, equity and real estate, relative to an estimated 1.5% currently.

[10] See for example Goldman Sachs (2016) who find global infrastructure investments have lower volatility (but also lower returns) than global equities and substantially higher returns (but somewhat higher risk) than global bonds. They also present evidence in favor of infrastructure investments as providing an inflation hedge and promoting "interest rate resilience" of portfolios.

[11] Blanc-Brude et al (2016a) and Bianchi and Drew (2014) find that listed infrastructure equity type assets do not constitute a new asset class and may be spanned by existing assets.

[12] Arguably this has been the focus of the G20's work in this area. This work has focused on standardizing project preparation and documentation and on data collection data with some reference to financial engineering – see "Roadmap to infrastructure as an asset class" – G20, Argentina Presidency.

the project is developed, may render the project unattractive given the returns on offer. The question might be then whether the risks to investors can be reduced in a way that would make infrastructure investments attractive but without creating large public liabilities.

Many of these risks appear to be related to information and incentive problems, they are not *exogeneous* market risks that depend on variables outside of the control of economic agents; rather they might be labelled as *endogenous* risks that depend on the actions of firms or governments and hence depend on those agents' particular incentives. We argue that different types of risks should be dealt with in different ways. Risks can be controlled, mitigated, insured, guaranteed or diversified. Governance and contracting structures, project preparation and monitoring institutions, market-based insurance and hedging instruments, government and Multilateral Development Bank (MDB) enhancements can all be deployed. How such instruments are used is critical to whether infrastructure may become an attractive asset class for investors.

The paper is organized as follows. In the next section, we discuss a number of preliminary aspects as background. Section 3 then suggests some "principles" that we consider may assist in allowing infrastructure securities to become an asset class. Section 4 then considers potential financial structures that would follow these principles. Section 5 discusses more specifically the role of government and MDB's and section 6 concludes.

2. Preliminaries

In what follows we will generally assume that the projects have been well-selected or in other words that their underlying quality is good. We will not discuss in detail what this means. Suffice to say that most large infrastructure projects involve tradeoffs, for example projects will likely benefit some groups more than others and some may even face costs. How such tradeoffs are valued is a critical element of project evaluation.

A related but different question is <u>who should pay</u> for the project. Some projects may fully pay for themselves from user fees or the capture of returns from an externality – for example the value of land may rise given a new road leading to higher land taxes that may finance the project. But large infrastructure projects may have significant externalities that are hard to capture. Here there is a prima facie case for either direct or indirect support from more general public funding. Still, a prima facie case does not mean that public support is necessarily justified and any such support should be carefully calibrated.

Large infrastructure projects will very likely have government involvement of one type or another. This might be via direct subsidies or support if justified (perhaps through availability or minimum revenue type guarantees), through awarding concessions, through a power (or other) purchase agreement, or through some type of regulation. How this is structured may be critical for investors' risk perceptions.

Infrastructure projects are heterogeneous. And yet to create an asset class standardization is useful. But this does not mean standardizing underlying projects. Rather the focus should be on standardizing analyses, processes and documentation. Projects may be quite different but if a common framework of analysis can be agreed (which may mean agreeing on a set of dimensions to express project heterogeneity) then this will assist institutional investors buying infrastructure securities. The time required to analyze projects and understand their risk-return characteristics will be reduced. Emerging platforms for the development of projects such as SOURCE are heading in this direction[13].

Moreover, financing structures may create a more standardized financial security, even if the underlying projects are heterogeneous. This is particularly the case for an infrastructure bond as a refinancing instrument. Still, there are subtle trade-offs. The more homogeneous the security, the more attractive that will be from the point of view of an investor, who then has to spend less time and energy figuring out exactly what may drive its value. But then the financing structure required to produce such standardization might have to be more complex which may reduce net returns. Different types of investors may wish to have a different standard giving rise to a type of basis risk. Designing financial securities can be more art than science and requires good knowledge of what actual investors are seeking. As in other financial markets, it may be a process of trial and error.

Investors also require appropriate benchmarks to track performance. Different benchmarks are needed for different types of securities that might be created. The right benchmark for an equity investment at the commencement of a project would be quite different to that needed for an infrastructure bond used for refinancing once the construction phase had been completed. Creating a benchmark without a large set of securities already created is challenging and yet some argue

[13] SOURCE is an online infrastructure project preparation and data management platform, led and funded by multi-lateral development banks (MDBs) in response to the G20 for addressing the global infrastructure gap – see https://public.sif-source.org/

that for infrastructure as an asset class to flourish, benchmarks are key. It is likely that such benchmarks will develop and become more refined as the market develops.

3. Creating an Infrastructure Asset Class: Towards a Set of Principles

Here we suggest some principles that may help in considering how to create a tradeable security from heterogeneous infrastructure projects.

3.1 Homogenizing the Heterogeneous: Go to the Cash Flows

Project heterogeneity may appear to be a substantial obstacle to the creation of an asset class. But any project can be represented at its most basic level as a set of cash-flows. The most important analysis would be the expected cash-flows stemming from the project. These cash-flows will likely be negative for a period of time (development and construction) and only turn positive after these phases are completed. It should be clear in this analysis where the positive cash flows are expected to come from (users, government subsidies or elsewhere) and how such cash-flows would then be divided between different investors.

However, it is also critical to have a good analysis of the risks to those cash-flows. This could be expressed in different ways. One way would be to think of negative scenarios and how the cash-flows would change in those scenarios, coupled with an assessment of the likelihood of those scenarios. Scenarios might include the materialization of one specific risk or a set of risks. This analysis would need to take into account any enhancements offered by the government and other outside agencies.

Ideally such analyses might follow a standard template(s) with a standardized set of risks covered. An analogy might be the typical "endogenous debt sustainability" methodology which has become common-practice by the IMF and other agencies to analyze sovereign debt sustainability. The methodology is essentially a central forecast (in this case it would be a forecast of cash-flows) coupled with a scenario analysis which would consider the same cash flows depending on the realization of a set of shocks. In the case of the IMF, both "exogenous risks" and "endogenous" type risks are normally considered. An example of the former might be the movement in a commodity price, or US interest rates that would affect an emerging economy. An example of the latter would be a change in the expected primary fiscal balance due to a policy change – or quite frequently the lack of reforms that are assumed would be implemented in the

baseline. The first principle is then to find a representation of infrastructure projects as sets of cash flows. The most relevant for a specific investor is the expected cash-flow that investor is likely to receive. But scenario analysis can be used to consider the risks to those flows.

3.2 Comparative Advantage in Risk-Bearing

Different actors have different *comparative advantages* in dealing with different types of risks – see Miller and Lessard (2001). In general, markets are good at dealing with *exogenous* risks. Stock, bond and commodity markets regularly amass information each day with prices reacting to developments in such risks. Futures, options and swap contracts are all forward looking contracts priced on expected values and volatility during the life of such instruments with some swap contracts lasting many years. Structured products are priced considering expected volatilities and correlations between assets. Billions of dollars are traded each day on contracts affected by market risk[14].

But markets are not so good at dealing with *endogenous* risks. These risks may be related to fundamental incentive and information problems. The classic example is that of the second-hand car market – the market for "lemons"[15]. As sellers may have better information and have incentives to off-load cars in a poor mechanical state, buyers are naturally suspicious. In the extreme, there may be no market at all. Insurance markets also suffer such problems. If those seeking insurance have much better information on potential losses, or if incentive problems are severe (once insured the incentives to manage the insured risk decline), then insurance products for some risks may cease to exist. The private market has come up with some ways to mitigate these types of risks. A trusted third party may provide information on the quality of a car. Deductibles and co-pays control some incentive problems in insurance.

Infrastructure projects suffer from severe information asymmetries and incentive problems particularly in the selection, development and construction phases. Institutional investors may have a hard-time deciding if the quality of projects selected to be developed is high, if the advertised time to build will suffer delays, if the expected costs of the project will over-run and if the quality

[14] Counterparty risks (and related incentive problems) may affect the depth and integrity of such markets. Historically, the London commodity markets favored limiting access to those in the trade with proven financial backing. US style commodity markets adopted margin payments and a centralized clearing system to guarantee performance. By managing the counterparty risks, this "infrastructure" help enhance liquidity. The US model has now become the standard throughout the world.

[15] See Akerlof (1970).

of the eventual construction is up to scratch, if the appropriate maintenance will be conducted as it should to name just some of the issues. However, seeking the information on each of these risks, monitoring the behavior of the actors involved and controlling "perverse incentives" that may arise is not the comparative advantage of an institutional investor.

Such risks should be placed first and foremost with those firms or agencies that have incentives to minimize those risks and that can monitor and control the actions of the actors concerned. Private market solutions for this may be available. A firm that intends to operate an infrastructure asset has an incentive to build and maintain it to a certain level of quality. Contracts that ensure firms charged with tasks that are hard to monitor have some stake in the results or that include penalty clauses (if they are credible) in the case of problems or delays may also have a role.

In some cases, governments and MDB's are able to monitor and manage these risks. However, as pointed out by Ehlers (2014) a government guarantee on risks that governments cannot control will erode incentives and may lead to large government liabilities. If governments offer guarantees they should be in those areas where the monitoring and control of those risks can be made effective.

Our second principle is then to seek *comparative advantage* in risk bearing. In general, private investors may wish to take *exogenous* type risks while *endogenous* type risks should be borne by those that have a stake in the game and can monitor and control those risks.

4. Systemic versus Diversifiable Exogenous Risks

Exogenous risks that are project specific (and not highly correlated across projects) are diversifiable. If a security is backed by an individual project, then an investor can diversify such risks in a portfolio. A security may also be backed by several projects (we discuss this further below), providing diversification benefits. Exogenous, specific project risks should be borne by investors and diversified.

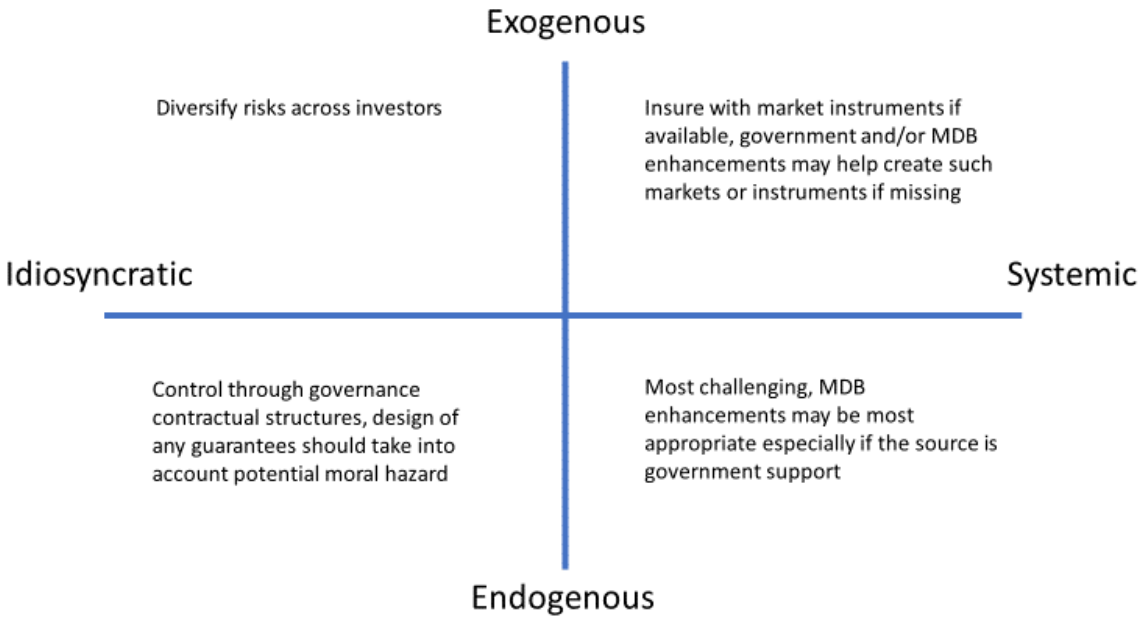
But some project risks are correlated across projects. For example, in a portfolio of projects in a single country, national level variables may affect all project returns. Currency, interest-rate and price fluctuations may provoke systemic risks for projects at the national level. In countries with well-developed financial markets, instruments may exist to insure such risks. However, in some countries these markets do not exist.

Investors may also diversify such risks across countries in a global portfolio. Investors regularly take such risks when investing in government bonds, particularly those in local currency. Having said this, currency risk may be a significant limitation for investing in emerging economy infrastructure. And such risks may be correlated across countries that are close trading partners or that are financially integrated or during significant shocks to global financial markets. A government guarantee or other enhancement may be a useful tool, but any contingent liability created should be carefully accounted for. This should be thought of as substituting a missing market and the trade-offs carefully assessed. Solutions that attempt to build the missing market would generally be preferred such that over time local capital markets including currency hedging markets develop. Some creative solutions have been sought with respect to currency risk in frontier markets where hedging instruments are not available[16]. Further development of such solutions could provide a significant boost to infrastructure investment especially in emerging economies[17].

Figure 1 (below) illustrates in a simplified and schematic typology of risks and ideas on how they should be managed. This figure draws on Miller and Lessard (2001) and Ehlers (2004) for inspiration. The overall risk inherent in a large, complex infrastructure project can be partitioned in different ways. Here we suggest attempting to divide the overall risks into those that are (i) systemic and exogenous (which can then be insured) (ii) idiosyncratic and exogenous (which can be diversified by investors) (iii) idiosyncratic and endogenous (which should be controlled via governance and contractual structures) and (iv) systemic and endogenous. This typology can be thought of in a descriptive fashion but also as a more normative guide. Financing structures should attempt to split risks in this way to then seek to exploit the comparative advantages in risk bearing.

[16] One example is the creation of TCX that hedges over 70 currencies worldwide.
[17] This is something that the G20 may wish to consider in its work-program.

Figure 1. A Typology of Risks in Infrastructure Projects



The last category, in the bottom right quadrant, of systemic and endogenous risks, is the most challenging. It is likely that such risks will not be insurable using market instruments. We discuss these risks below in the next section.

The risk of a major failure of a large investment project may also be somewhat similar in nature to this type of risk. It may simply not be credible to pass such risks to private investors. If a large project fails catastrophically then some type of public sector rescue may ensue whether this is allowed for explicitly or not. If it is not credible to pass such risks to private investors, then an explicit resolution procedure should eb developed ex ante. We don't go into further details here but lessons may be available from modern techniques for bank resolution. The analogy to protecting depositors but not bailing out the owners or managers of a bank, would be to protect the project and the users or consumers of that project but without necessarily bailing out the owners and large non-guaranteed sophisticated private investors.

5. Systemic, Endogenous (including government counterparty) Risks

Perhaps the most important example of a systemic endogenous risk is government counterparty risk – here we consider a wide definition of such risks. Virtually all large infrastructure projects will involve government actions in one role or another. For some projects, the continuation of a stable regulatory framework is critical. For others, a direct subsidy may be involved, in others a

purchase agreement from a public entity, in others a guarantee on some payments or a minimum revenue guarantee may be contemplated. The institutional structure surrounding this involvement may be a critical part of the risk assessment. What level of government is involved? What flexibility is there to "change the rules"? Is there any independence from general government? What is the precise legal instrument that is used, is it enshrined in a law or some other legal instrument? Countries have different legal-systems, relevant levels of government may differ across projects and countries and large infrastructure projects are managed in different ways. It would be of interest to develop a typology of government involvement with a view to assessing what different types of involvement may imply for the risks to cash-flows.

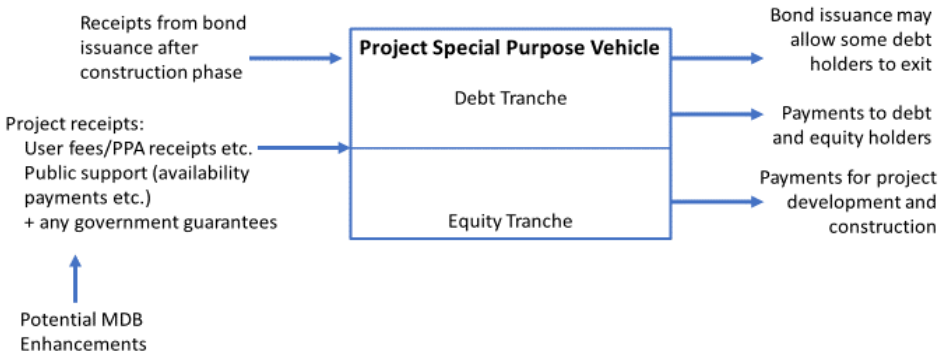
An interesting question is whether government financial guarantees are a useful instrument to mitigate the relevant counterparty risks from another public body. In some circumstances such instruments may well provide comfort to investors but the times when one public sector body may not perform as per a contact may be precisely those times of intense stress, when the performance of a government guarantee might also be questioned. Government guarantees on a sub-national public entity may insure against certain risks but may not be the most effective form of enhancement.

For systemic endogenous risks we suggest an outside entity, ideally with some leverage over the government in question, would be the best source for an enhancement. The natural candidate is a Multilateral Development Bank (MDB) or another multilateral agency.

6. Financing Structures

Typically, a Special Purpose Vehicle is created for each infrastructure project that receives financing, makes payments for the development and construction of the project and all other relevant services, receives the user-fees and any other revenue support during the operational phase and pays investors. This SPV may have a level of first-loss equity finance and may also attract debt financing typically from banks but possibly from other investors as well. Figure 2 provides a highly-schematic representation.

Figure 2. Project Level Special Purpose Vehicle



6.1 Project Receipts

If the present value of user-fees (or purchase agreements for electricity etc.) are sufficient then no government support may be involved. However as discussed, government support may be appropriate in some circumstances, particularly where positive externalities are significant.

If present, then this support should be structured with the above-mentioned principles in mind. If project returns from users are insufficient to attract financing but positive externalities are strong then availability payments (or other payments conditional on performance) may be warranted. If expected returns are adequate but risks are perceived as being high, government support would be best focused on those systemic risks that are exogenous or on those endogenous risks where governments can truly monitor and control outcomes effectively. As argued above governments should avoid insuring idiosyncratic exogenous risks (that can be diversified) or endogenous risks where governments cannot monitor or control agents' actions, as these may generate moral hazard and large public liabilities[18].

6.2 Investors

One role of the SPV structure is to attract and organize a set of different investors at the commencement of the project. Typically, at this juncture equity finance is provided by the sponsor

[18] This discussion is closely related to that regarding the World Bank's *cascade* view. See for example World Bank (2017) and Cordella (2018), for recent comment from outside the World Bank see Carter (2018).

or construction companies themselves as specialized monitoring and technical expertise are critical. If such firms provide the first-loss capital, then they have skin in the game and have the incentives to minimize construction risks, cost over runs and delays. However, their incentives will also be governed by the specific contract that they have – fixed price or with some degree of flexibility to share risks. Such financing is normally limited in nature.

One role that institutional investors may then usefully play would be to augment this first tranche of equity financing. This type of financing would likely be through a dedicated infrastructure unit that has skills in monitoring the adverse incentive problems and endogenous risks of the construction phase. This type of investing may remain inside project-risk type financing and any securities created may remain illiquid. Creating a large liquid market of tradeable equity type securities attractive to outside institutional investors to finance (endogenous type) project construction risks appears an unlikely proposition. Indeed, we suspect that it is precisely due to the nature of these risks that the number of traded, liquid equity type securities backed by infrastructure remains fairly limited. Still, increasing institutional investors' role here through expanding dedicated infrastructure units, as Canadian pension funds and others have done, may be extremely valuable.

Banks and other debt investors also play a critical role at this early stage. Banks have expertise in project finance and by providing financing (debt and equity) to complement the equity tranche, and through monitoring of the project, may provide a disciplining role, as in standard theories of corporate finance. There is concern that the role of banks may be affected by regulatory reforms since the global financial crisis including the ongoing adoption of Basel III – see World Bank (2017) for a discussion in relation to Latin America. Given the exit of monoline insurance companies and tougher regulations on liquidity and on capital, banks may find it increasing difficult to finance long maturity infrastructure projects.

A recent preliminary report on the potential impacts of post global financial crisis regulatory reforms on infrastructure investment suggests little evidence of a material impact on a global scale – see Financial Stability Board (2018). Interestingly, the report notes that the top 10 suppliers of infrastructure finance (all of which are banks) provide 50% of infrastructure finance in EM's and loans remain the primary financing instrument for infrastructure in EM's[19]. While

[19] Overall, the size of the global market for infrastructure is growing with that growth coming most strongly through non-bank and specifically from bond financing - see Financial Stability Board (2018).

banks may be best placed to complement equity finance for the riskier construction phase given their project management expertise, that does not mean they need to keep the asset on their books for many years. This raises the possibility of banks securitizing infrastructure assets by issuing infrastructure bonds.

The FSB report notes the potential impact of tougher rules on liquidity for banks funding longer term assets - of greater than one-year maturity. Somewhat curiously, the Net Stable Funding Ratio (NSFR) does not differentiate between loans of 2 years and 10 (or 20) years maturity. Infrastructure financing also attracts relatively high risk-weights, although these are largely unchanged as a result of the reforms. The risk weights may then be reduced during the operational phase for projects (when risks are believed to fall) that conform to certain standards. These aspects, plus somewhat tougher rules for securitization, may provide disincentives for banks to refinance.

In principle, the relatively high-risk weights can be reduced with enhancements such as guarantees. In theory the regulatory treatment should depend on the risks that are covered, for example whether the guarantee wraps all risks or only covers specific ones. As discussed above there is an argument to attempt to unbundle risks and treat them differently. This then presents challenges for designing appropriate regulations. Moreover, if the loan is to a project SPV which has a large equity or subordinated debt cushion this is not necessarily reflected in the initial risk weight. There seems to be some room to refine these detailed rules on risk weights for infrastructure.

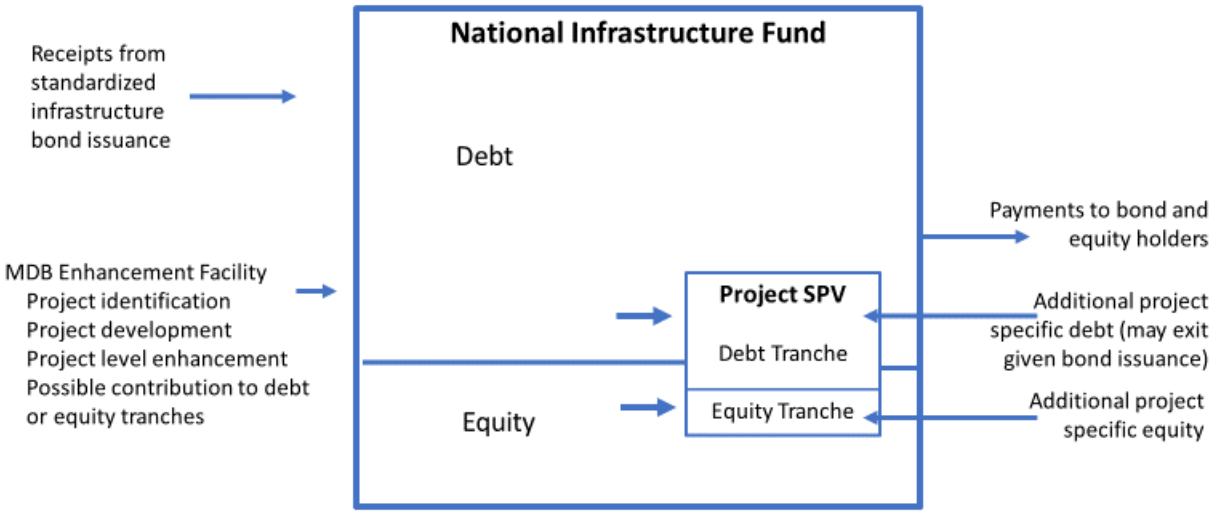
Banks are natural investors for the construction phase given their project-finance expertise, but they are not natural holders of very long dated loans which may increase maturity mismatches on their balance sheets. While project (and default) risks may decline after the construction phase, long maturity assets increase liquidity and interest rate risks. This suggests refining regulations to provide incentives for banks to securitize or refinance such long dated loans perhaps through the issuance of infrastructure bonds. At the same time an infrastructure bond issued after the construction phase may well constitute an asset class attractive to global institutional investors.

Infrastructure bonds have indeed been issued in this manner – see OECD (2014) for a discussion and Ehlers et al (2014) on the Asian experience. This raises a further intriguing possibility which is whether aggregating infrastructure projects within a second broader SPV (an SPV of SPV's or Super-SPV) which might then issue a standardized bond might be attractive for investors. This Super-SPV might then include a further first-loss equity tranche and enhancements

at the project portfolio (in addition to any enhancements at the individual project) level. The advantage of such an arrangement is a measure of diversification. One possibility would be to aggregate at a country level. This would then allow for the development of a standardized infrastructure bond that would be associated with a country, and backed by different infrastructure projects.

One way to structure this might be through a national infrastructure fund. Such a fund may be composed of a first tranche of equity provided by institutional investors' dedicated infrastructure units, likely with some government or MDB involvement. A second level of debt might be provided by commercial banks. Such a fund would then finance the equity and debt tranches of individual project SPV's to finance the construction phase of projects but would then seek to refinance through securitization and bond issuance. Bonds would be backed by the fund and the cash flows from several infrastructure projects. Such bonds would be standardized. This does not mean that they have to be exactly the same, a small menu of such bonds might be constructed but each may have a standard set of characteristics. An analogy might be the commencement of the class of emerging market bonds created at the time of the Brady deals in the late 1980's and early 1990's. A highly schematic representation is provided in Figure 3.

Figure 3. Schematic Representation of a National Infrastructure Fund



A question is whether the transaction costs of such financial engineering is truly warranted. There are several parts to this question. A first is to what degree the creation of a fund would help in the drive towards the standardization of analysis, documentation and security design and how valuable those objectives really are. A second part is the question of whether it is truly in banks' (or others) interest to provide debt finance and then refinance. As discussed, this may hinge critically on the regulatory treatment of maintaining long dated assets on banks' balance sheets and the regulatory treatment of securitization. A third part is the underlying question as to whether the constraint is really financing but rather deal flow.

The national infrastructure fund with appropriate MDB enhancements may help to address each of these questions. A complementary MDB facility might assist project identification and development assisting deal flow. The national fund may provide for risk reduction including greater confidence on project quality. Indeed, one idea would be for MDB's to define a set of criteria for *qualifying* infrastructure projects. These would be projects that were developed according to best practices, that employed standardized documentation and that had been analyzed according to agreed risk-metrics and that met certain risk standards possibly including MDB enhancements. Given lower risks such projects may then gain a somewhat more favorable regulatory treatment. Given standardization such projects may also attract more favorable terms for refinancing. Such projects may then form the underlying assets to commence a new asset class.

7. On the Role of Multilateral Development Banks

As discussed, multilateral Development Banks may have an important role to play in the creation of a tradeable standardized security backed by infrastructure projects. However, this support is not a free-lunch and so should also be calibrated carefully and focused on the comparative advantages of such institutions.

First, MDB's might provide enhancements to individual projects. As discussed above, arguably a comparative advantage of an MDB is to guarantee systemic endogenous risks that relate to government counterparty risks. This comparative advantage stems from the fact that MDB's may influence governments to some degree given their overall lending portfolio and relationship with a borrowing country. This may reduce then reduce performance risks on government backing for projects. MDB's may also assist countries with underdeveloped capital markets to insure systemic exogenous risks. In these cases, having an MDB with a AAA rating intermediate in an

international market, say against currency or commodity risks may be cost-effective. However, such guarantees or other enhancements do not come for free and they also tend to use up country lending allocations. The precise rules vary across institutions but where internal rules consider a dollar of such a guarantee the same as a dollar of lending, the opportunity cost may be high. Still some MDB's have attempted to provide incentives for the judicious use of such instruments and this remains an area of some discussion.

Second, MDB's could provide first-loss equity or equity-type subordinated lending to project level SPV's or to a Super-SPV. Or, they may provide such financing to a national fund which may then provide this type of equity financing. Such financing is normally expensive in terms of MDB capital but such arrangements may also attract additional donor resources. These ideas should be considered carefully on their individual merits given their potential development effectiveness in the countries concerned. MDB's may also have a particular advantage in creating a Super-SPV, where for example this might finance projects in several, perhaps smaller, countries, or projects that have benefits for more than one country. MDB's may also play a role in providing technical assistance to a national infrastructure fund, financing a complementary project identification and selection facility, and a facility that might grant enhancements to individual projects as financed by such a fund.

Indeed, MDB's already assist countries in terms of infrastructure project identification, development and financing. Typically, MDB's extend long term loans and keep these assets on their balance sheets through the construction and the operation phase until these long-dated loans mature. Countries are free to pay back such lending early and could issue a bond themselves to do so but this is relatively rare. Given the above discussion, a third possibility is then for MDB's to assist in project identification and development (to help ensure high quality projects) and finance the riskier construction phase but then securitize the assets from their own portfolio. If the MDB in question is capital constrained this would have the benefit of releasing capital to allow for further lending. However, in general there is also a cost. Triple-A rated MDB's can borrow at very low rates and generally charge country clients for dollar loans below market rates. Such low rates are also a result of MDB's being considered as Preferred Creditors, meaning they are senior to private creditors in case of a sovereign default[20]. Securitized MDB loans would likely lose such a status

[20] See Cordella and Powell (2018) for a review of the literature on Preferred Creditor Status (PCS) and a theoretical model of PCS for crisis lending.

and private investors would seek returns higher than a typical MDB[21]. While this may be mitigated by the enhancements discussed above, MDB's would likely have to sell such assets for less than their present value to the MDB in question and in that sense would face a capital loss. Moreover, MDB's must finance their operations. Typically, the fixed and variable costs (such as staff, consultants and travel) of loan identification and preparation are paid for by the small spread on MDB lending[22]. If MDB's securitize and recycle assets (so there is more new lending) then the variable costs will rise. This suggests that if such securitization is done at scale, MDB income models may need to be reconsidered. Still, even if there are challenges for MDB's to originate but then securitize large amounts infrastructure assets, there may be an argument for MDB's to do a small amount to kick-start a market in standardized infrastructure bonds as part of market creation. Over time however it might be more efficient for the asset not to enter on to the MDB balance sheet at all but rather have the enhancements provided to project SPV's (or Super-SPV aggregators) on the MDB balance sheet through one of the structures reviewed above.

8. Conclusions

In this paper, we have reviewed some of the recent literature that has looked at whether infrastructure can be considered as an asset class. While the existing literature is of interest, much of it centers around analyzing existing securities rather than considering the slightly different question of how assets based on infrastructure projects can be developed such that those assets might become an asset class.

To shed light on that question, we develop a set of principles. These principles may be applied at the project level but also take into consideration that projects might be aggregated into a Super-SPV type structure. We have not advanced a specific proposal or financing structure. However, we see further work might be centered in at least three mutually supporting areas.

The first would be to advance existing efforts for institutional investors to take equity stakes in infrastructure finance. Given the high endogenous risks in the phases of project selection, development and construction, and despite the valuable efforts regarding the standardization of project analysis and documentation, this is likely to remain an inside type of financing where the

[21] On this point see Risk Control (2017).

[22] MDB's also finance Research and Technical Assistance from their "profits" , indeed it has been argued that it is precisely the bundling of lending and knowledge that is the backbone of the MDB model – see for example Gilbert et al (1999).

investor will wish to monitor the project carefully. As such, while institutional investors may dedicate greater sums to this type of investment, these investments may remain illiquid inside type financing.

The second area where further work may be useful is on the development of infrastructure bonds particularly for refinancing projects (initially financed by equity financiers and banks) after the construction phase. With greater standardization of project analysis and documentation such bond financing may be more attractive to institutional investors, particularly if such bonds are issued by project SPV's or Super-SPV's (that aggregate projects according to certain criteria) that are enhanced by an equity or first-loss tranche. Still, the incentives for such refinancing, particularly in emerging economies that lack project finance from other sources, may hinge on the regulatory treatment of infrastructure on bank balance sheets and regarding the regulatory treatment of securitization. Here Basel liquidity and capital requirement recommendations and their application in different countries may be an important factor. Moreover, if the risk of the bond (determined by the financial viability of the project(s), their future returns and risks and the financing structure) is not clear and transparent, investors will demand a risk premium which will lower the incentives for refinancing.

The third area where further work would be helpful is on the appropriate role of government and MDB's. A further idea would be to develop a set of national infrastructure development funds. These might play the role of standardizing government support for individual projects and also in the governance of project SPV's or Super-SPV's that aggregate projects.

MDB's also have several important roles to play. They may provide technical assistance for project selection and development and in the development of national infrastructure funds. They may grant guarantees or other enhancements to individual projects and first-loss equity type funding in project SPV's or Super-SPV's. Such support should be considered carefully as it does not come for free and MDB balance sheets have been constrained to there are opportunity costs. Moreover, MDB sovereign lending (or guarantees) implies the commitment of public sector balance sheets and higher potential debt ratios. A further role of MDB's may be securitize some of their own infrastructure portfolio to kick-start a market in infrastructure bonds. Securitization at scale would however present significant challenges to current MDB income models. These roles are highly complementary perhaps the greatest challenge is to determine the right combination to maximize the leverage of MDB's in stimulating private investment flows.

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