

A Unified Market Approach to the Infrastructure Finance Market

*By Ranjan Chakravarty, Joseph Cherian, Kiyoshi Nishimura and Wong Heang Fine
(October 2017)*

I. Introduction

Globally, the current gulf between sanctioned infrastructure projects, estimated at US\$730 billion per year, and the available infrastructure funding at a mere 10% of this number, speaks for itself. It is also worth noting that an overwhelming 97% of institutional assets are not currently allocated towards infrastructure.

A recent report by the Asian Development Bank highlights that the gap in Asia's infrastructure alone has doubled from a decade ago, with an astounding US\$1.7 trillion required annually between now and 2030. As it stands, the public sector currently finances ~92% of the region's infrastructure investments, and as infrastructure demand in developing Asia continues to grow, more private funding will be required to plug the gap. The problem however is that the pipeline of viable projects in Asia remains significantly in deficit; or as the World Bank Group describes it, "infrastructure in developing countries are untapped investment opportunities, but only a small percentage of projects are able to successfully attract private sector investment so far".

This gap in supply and demand of project funding and institutional asset allocation needs to be closed, the market completed, and better risk-adjusted excess returns earned by the parties that perform this task. The following analysis underscores that the solution to this conundrum is unique – based clearly on a global approach combining cutting-edge techniques in valuation, structured finance and capital markets – and which an intermediation role can be effectively played by global financial centers of the world.

II. Issues Facing Infrastructure Finance: A Focused Morphology

Prior to conducting an informal diagnosis of the funding and investment gap in this asset class, there are three things worth emphasizing.

Firstly, infrastructure is by nature a facility to which intrinsic, tangible and intangible values are only realized at some point in the future. There is a shortage of transparent data that can validate the expected risk and returns of infrastructure, and a dearth of operational players that can effectively marry financial and technical engineering aspects of infrastructure projects to "crowd-in" private sector investment. Secondly, it is characterized by dividend-like cash flows, which can take on the nature of either payments in perpetuity, stepped up bond-like payments interspersed with occasional windfall-like bullet payments, or a combination of the above.

Thirdly, since such infrastructure assets are required at a scale where the surrounding economy is potentially deficient in some manner, their construction necessitates the

intervention of sovereign, supranational or multilateral credit guarantors to enhance their viability. In many cases, political risk is often the “straw that breaks the camel’s back”. Indeed, there is a need for a cohesive approach to secure local government and regulatory support to ensure that infrastructure projects can survive changes in political regimes.

A) Getting the Valuation Right

The first fundamental problem facing infrastructure finance is accurate valuation. Valuation of infrastructure assets necessitate that scale, uncertainty, environmental impact, embedded flexibilities and externalities – both positive and negative consequences – be considered and priced. Though traditional project finance approaches have used discounted cash flow techniques which incorporate quasi-qualitative uncertainty parameters, these fall short as accurate measures. This is because the forward-start nature of infrastructure projects, with management having the option or flexibility to expand, diminish, defer, abandon or continue with the project, do not lend themselves to traditional discounted cash flow models.

The most realistic and appealing approach to valuation of infrastructure projects is Real Options Analysis (ROA) applied to forward-starting projects with embedded flexibilities. ROA appeals to the Black-Scholes-Merton option pricing technology for infrastructure resource pricing by using stock market-like volatility measures. This measure is also free of many biases that the traditional capital budgeting approach imbues, which could lead to mispricing or underpricing – in industry parlance, this is referred to as the infrastructure project not being “bankable”. ROA significantly ameliorates this mispricing or underpricing problem. Once algorithm-ready, the implementation of a library of such ROA pricing models could hold immeasurable intellectual property value to infrastructure finance hubs. Though the level of mathematics required can be fairly involved, it is noteworthy that this expertise already exists in both the academic and practitioner worlds today.

B) Bringing all the Right Instruments to Bright Light

The next step in this morphology examines the infrastructure asset structures that the ROA valuation models should be applied to. These comprise fundamental building blocks: supranational, sovereign or multilateral guarantees, deferred stepped-up equity dividend and/or project bond coupon payouts, and the securitization thereof. The first simple security type is a term loan-type project bond which either could be a straightforward bond – green or otherwise – with some form of a guaranteed payout. It could also be a convertible bond with a defined convertibility ratio and an equity-type payoff. The pricing technology for both assets are readily available, and these securities are already familiar to asset owners such as pension and government funds.

Moving up the complexity chain we have the deferred coupon long-term version of the above securities. Through accrual accounting they could offer tax benefits for taxable

institutions in certain jurisdictions. These could also lend themselves to lengthening the duration of holdings for the wealth funds' asset/liability management.

Additionally, once one starts pooling underlying real assets, such as toll roads, matching up their cash flows and adding a credit enhancement facility to such a portfolio, we have a classic infrastructure asset-backed security (i-ABS) structure. This structure could now issue a series of bonds with different tranches rated AAA to equity, which could be held by different investors with varying risk appetites.

A case in point is the World Bank Group-owned International Finance Corporation's (IFC) **Managed Co-Lending Portfolio Program** (MCP), which enables asset owners and managers to participate in IFC's future loan portfolio on which due-diligence has been conducted by their experts on the ground. In the case of the highly innovative IFC MCP Infrastructure Fund, asset owners and managers are able to "participate in infrastructure projects by (1) enabling investors to leverage IFC's ability to originate and manage a portfolio of bankable emerging market infrastructure projects, (2) offering a portfolio that has sufficient scale and diversification through a cost-effective portfolio syndication process, and (3) providing credit enhancement through an IFC first-loss tranche to create a risk-return profile akin to investment grade, thus clearing a key capital constraint". In the case of MCP Infra, the Swedish Development Agency (SIDA) and IFC take on the first-loss.

In a similar vein, the Temasek Holdings-owned infrastructure consultancy company, Surbana Jurong (SJ) of Singapore, has innovatively teamed up with the Asian Development Bank-linked Credit Guarantee & Investment Facility (CGIF) to boost the use of local currency-denominated infrastructure projects bonds. The partnership's fundamental aim is to increase the number of bankable infrastructure projects in Southeast Asia, with Surbana Jurong "providing technical assessments to validate the time, cost and quality aspects of selected greenfield infrastructure projects that aim to issue local currency-denominated project bonds with the support of CGIF's Construction Period Guarantee (CPG)". This approach de-risks infrastructure projects on two fronts: eliminating foreign currency exposure risk for the issuer, and providing the necessary political and credit assurance needed by investors to invest in Southeast Asian greenfield project bonds. The backing of SJ's technical expertise, evaluation and project control further instils confidence that the selected projects can be materially completed within the anticipated time and budget allocation.

Separately, CGIF is also currently working on i-ABS type transactions that involve the securitization of roof-top solar systems and small hydro projects. These will be milestones in the region's local bond markets to fulfill smaller funding requirements with long term financing, a challenge devoid of solutions at present. Proceeds from the bonds raised can be recycled into developing new assets for the next cohort of assets to be securitized. It is envisaged that long term conservative investors will gain familiarity with

these assets with the support of a guarantee, and also eventually be able to invest in future series of bonds on their own as a viable safe asset class once confidence is attained.

Beyond the narrow definition of securitization, more structuring innovation is needed to address the needs of investors. All too often, infrastructure project financing by banks are structured to meet the needs of infrastructure assets or projects appealing only to specialised lenders that possess the requisite expertise to be involved.

A paradigm shift is needed – one that is more investor-driven so as to meet their various needs. Most may only accept “plain vanilla” assets, structures or instruments which they can easily understand and invest in. Some may be more sophisticated to boost their returns, or manage a rapidly growing portfolio. Between these two extremes, there can be wide varieties of assets classes which meet specific needs and circumstances of different investor groups. Bridging the gap between the projects’ and investors’ needs will require an extensive arsenal of structures, modalities and intermediaries. For example, infrastructure assets may need to be re-packaged to create asset classes or investment products which meet different needs of investors, with the introduction of different structures, tranches and credit enhancements. CGIF’s fully irrevocable and unconditional guarantees, as well as its CPG, are cases in point.

There are a variety of other i-ABS structures that infrastructure assets lend themselves to. Since the building blocks are almost identical, we see infrastructure-related Collateralized Debt Obligations (i-CDOs) as a natural outcome of this asset collection and guaranteeing exercise. Consider the potential of the resurgence of the CDO, and higher-order i-CDO asset class, but this time with a multilateral due diligence and credit enhancement facility provided at the onset.

A precedent for an uncertain cash flow-based asset, with potentially high tax-advantaged deferred capital gain, already exists. Indeed, it has a long and mostly profitable history: the Real Estate Investment Trust (REIT) structure. With the presence of a sovereign guarantee, an Infrastructure Investment Trust could be very attractive. Such a structure could also lend itself well in a Sukuk or Islamic finance context, given that Sharia compliance has already been invoked in such structures in the ASEAN region. One of the significant advantages of such a structure is the potential tax benefit and credit enhancement to the global investor, who may also have inbuilt Sharia compliance requirements.

In 2015, APEC Finance Ministers called for the development of an Islamic Infrastructure Investment Platform (I3P) to mobilise Islamic institutions to finance infrastructure. CGIF also contributed to the discussions on the development of I3P, including the proposal of Islamic Private Public Partnership (i-PPP) to deliver better developed projects for Islamic funds. i-PPP, which embeds Sharia principles into the project architecture itself to address the interest of all stakeholders (including affected parties and users), will be a paradigm shift from the present model of structuring Sukuk (Islamic bonds) around conventional concessions. The conventional debt/equity capital structure may well be replaced by a

variety of Sukuk that provide capital on differing risk and reward propositions that serves the different Islamic investors' interest – absent of “debt-like” equivalents that mirror conventional debt financing which are often controversial.

C) Origination: Bright-lining Infrastructure as a Clear and Present Investable Asset Class

In sum, the financial product structure value chain clearly highlights infrastructure as the asset class that is a potentially strong contender for the revival of the structured products market in this post-crisis era. The aforementioned morphology leads squarely to a clear troika: origination, structuring and financing. We have highlighted structuring, scoped-out various financing mechanisms, and now address origination.

Origination in the infrastructure business lies in asset ownership, asset management and investible capital. The first is the sovereign in whose jurisdiction the asset exists or is being developed. The second is the asset manager who structures the asset's finances on the sell-side and books it on the buy-side. The third is the source of investible capital, which are mainly the asset owners. In this infrastructure market exercise, global financial hubs need to facilitate the seamless movement of investible capital into and out of infrastructure assets so as to encourage the proliferation of origination and structuring, and finally, seamless trading and liquidity in this asset class.

III. Role of Local Long Term Savings

One critical missing piece of the infrastructure financing is the availability of long term savings in local currencies to match the financing needs of long term infrastructure. Servicing foreign currency debt is untenable to project companies and economies, a lesson harshly taught by the 1997-98 Asian crisis.

Even in countries which have abundant local savings, if the savings are intermediated by banks, the risks and costs of using short term deposits to lend long term make such mode of intermediation inappropriate. When one adds to this the need for prudential limits to single borrowers and sectors, the case for boosting long term local currency savings to finance infrastructure directly via the local bond markets becomes clear.

Possible measures to take include introducing mandatory national retirement savings, like Malaysia's Employees Provident Fund to capture the “demographic dividends” of emerging economies. Reforms to the life insurance sector to push for traditional life insurance products, rather than just investment-linked insurance products, need to be promoted to provide insurers with the discretion to invest in more complex long term project finance bonds. Lastly, the introduction of strong tax and non-tax incentives to invest in long term project bonds. Funneling routinely rolled-over short term fixed deposits in the domestic banking sector to switch to long term project bonds either directly or via commingled funds can help to immediately mobilize existing domestic savings to finance infrastructure.

IV. Role of Local Project Bond Markets

Long term savings are conservative and expected to provide comforting stable returns in the long term. To mobilise long term savings into infrastructure projects via project bonds, transparent market regulations, adequate bond structuring skills, robust national ratings framework and innovative credit enhancement products will be needed.

Well-run sovereign-backed and multi-lateral guarantors can play a role to build confidence, absorbing project risks not yet well understood by the guardians of local long term savings – making project bonds a prime asset class. There is now sufficient expertise and track record for such institutions in the region, Malaysia’s Danajamin and CGIF are prime examples. Multi-lateral guarantors like CGIF and the global reinsurers behind them can further supplement the capacities of the national institutions – together crowding in other private sector participants and taking the model of separating funding and risk taking/participation to greater heights.

V. The Enabling Role of the Multilaterals in Private-Public Partnerships

Once we move beyond the non-market notion of a sovereign investing in its own infrastructure through tax receipts, loans and sovereign project bond issuance, we can ratchet up to the next level, of private investment within a country doing so. The reason the former approach is still popular is driven by the reality that a unified sovereign guarantee or credit enhancement model has heretofore been difficult to operationalize.

However, another key recent event offers a cue to the rapidly-changing landscape. A recent private-public partnership (PPP) healthcare service project in Turkey’s Elazig Province, backed in coordinated fashion by the IFC and the European Bank for Reconstruction and Development (EBRD) for credit guarantees, enabled the first “green and social” project bond in Turkey to be ranked two notches higher than Turkey’s sovereign rating by Moody’s. Such an event, along with the IFC and EBRD’s credit enhancement framework coming into effect and gaining note in this asset class, provides a template for many such capital markets-driven projects to follow, which could potentially drive the PPP market going forward.

It is clear that the next logical step is global investible capital reaching this asset, which has no reason to be restricted by national boundaries. One could, for example, see the Elazig asset as equivalent to a high yield US dollar- or Euro-denominated bond issued anywhere.

The leadership provided by multilaterals and credit enhancers needs to be followed by commercial providers, like the mono-line insurers, whose success in guaranteeing infrastructure assets were drowned by their debacle in covering sub-prime obligations and worse still, the derivatives of those. Prime infrastructure assets offer a different proposition – a point CGIF aims to prove with its project bond transactions.

VI. The Role of the Exchange

Once this breakthrough has been achieved and is commonplace, the remaining piece of the puzzle to be completed is a universal counterparty in infrastructure assets, much as is the case in high yield bonds or REITs today. This is where an exchange and clearing corporation enters the picture as a guarantor of settlement, a source of price discovery, and as an avenue for the provision of liquidity of infrastructure project bonds and such.

The exchange's listing facility is the avenue for the infrastructure asset to go through an IPO stage for early investor exit, infusion of capital for speculation and investment, and first stage systemic risk insulation. The clearing corporation's settlement guarantee process offers the investor the necessary comfort in the event of failure or bankruptcy in the asset class.

The appointment of clearing members, market makers and trading members all drive the basics of liquidity provision. In the case of Singapore, SGX, SGX DC and SGX AsiaClear are experienced in doing so across various asset classes.

VII. The Role of the Clearing Corporation

In the paradigm shift from multiple OTC structures housed in various institutions in multiple jurisdictions, each implying great outlays of capital for counterparty credit risk, globally-regarded exchanges would similarly play a crucial role beyond clearing and settlement for infrastructure finance.

First, the service that would be a major value-add is warehousing. Given the fact that the infrastructure product structures outlined above involve significant duration and convexity risk, the existence of major swap warehousing facilities contiguous with these assets, offer not only products for investors and traders to benefit from, but also for the clearing corporation itself to manage its market risk.

Second, this natural diversification and risk management would serve to strengthen the clearing corporation organically, enhancing its value as a central counterparty to the asset owner and manager. Third, the clearing corporation could offer steadily reducing capital charges that institutional investors and government funds would need to apply in order to trade this asset. In totality, a compelling value-addition.

VIII. Role of the Ratings Agencies and Liquidity Provision

In an ideal world, Moody's, Standard and Poor's and Fitch would be actively involved in the rating of the infrastructure asset structures, and these ratings would be published, with proper records maintained. For local currency financing fulfilled by indigenous long term local savings, national scale ratings as well as robust analysis and standards are crucial to pitch the asset class as safe and stable for long term investors. The success of the Malaysian Ringgit project bond market can be credited to the domestic rating agencies opinions and standards – both of which were established in the 90s.

An exercise selecting and designating two-way, price-making market makers and brokers also needs to be conducted. This is critical in ensuring order flow in the assets, and has to be set-up expeditiously within the infrastructure asset trading facility. Once this is established, buy- and sell-side institutions can align themselves to the market participants, and participate in the process of liquidity provision in this asset class.

Finally, historical transactions and trading data need to be reported, captured, and preserved in real-time. On this front, the US's Trade Reporting and Compliance Engine (TRACE), Malaysia's Bond Info Hub and China's CFETS are good cases in point. Such preservation of quality transactions and trade data allows for in-depth academic and practitioner research to be conducted, not just to improve price transparency and liquidity in this segment of the financial markets, but also to offer ancillary primary and derivative products to the investing community. Examples of such products are infrastructure index-based ETFs, Swaps, Futures and Options for investment, hedging and insurance purposes.

VIII. What an Infrastructure Ecosystem Needs

The most important issue facing the infrastructure asset class is recourse in the unforeseen event of failure. This necessitates that the exchange and clearinghouse should be in a jurisdiction with impeccable legal processes and mechanisms for the restitution of damages. Second, the ecosystem is required to provide seamless connectivity and zero failure in power systems, information flow and connectivity.

Third, the exchange jurisdiction should have access to cutting edge exchange and capital market talent, with financial technology enabling innovation, productivity gains and cost reduction in financial intermediation.

Last but not least, the infrastructure ecosystem – indeed, the entire infrastructure value chain – needs to be lean, green and clean. Infrastructure decision-making, investments and issuance have to be environmentally-friendly, socially-responsible, and good governance-practicing (i.e. incorporating ESG or Sharia principles in the case of i-PPP), where the actors have the fiduciary responsibility of serving the best interests of all stakeholders and beneficiaries involved. Undeniably, the emerging markets of the world need infrastructure big time for their economic development and prosperity. To that, the UNDP's Sustainable Development Goals (SDGs) are good guideposts for those wishing to invest in infrastructure for good and profit, and who yet feel strongly about protecting the planet while ensuring that all people enjoy the peace and prosperity that comes with good infrastructure development.

IX. A Roundup

This paper has focused on providing as precise a commercial roadmap for making infrastructure assets more palatable and tradable. Since there exists significant current research already stressing the need for an infrastructure bond market across the board in

Asia (see, for example, Nomura Journal of Asian Capital Markets' Spring 2017 issue on Infrastructure Financing), we have endeavored to present the structures that should be traded, and the family of models we feel best suited to value these assets.

Clearly the CDO/REIT-type structures are appropriate for infrastructure assets, and the ROA family of valuation models should be implemented for the proper capital budgeting of these assets. Additionally, ESG principles and the public's interests cannot be forsaken for mere *profit-driven-at-whatever-cost* objectives.

Other elements that would aid in providing liquidity and trading in the assets were outlined, and we have identified the various agencies needed in doing so. It is only a matter of time before a global financial hub steps up to the plate, provides the necessary ESG- and SDG-friendly ecosystem, and potentially dominates this highly lucrative asset class.

Ranjan Chakravarty is a Visiting Research Consultant at the Centre for Asset Management Research and Investments (CAMRI) at National University of Singapore (NUS) Business School and **Joseph Cherian** is Practice Professor of Finance at the NUS Business School and Director of CAMRI. **Wong Heang Fine** is Group CEO of Surbana Jurong, a Singapore Temasek-owned multi-disciplinary urban, infrastructure and management services specialist consultancy company and **Kiyoshi Nishimura** is CEO of the Credit Guarantee & Investment Facility, an Asian Bond Markets Initiative funded by the Governments of ASEAN, China, Japan & Korea as well as Asian Development Bank.

For more information, please contact camri@nus.edu.sg