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Funding Streams of Design-Build-Finance-Operate-Mitigating PPP Governance Challenges: Lessons from Eastern Australia to Focus Future PPP Research

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Mitigating PPP Governance Challenges:
Lessons from Eastern Australia to Focus Future PPP Research

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Abstract

Australia has had over two decades of experience in delivering civil and social infrastructure through public-private partnership (PPP) concession agreements awarded by National, State and local public agencies. Along the way, the government and private participants in PPP project delivery have encountered, and developed ways to address, significant governance challenges for this form of public-private commercial partnership to finance and deliver infrastructure as a long term service to governments and their citizens, rather than delivering infrastructure assets to be operated—and, hopefully, maintained—by government. This study reports the findings from a set of in-depth interviews with 25 senior executives of governmental and private participants in PPP infrastructure projects from the three Eastern Australian States with the longest history of PPP delivery in that country about effective ways to address governance issues by: (1) the government and its financial and infrastructure ministries and agencies; (2) the sponsors of the special purpose vehicle (SPV) companies set up to finance, develop and deliver these concession services; and (3) the private investors and design-construction/operations contractors. States in the US are beginning to adopt this form of project delivery and should be able to learn from the experience of governmental and private participants in a country with a similar level of economic development and urbanization, a Federal constitution (albeit a parliamentary one), and a similar—and sometimes overlapping—set of global financial and delivery participants. In addition, the findings highlight a set of governance challenges in delivering infrastructure services sustainably to citizens via privately financed and managed concessions that warrant future policy-oriented research by academics worldwide.

KEYWORDS: alignment of interest; conflict of interest; governance; infrastructure; institutional investor; investment bank; public-private partnership; P3; PPP; pension fund; pension fund aggregator; infrastructure developer; structured finance; relational contracting; risk allocation.

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Introduction

A great deal has been written about the pros and cons of delivering civil and social infrastructure services via public-private partnership concessions (PPPs) (Tang, Shen, Skitmore, & Wang, 2015), but much less about the governance challenges arising from potential conflicts of interest between and among the different parties within different phases of PPP infrastructure projects over their life cycles. The early phases of PPPs involve planning and selecting which infrastructure elements to develop, a very different phase from the phase when the infrastructure is designed and constructed, which, in turn, is very different from the operations and maintenance phase. As research uncovers the complex nature of PPP governance, it becomes evident that multiple scientific disciplines need to be combined to develop richer and more comprehensive models of governance for this form of cross-sectoral infrastructure delivery.

PPPs combine private and public actors in society, so it is natural to look to research that takes the public sector perspective on PPPs, and combine that with research that takes the private sector perspective. The public sector perspective has been adopted by researchers in public policy fields, such as political economics, public economics, and political administration. This research focuses on how government legislators and executive agencies prioritize projects, and organize the regulatory framework and agencies for infrastructure service delivery (Boardman & Vining, 2012; Vigoda, 2002). Private sector perspective PPP research has been carried out by researchers in Management, Finance, and Engineering, This research focuses on productive organization of work and contracts and relationships between actors (Cruz & Marques, 2013; Kwak et al., 2009). The public perspective research is thus more concerned with public governance and utility, whereas the private perspective focuses more on efficient production for creation of profit.

Governance of infrastructure PPPs lies at the intersection of public policy, management, finance, and engineering, yet there is currently very little cross-disciplinary research on PPP governance. We therefore look to current practice to develop a research agenda for PPP infrastructure services. This paper summarizes insights about PPP governance challenges and lessons learned from more than two decades of experience with alternative approaches for addressing a variety of governance challenges confronting economically, environmentally and socially sustainable investment and delivery of infrastructure in three Eastern Australia States (Victoria, New South Wales and Queensland). We choose to study Australia, because it is one of the most experienced countries with respect to governance of PPP infrastructure service delivery (Johnston, 2010; Matos-Castaño, Mahalingam, & Dewulf, 2014; Osei-Kyei & Chan, 2015). We discuss and draw insights about the following five areas of governance:

(1) Prioritization of Federal and State funds to address the wish-list of infrastructure needs and desires of all regional and sectoral claimants for new or enhanced infrastructure services;

(2) Deciding whether a prioritized project should be delivered via a PPP concession or as a traditional government financed and operated project;

(3) The procurement process to short-list and select concession companies, termed special purpose vehicles (SPVs) to deliver PPP projects;

(4) Internal decisions of the SPV board and its key executives over the lifecycle of the concession; and

(5) Contracts between the SPV and its construction and operations contractors.

These empirical observations of current practice highlight considerations of public utility, suggesting that public utility, institutions, and coordination issues are of importance for PPP infrastructure service. Based on these insights, we develop an agenda for future research on the governance of PPP infrastructure service delivery.

Research on Public Private Partnerships

The history of public and private collaboration to develop and deliver infrastructure can be traced back in history to the Stone Bridge of Regensburg in mediaeval times, but the formalized arrangement known as a public private partnership (PPP or P3) is a much more recent phenomenon. Research on public private partnerships has adopted the perspective of the public in political economy, public economics, and public administration (Boardman & Vining, 2012; Hodge & Greve, 2007; Iossa & Martimort, 2015; Vigoda, 2002). Of these, the former two focus on the economics of public private partnerships, whereas public administration focuses on public sector management and governance of PPPs (Vigoda, 2002). In the economics literature, theories on rational expectations have motivated research on PPPs. Public utility is governed by public agency (Pongsiri, 2002), contracts that safeguard against opportunistic behavior (Iossa & Martimort, 2015; Ho & Tsui, 2009), and/or by self-organized sharing of "common pool" resources (Ostrom, 1990). Infrastructure service has thus been studied from the perspective of public utility, and governance has been studied through contracts, self-organization, and agency.

PPP research in the fields of finance, management, and engineering has generally adopted the perspective of the private sector (Kivleniece & Quelin, 2012; Tang, Shen, & Cheng, 2010). This body of research focuses on the efficiency of hierarchies vs. markets, and which of these is most suitable for production of infrastructure services (Rufin & Rivera-Santos 2012; Gunnarson & Levitt 1982). The research uses theories about markets, relationships and contracts (Kwak et al 2009) and theories on work organization (Liu *et al.,* 2015). Infrastructure is primarily studied and conceptualized as an asset in PPP research (Tang et al. 2010). Although not explicitly studied, infrastructure service can be conceptualized as social interaction and exchange among the participants in infrastructure delivery (Levitt *et al.,* 2010), and governance is implemented through organization of work for design, construction, planning and maintaining the infrastructure.

Comparing public and private perspectives on PPP research, it is clear that research on the public side revolves around how the system surrounding the infrastructure service leads to distribution of public utility, whereas the private perspective takes the delivery approach as a given, and focuses on how to deliver the service as efficiently as possible. Put simply, the public perspective research studies how to govern the selection of projects to pursue and delivery approaches for delivering them, whereas the private perspective research studies how to optimize the delivery of the infrastructure service given a project and delivery approach chosen by the government. However, little or no research is available on how this should be done in practice.

Considering the public side in particular, the public government and agencies weigh public utility and cost in a number of ways, such as health, economic benefits, and socio-economic progress as they prioritize which infrastructure projects to build or enhance (Afonso *et al.,*, 2005). Public choice models are important because political environments that limit the feasibility for policy change are associated with less infrastructure investment (Henisz, 2002). As societal progress brings changes in citizens socio-economy, health, and urban life, there is a need for a corresponding evolution in models of public utility, that can guide public government in the prioritization of public funds to address the wish-list of infrastructure needs and desires of all regional and sectoral claimants for new or enhanced infrastructure services (Rauch, 1995). Commonly, infrastructure investments are based on engineering assessment of public needs, political outcomes, socio-economic effects, and urban and environmental sustainability (Gramlich, 1994; Koppenjan & Enserink, 2009). However, infrastructure development and maintenance is expensive, and governments find it increasingly difficult to fund infrastructure. The search for alternative public governance models has resulted in models involving private capital, and the UK, France and Australia have led the field.

Politically elected government usually decides whether a prioritized project should be delivered via a PPP concession or as a traditional, government financed and operated project. Increasingly, private capital wishes to invest in infrastructure, and there is a resulting growth in PPP infrastructure. In case the private sector is involved, the government has to decide at what phase of infrastructure service delivery

they should be involved, and how the private sector participation should be governed (Koppenjan & Enserink, 2009). Examples range from projects in which the private sector gets involved only in operation and maintenance, to those in which the private sector takes care of financing, development, design, construction, operation and maintenance. The UK and Australia, early adopters of PPP governance models, have continuously evolved their PPP governance models, as they have learned from both successful and less successful experiences. Their models represent current best practice, and are designed to govern in a way that balances the short term profit orientation of the private sector with public service, ownership, risks, and finance (Johnston, 2010).

Tendering for an PPP infrastructure project is very costly— as managers several tens of millions of dollars for each bidder on a large project. So it is especially important to design the procurement process so that a small number of concession companies are short-listed and selected to tender. Studies that have reviewed success factors of PPP infrastructure project procurement generally point to the importance of a well-defined business proposition for the private sector, strong public sector governance, transparent communication between public and private sector, and elaborate risk management (Liu, Wang, & Wilkinson, 2016; Osei-Kyei & Chan, 2015; Ismail, 2013; Zhang, 2005; Aziz, 2007). Common practice is that the private sector companies form a special purpose vehicle (SPV— a private corporate entity, owned and financed by private companies, and that provides public infrastructure service according to specifications provided by the government. In many cases, enabling legislation is made for each SPV individually, meaning that politically elected officials decide on the legislation, and that government agencies implement the legislation by supervision of, and cooperation with, the concessionaire (Kwak *et al.*, 2009).

The organization, structure and management of the SPV contains the conflict between the short term profit orientation of private actors and long term infrastructure service utility that the public sector wants. Traditionally, infrastructure development is divided into different phases, each involving partially different sets of public and private stakeholders (South et al 2015; South et al. forthcoming). The organization of the SPV should reflect the long term orientation inherent in public infrastructure service delivery. This is currently problematic, as design and construction phases traditionally involve actors that are more transaction oriented and therefore short sighted, whereas operations and maintenance is a more long term phase. There is a surprising dearth of research that covers infrastructure PPP change across lifecycle phases, but research on PPP infrastructure risks (Grimsey and Lewis, 2002; Bing, et al. 2005), and stakeholder management (El-Gohary et al. 2006) provides some insights into overall project governance. Extending the SPV organization, structure and management therefore requires organizational arrangements that achieve a balance between the interests and operational style of short and long term-oriented phases and stakeholders.

Finally, formulation of contracts between the SPV and its construction and operations contractors need to be considered for how they allocate risks and responsibilities within the SPV, and for how relationships with the government should be conducted. Within the SPV, contracts need to reflect the long-term responsibility of the SPV board, and its relationships to private participants in the project. The contracts within the SPV are between private companies, so there is both considerable past practice, and an established legal framework in common law countries like the US and Australia to utilize in contract making. Contracts between the government and the SPV are different, because they are between a private and a public actor, and the legal institutions in that area are still emerging (Hart, 2003). For instance, many PPP infrastructure developments have required enabling legislation specifically designed for that PPP. Because PPP infrastructures are complex, and extend over long periods of time, involving many actors, the SPV will always face an incomplete contract situation, where outcomes are uncertain, and therefore cannot all be specified beforehand (Hart, 2003). The government authorities that oversee the infrastructure, may issue additional requirements if environmental specifications are not met. For infrastructure PPPs, the contracts must specify procedures for the interaction between government and private actors in case of contract dispute. Success in the administration of one-off, long term, high

uncertainty transactions requires more than traditional legal contracts alone; the contracts must be buttressed by relational mechanisms between the public and private parties to the project (Williamson, 1979; Henisz *et al.*, 2012).

As we go on to report the findings of a study of best practices in PPP infrastructure, namely that of Australia, we will consider how governments in three of Australia's Eastern States — Victoria, Queensland and New South Wales — have handled governance across the lifecycle changes of infrastructure PPPs.

Research Methodology and Approach

The insights presented in this paper are derived from a set of semi-structured interviews that the first author conducted with more than 20 senior executives drawn from key participants in PPP investment and delivery — governmental PPP bodies and infrastructure agencies, pension funds and aggregators of pension funds, infrastructure developers, investment banks, investment arms of construction firms, lawyers and bankers — over a two-week period during December 2015 in three Australian States: Victoria, New South Wales and Queensland. To encourage free-flowing, candid discussion, interviews were not recorded. Extensive notes were taken, redacted, coded and analyzed. The insights are developed as "grounded theory" and are then compared with extant literature relating to these kinds of governance challenges in PPP projects. These insights can serve to generate a set of focused research questions for academics to explore in greater depth, and provide high-level guidance to federal and state agencies in countries like the US that have had far less experience delivering infrastructure as PPP concessions.

Key Findings, and Implications.

Analysis and coding of the interviews is still in progress, but following are some initial conclusions that can be drawn:

National Infrastructure Need Prioritization

Australia's national Parliament has created an infrastructure agency to help it develop a prioritized list of national infrastructure needs. The agency is called 'Infrastructure Australia', and it has a mandate to prioritize and progress nationally significant infrastructure, and to advise government at national and state levels. Like similar agencies created in the UK and elsewhere, a group like this provides some influence over which regional or sectoral projects will receive national funding, but it is challenging to insulate this kind of professional bureaucracy from high level political pressures when the party in power in the government changes, or when new projects that were not previously prioritized are proposed by state, municipal or regional governments, or presented as as unsolicited proposals by private infrastructure concessionaires.

There is a question about how national governments should best support regional infrastructure projects, especially ones that contribute to nationwide transportation, communication, power or other networks.

State Level Governance Issues

Three Australian state governments—Victoria, Queensland and New South Wales—have established independent statutory bodies to prioritize statewide infrastructure needs. Infrastructure Australia and federal legislators will still make the final calls on funding projects at the state level, but cannot easily ignore the state priorities to favor regional or other special interests. To the extent that these agencies publish and widely disseminate their prioritized lists of statewide projects, it becomes increasingly difficult for the legislature to completely ignore their rationally prioritized projects and justify to the public investing in a lower priority project, or one that had not previously been considered.

Sponsors of unsolicited, "market-driven" PPP proposals must justify sole-source negotiation between the government and the SPV, rather than an open call for proposals, based on their "uniqueness". These proposals have only occasionally been accepted; and virtually all of the handful that have been accepted

thus far involve expansion of the scope of existing assets. The perceived extreme difficulty of managing the interface between the entrenched concessionaire and a new concessionaire whose construction or operations might interfere with the existing concessionaire's operations has been the only justification for claiming "uniqueness" that appears to have been accepted thus far as a basis for such sole source unsolicited proposals. This basis for justifying "uniqueness" clearly runs the risk of increasing the concentration of ownership of infrastructure concessions in a given sector by expanding the number and scope of facilities already being operated by existing P3 concessionaires. For example, in the Australian roads concession sector, Transurban™ is already a dominant player in Australia, and has had expansions of its existing concessions approved.

The expansion of the scope of an existing asset has typically been proposed as being "free to the public"—i.e., without the need for upfront government funding or additional availability payments. The proposals that have been accepted to date typically request a lengthened concession period for the underlying asset and, in some cases, increases in tolls—e.g., sharply increased tolls for heavy vehicles, which disproportionately damage roads. So the unsolicited infrastructure proposals typically claim that there is no cost to the state or Federal government for the unsolicited proposal. However, from a public benefits point of view, this claim is misleading. Taxes or user fees, or a combination of these two sources, must ultimately pay for all infrastructure services. So, even if no new, tax-supported government funds are being sought for the unsolicited proposal, the new project will ultimately require incremental taxpayer and/or user funding —via the additional availability payments to be made over the lengthened concession terms and/or the longer toll collection period and higher tolls— in addition to the public's payments of taxes and user fees for all other existing and new projects. Thus, the new infrastructure advisory agencies at Federal and State levels should still rank any unsolicited proposal against the existing list of prioritized projects to determine whether and when they will be developed, even if they do not seek near-term additional government funding for their development and delivery.

Choosing PPP vs. Traditional (Design-Bid-Build or Design-Build) Delivery

During the late 19th and 20th centuries, most developed countries adopted a strategy of public finance, public and/or private design, private construction and public operation of infrastructure. Starting late in the 20th century, the UK, several Commonwealth countries – notably Canada and Australia – began using an alternative infrastructure delivery model in which the government selected projects to be delivered and then contracted for the financing, design, construction, operation and maintenance with private concessionaires. This public-private partnership (PPP) model spread to Latin America, Eastern Europe and other parts of the world, promoted by the multilateral development banks. The United States was very late in adopting this approach, although infrastructure such as roads, bridges and ferries had often been provided under concessions during colonial times. The federal, state and local tax exemption for interest payments associated with public financing of infrastructure has undoubtedly tilted the choice in favor of public financing of infrastructure in the US until very recently, when full or partial tax exemption has also been extended to private developers of public infrastructure.

In choosing between PPP versus traditional delivery of prioritized infrastructure assets, most countries that allow PPP delivery use some version of a "Value for Money (VfM)" analysis, in which the total costs for public versus private financing, operation and maintenance of an infrastructure asset over its lifecycle are compared. In this comparison, public financing bears lower interest rates than private financing in most developed countries that have sound credit ratings, even without the tax exemption described above for the US. So the PPP alternative must demonstrate enough savings through greater efficiency and quality of design, construction and maintenance, as well as in the expected value of the construction cost overrun and demand shortfall risks that the private party would assume under a given PPP concession regime to compensate for the lower cost of public financing, in order for it to be selected.

This VfM process has been quite controversial at times. It is very difficult to capture the full cost of public financing and supervision of design and construction; and public maintenance is seldom provided at the

same level of quality as what is required in PPP agreements. Moreover, determining the expected value of risk transfer for construction cost overruns and user demand shortfalls requires considerable judgment. These judgments can be—and have frequently been—challenged by advocates of one or the other delivery approach. In spite of this, mature jurisdictions such as the UK, Ontario, Canada and the three Australian states listed above have developed standardized VfM procedures that employ impartial experts to make these judgments based on historical data wherever available, and running Monte Carlo simulations on the set of probabilistic variables to determine the expected value of the interacting risks being transferred. The standardization and professionalization of VfM analyses have contributed to their broader acceptance over time. The Australian government and infrastructure Australia develops national standards for VfM, and VfM has emerged as a relatively standard process for selecting the delivery approach when comparing PPP delivery to traditional delivery of infrastructure assets.

PPP projects have historically been viewed as "off-balance-sheet" financing, especially when they were 100% funded by user fees. Because of this, they were excluded from budgetary planning by governments and from credit evaluations by credit rating bureaus. However, a PPP with fixed, periodic availability payments—increasingly used for surface transportation projects – is essentially equivalent to a bond from a budgetary perspective, since it commits future funding resources from the government to this project. An emerging approach for a government jurisdiction to evaluate infrastructure project delivery alternatives in a more comprehensive way, therefore, considers the impact of the lifecycle fiscal commitments associated with PPP vs. traditional delivery of an infrastructure project on that government's long term future "budget resilience." This approach has been called "Value for Funding (VfF)" (Kim and Ryan 2015). VfF embeds the future financial commitments of a conventional versus PPP delivery approaches for a given procurement stochastically in the context of all of the government's other projected fixed and uncertain revenues and expenses over the P3 concession's term or the project's planned lifespan to determine the impact of these two approaches on the "budget resiliency" of the jurisdiction that will deliver the project in making the determination of whether either or neither delivery approach is the preferred choice. Ongoing research by Stanford's Global Projects Center will be developing methods and tools for conducting VfF analysis of infrastructure project delivery.

SPV Governance issues

Governmental infrastructure agencies in all three States covered by this study stated that they were not concerned about internal SPV governance issues and so did not typically review SPV shareholder agreements. They believed that their concession contracts with the SPVs, which had fixed availability payments and penalties for violations of operational performance requirements, placed these governance risks squarely on the SPV's owners and lenders, and thus insulated the government and public from harm due to any conflicts of interest internal to the SPV. The Australian government provides detailed contract templates that can be used by states (https://infrastructure.gov.au/infrastructure/ngpd/index.aspx). There are templates for traditional contracting, alliance contracting, and public private partnerships. The contract templates specify cost, governance, performance, value for money, and many other factors for each development phase of the project. These documents show that the Australian institutions for infrastructure development are mature and well developed.

There is one exception, however. Some of the earliest Australian PPP concession SPV's were to be funded purely from patronage tolls and were sponsored by investment banks acting as developers. The investment banks garnered significant management fees for packaging the projects and winning the bids —often based primarily on using more optimistic demand forecasts than other bidders—and then listed and sold their equity via an IPO immediately or shortly after financial close. Some of these listed shares lost much or all of their value when the demand forecasts in the SPV proposals turned out to have been highly optimistic. Partly as a result of this experience, Australian government agencies now typically exert some control over the identity and ownership structure of their counterparty to the SPV agreement across the

project lifecycle, although not over its internal governance. Australian SPV concession agreements now typically contain a number of constraints on any "change of control" of the SPV or even on significant changes to its capital structure at different project phases to avoid equity participants selling out their stakes to public shareholders or unknown others too soon in the concession term without the agency's knowledge or consent. Violation of these concession terms would constitute a serious breach of contract by the SPV and no interviewees reported the occurrence of any such breaches.

The longer the required investment holds by concessionaires, the more closely their goals become aligned with the government's goals for long term, low cost, high-quality delivery of infrastructure services to its citizens, and hence the fewer real or implied conflicts of interest are likely to arise. From this point of view, pension funds, pension aggregators, sovereign wealth funds and others are the ideal majority investors in infrastructure concessions, provided that they can access the necessary design, construction and operations expertise to bid competitively and realistically and to manage these infrastructure services well over their lifecycle. The PPP investment arms of design-construction contractors typically have heavily overlapping ownership with the contractors —often 100% common ownership (Bing, Akintoye, Edwards, & Hardcastle 2005). They should not generally be majority equity partners in PPP infrastructure assets. They are not long-term asset holders, typically seeking to exit after construction has been completed. Moreover, equity participation in the PPP concession can generate conflicts of interest between construction profits *vs.* infrastructure returns that pose risks to other purely financial eqity investors, lenders and the public. The English Channel Tunnel project, in which five British and five French contractors owned all of the initial equity in Eurotunnel and were also the builders of the project, showed how serious these conflicts can be, especially when a project is not yet fully designed at the beginning of the concession term (Henisz et al 2012).

One approach that has been proposed to address this conflict, while still bringing the requisite expertise into the concession, is to create well-aligned investment platforms for investing in multiple infrastructure concessions comprised of engineers, contractors operators and long-term, institutional investors such as pension funds, in which the long-term investors would hold the majority stakes in the concessions and the contractors would be given the opportunity to bid on the concessions but would not be guaranteed the award of the contracts.

When Design-Construct (D-C) contractors or infrastructure operators (collectively termed "Industrial Investors") hold large enough minority equity stakes to give them SPV Board representation in SPVs in which there are also pure "Financial" equity investors such as pension aggregators like QIC or Hostplus or infrastructure development and investment funds not majority owned by Industrial partners, shareholder agreements generally require the D-C or operations contractors' nominated directors to recuse themselves from voting on board resolutions involving construction cost or time extensions, operating issues or similar SPV Board of Directors' matters in which they are "interested parties." Some financial investors go further and assert that directors nominated by D-C or operations partners or their firms' investment arms should be excused from the meeting and should not even participate in board-level discussions on matters in which their holding company's construction or operations arm is an "interested party."

In some cases, executives from the infrastructure finance arms of construction firms argue that their firms are truly independent business entities, that they are personally, organizationally and individually independent of their parent company's construction arms, and they are incentivized based on their investment arm's long-range financial returns not on the profits of their sister companies' construction arm. In addition, some of them state that they have developed a history of holding infrastructure investments far into the operating concession phase so that their goals are very well aligned with the goals of the financial investors. These firms have sometimes been able to establish sufficient trust with the purely financial investors to have these conflict of interest recusal clauses for Industrial directors in the SPV shareholder agreements waived when their parent firm's construction or operations subsidiary holds the D-C contract for the SPV.

Australia has very strong fiduciary requirements in its corporation laws that require corporate directors to act strictly in the interests of the companies on whose boards they serve—in this case the SPV's board rather than the SPV directors' previous or current employers' boards. In addition, all three States surveyed engage 'Probity Auditors" across the phases of tendering, SPV selection, financial and commercial close, design-construction and operations to assure good governance of the SPV companies. Nevertheless, when delivery partners or their investment arms hold enough SPV equity to gain one or more seats on the SPV Board, a virtually unanimous opinion among all of the executives interviewed in this study is that appointing an experienced Independent Board Chairperson with no ties to either the Financial or Industrial partner companies in the SPV has proven to be extremely valuable in tapping the delivery partners' deep construction or operations expertise for the benefit of the SPV, while providing good governance to address real conflicts of interest when they arise, and keeping contentious board-level discussions on track. Several experienced Australian senior executives now make a career out of serving as independent board members, independent board chairs and senior executives in concession SPVs.

SPV-Design-Constructor Agreement Issues

PPP SPVs typically agree to very strict limits in their concession agreements with the government on making any claims for additional payments from the government for construction cost or time overruns . The concession agreements typically disallow claims for extra time or cost due to differing site condition, or worse than average weather, with exceptions only for a limited and very specific set of *force majeure* definitions such as storms or floods larger than the 100-year return period. These concession agreement terms are then passed down to the SPV's design, construction and operations contractors to prevent construction or operations claims from impairing the SPV's equity, potentially triggering debt defaults or renegotiations due to violations of loan covenants. In fact, part of the due diligence process by lenders involves a "gap analysis" of any differences in contract terms at the two levels—government to concession *vs.* concession to contractor— that could impair the SPV's equity. Tough, firm, fixed-price contracts that set very tight conditions in the contract between the SPV and the design-constructor for making construction claims also simplifies or eliminates many potentially conflictual governance issues within SPVs owned by both "Industrial" participants (design, construction and operations contractors) and Financial equity investors (pensions, pension aggregators or other funds with long-term investment holds and return objectives).

Such contracts are much more rigid traditional public works contracts, which allow for "equitable adjustments" in completion time and payment to the contractor based on differing site conditions and other project risks. Since PPP projects tend to the very large— often greater than US$1 billion— in order to justify their increased transaction costs, this creates substantial risk for the constructors and could deter over the most well-capitalized bidders, thereby reducing competition and increasing construction prices.

Institutional Investors' Internal Governance Issues

Pension funds have historically not been direct investors in greenfield infrastructure projects—with a small number of notable exceptions such as the Ontario Teachers Pension fund. Traditionally pensions have required extensive internal committee review and approval of significant financial commitments in, or changes to, their investments. The same has been true for some of the pension aggregators, with internal committees that can create delays for urgent decisions that need to be made by the board. This made them unattractive partners to infrastructure developers and builders who are able to delegate more decision-making authority to their SPV directors and managers. Increasingly, Australian aggregators of pension funds wanting to invest in greenfield infrastructure assets have been acquiring and/or developing significant internal capacity and/or relationships with external advisors that allow them to invest directly in the equity of greenfield infrastructure assets. The most experienced pension aggregators have changed their internal governance accordingly to allow them to appoint board representatives in the SPV's who are authorized to make substantial financial commitments and decisions without prior approval from their own or the participating pensions' investment review committees or boards. This makes them more

attractive SPV partners in greenfield infrastructure projects for the more sophisticated investment funds and other participants in SPV equity.

Comparison of Australia and the US

The infrastructure deficit in the US is substantial, to the extent that it is hampering economic progress (Heintz et al. 2009). While US infrastructure service delivery works well in some respects, it may benefit from adopting parts of the Australian model. The reason is that Australia is one of the worlds most advanced, and well developed markets for public private infrastructure service delivery, and the US infrastructure service market is not as well developed when it comes to public-private partnerships. In particular, the prioritization of federal and state funds is currently done in a tug of war negotiation that frequently results in a deadlock.

US infrastructure has traditionally been developed with "OPM"— other people's money (Bennon 2016). Since the end of WWII, the US Federal government has funded new construction of nationally significant infrastructure such as the Interstate Highway Program launched by President Eisenhower, the wastewater treatment facilities built under the Environmental Protection Agency's Clean Water Program and the Urban Mass Transportation Agency's urban mass transit programs of the 1970s-1990s using 90% Federal funds and only 10% local funds, whereas maintenance has had to be funded locally by the states. Facing this unbalanced funding model, State and local legislators have tended to defer maintenance expenditures indefinitely until roads, bridges and other assets deteriorate so badly — often to the point of catastrophic failure, as in several recent cases of bridges in California, Minnesota and Washington— that local politicians can ask their representatives in the US Congress to seek Federal funding for replacement infrastructure (Kirk and Mallett, 2013).

Local legislators in the US are typically elected every two years and increasingly face term limits of two terms. So, even without the incentives to defer maintenance that are created by the unbalanced US Federal funding model, it has usually been more politically attractive for them to launch new infrastructure projects than to spend taxpayer dollars on maintaining existing projects over the long term—particularly where those assets carried the names of the earlier legislators—perhaps from a different political party—who led the efforts to authorize and fund them. If a national government deems a project to be nationally important enough that it chooses to fund it, it would be more effective for the national government to require a larger portion of local funding for the project's capital costs in order to screen out politically favored projects that lack adequate local support, and for the Federal government to require that it and/or the State provide a higher level of ring-fenced funding for the project's lifetime maintenance to prevent the all-too-common deferred maintenance scenario described above from ensuing.

At the same time, and in opposition to the above, the US has a unique way to subsidize infrastructure investments over other uses of public funds. Federal, State and local tax exemption for the recipients of interest payments on public sector bonds is unique to the US, so that public bonds have historically carried a lower interest rate than comparable privately issued bonds (at last they did until the 2007 global financial crisis, together with their rapidly increasing unfunded pension liabilities, impacted the bond ratings of some local agencies). This practice does not really reduce the cost of public borrowing to the government, since the local, State and Federal governments are forgoing taxes they could otherwise collect from the recipients of the interest payments. It is rather a means to cross-subsidize and favor investments in infrastructure over other kinds of Federal, State and local government spending. Tax exemption for public bonds has historically tilted the playing field in favor of government financing, operating and maintaining —albeit often under-maintaining— infrastructure assets, versus having these functions performed by prospective PPP concessionaires. Attempts by some legislators to get rid of this preference during the post-2007 financial crisis were fiercely opposed by public-sector unions and the underwriters of these tax exempt bonds.

Facing increasingly smaller discretionary budgets from a combination of growing health care and pension entitlement obligations and public opposition to tax increases, the US Federal government can no longer fund most of the capital cost of State and regional infrastructure. So the Federal government has recently created revolving loan funds to provide low-cost loans or loan enhancements for State and local infrastructure development, thereby reducing the costs and challenges of financing such projects, but requiring the state and local agencies to finance and ultimately fund them. As the loans get paid back, the funds can be reused for new projects. The TIFIA program was established for surface transportation projects and the WIFIA program has just been established (but not yet funded as of April 2016) for water and wastewater projects. The US Federal government has also made tax-exempt financing available for private PPP concessionaires working on public projects through Private Activity Bonds. This has achieved a double benefit of removing the "lower cost of capital" preference for traditional public financing and operation of infrastructure, and of incentivizing regional and state agencies to build only projects for which there is sufficient local political support by its purported local beneficiaries to develop and maintain them.

Compared to the US, Australia has a much more developed institutional framework for infrastructure service delivery. The interplay between state and federal level is limited to the way that states argue for their infrastructure needs. However, federal funding follows the recommendations of Infrastructure Australia, and the department of infrastructure of the Australian government. In November 2008, The Council of Australian Governments endorsed National PPP Policy and Guidelines, meaning that regional and local governments choose to adopt national standards. The National PPP Policy and Guidelines thus apply to all Australian, State and Territory government agencies (WWW.infrastructureaustralia.gov.au and www.infrastructure.gov.au).

The guidelines include overall policy and governance recommendations, as well as elaborate evaluation and contract templates for different procurement forms. For instance, there are contract templates for different kinds of actors, and there are also VfM and cost assessment templates. There are thus national guidelines for the prioritization of projects, governance, procurement process, internal decisions, and contracts. These elaborate guidelines are evidence of that the institutional framework for Australian infrastructure service delivery is developed.

In the US, there is wide State by State and project by project variation even within a given infrastructure sector like roads in how particular projects fit with national and regional priorities, governance mechanisms, procurement processes and PPP concession contracts. The variation exists not only across states, but even within states when cities or metropolitan transit authorities deliver PPP projects. The US could benefit greatly from professional and autonomous National and State infrastructure needs agencies, like 'Infrastructure Australia' and "Infrastructure Queensland," where national and regional coordination and prioritization of infrastructure projects are conducted by professional agencies staffed within internal and external experts that develop prioritized five-year infrastructure plans. And moving toward adopting unified PPP legislation and procurement policies countrywide, as the UK and Australia have done, would greatly lower the transaction costs for the government and the SPVs in tendering for and delivering future PPP projects.

Research agenda for PPP infrastructure service delivery

The description of practice and models used for PPP infrastructure service delivery in Australia shows that private and public actors there have developed working practices and models for infrastructure service delivery that address many of the key governance challenges that we and others have identified and criticized in PPP projects elsewhere. The comparison to the US infrastructure service delivery market provides a good perspective on how much more developed the Australian market is. The mature and sophisticated PPP institutional framework in Australia makes it easier and less costly for industry and government to know the rules, business conditions, and regulations for PPP infrastructure service delivery.

Our observation is that a mature and transparent institutional framework is critical to the emergence of an efficient market for infrastructure service delivery. There is a need for more research to validate this observation.

The importance of institutional frameworks for the performance of Infrastructure service delivery is most likely due to the uncertain and complex nature of these transactions. Infrastructure development has frequently resulted in poor performance, and missed goals. Future research should clarify which parts of the institutional framework are most essential for performance increases of infrastructure service delivery in different sectors. Is it in national needs prioritization, selection of delivery modes, procurement processes, SPV governance, internal SPV governance issues, or concession contracts?

The selection of PPP infrastructure service delivery vs. asset purchase, and the governance of infrastructure services are two broad areas needing further research. Selection of which project to pursue, and whether it is suitable for a PPP or not, can be analyzed using theoretical frameworks that balance the lower public cost of capital with the higher public-to-private risk transfer of PPPs and the resulting differences in observed alllifecycle performance outcomes. This is considered in public policy, political economy, and to some degree in the public administration literatures. In these literatures, theories concerning public utility of commonly owned resources explain why those resources should be distributed in a certain way. Unlike fisherman sharing the total catch in a region or foresters sharing the total timber harvest in a forest in a consensual and decentralized manner, the distribution of the total value of an infrastructure asset over its lifecycle viewed as a "common pool resource" (Gil & Baldwin, 2014) cannot realistically be achieved in this manner when public and private actors play different roles in the exploitation of a "collective commons" containing "common pool resources" and the "common pool resources" to be shared are so heterogeneous (Ostrom, 1990). The research literatures deal with this problem from different perspectives (Hodge, 2007; Iossa & Martimort, 2015).

The Australian experience shows that "rational" models for national infrastructure needs prioritization and funding have been developed for infrastructure service delivery. The model for national needs prioritization is that parliament has created an agency that provides analysis of national infrastructure needs, and advises government at all levels. Government ultimately decides which infrastructure assets to develop, and the delivery approach used to finance and develop the infrastructure. Future research could study the public infrastructure decision making process, including which kinds of legislation and governmental organizations are most conducive to maximizing public utility.

Related to this issue is the need for developing an overarching policy and legal framework for the contractual and regulatory environment of PPPs (Cruz & Marques, 2013; Pongsiri, 2002). Another area of research is the formulation of infrastructure service provision needs, as these can range from narrowly defined parts of societal systems, such as a road, to more integrative and holistic societal systems, such as sustainable urban housing and integrated smart infrastructure systems in nearly off-the-grid "ecoblocks." The most appropriate governance regimes for delivery of infrastructure services will differ, depending on the kind of infrastructure project, and the kind of infrastructure service provided. In all cases, the relationship between government, private, and civic actor groups are key to delivering sustainable infrastructure services (Henisz *et al.*, 2012; Levitt et al., 2010), and there is a great need for research in this area.

Governance of PPP infrastructure services takes the national prioritization of public common goods as a given, and instead focuses on how the infrastructure service can be provided. Research literatures on public administration, institutions, general management, project management, and engineering formulate theories of markets governed by hierarchies, contracts and relationships, and theories of the organization of work within and between organizations (Macneil, 1977; Stinchcombe, 2001; Williamson, 1985).

In the Australian case, coordination over the different lifecycle phases of an infrastructure asset is increasingly being governed by stipulating that the infrastructure needs to be owned and governed by its initial investors for an extended time period, including design, construction and a ramp-up period of

operation and maintenance. The division of responsibilities of private actors and the public is governed in an elaborate and precise contract that stipulates the responsibilities of the private actors. Thereby, the government can use contract enforcement to achieve the desired infrastructure service for the public. An interesting research question for the future is to what extent relational contracting can be used to complement the formal contracts between the government and private concessionaires. Research finds that relational contracting is an efficient mode of managing relationships (Henisz et al. 2012), but it does not allow for strict delineation of responsibility, so it needs to be used in addition to formal contracts in order to be suitable in a PPP setting. Several of the participants interviewed in Australia for this paper expressed skepticism about the extent to which relational mechanisms could bridge disagreements between stakeholders when the economic stakes were as high as they often are in such projects. Research should explore this further.

The Australian case shows that the relationship between private investors and private infrastructure service providers can be better aligned when long term private ownership responsibility is promoted. This arrangement mitigates the problem of the differences in participants and interests across lifecycle phases, since long term ownership responsibility increasingly bridges over successive phases of the provisioning of infrastructure service. Further research could delineate the motives, interdependencies, and responsibilities of private actors within and between lifecycle stages, as grounds for determining the mode of governance. Relatedly, there is a need for research on how contracts should be designed for efficient work between the concessionaire and its subcontractors (Cohen, 1989; Cruz & Marques, 2013; Garvin & Ford, 2012). The shift in perspective from governments procuring *infrastructure as an asset* to procuring *infrastructure as a service to the public* creates a need for additional development of contracts, as the concessionaire can be contracted to deliver a service, and the infrastructure asset is then an important part of that concession, but not the only part.

Conclusions

Most countries in the world have infrastructure deficits, and Australia is an interesting case, because it has one of the world's most highly developed markets for infrastructure service delivery. In comparison to the US, the institutional framework in Australia has been further developed, rationalized and elaborated, resulting in better market conditions for public-private business.

Future research on PPP infrastructure service governance could further delineate and elaborate on the separate responsibilities of public and private infrastructure service providers. Contractual and relational governance forms could be elaborated for the lifecycle of an infrastructure service. Governance forms could be developed for different kinds of sustainable societal system infrastructure, such as sustainable "off-the-grid" urban districts or "ecoblocks". Limiting the role of the government to high level, planning and prioritization of needs, while upholding the public interest in later stages of development through regulation of service quality and user charges during the service delivery phase, could enhance infrastructure service delivery, while investors and infrastructure service providers could get more business opportunities and create new, high-paying jobs to stimulate their moribund economies.

At the same time, long term investors can reap increased returns on their invested capital by capturing 'long term alpha" (Dixon & Monk, 2014) through holding infrastructure concession investments through multiple business cycles. Many pension funds worldwide currently face huge unfunded pension liabilities caused by the twin effects of increased life expectancy of retirees and the near-zero—and even below zero!—real returns they are earning from "fixed-income" investments like government or corporate bonds in the current global economy. Direct investments in a regionally and sectorally diversified portfolio of carefully screened greenfield infrastructure assets delivered using some of the better aligned governance approaches described above could boost pension funds' investment returns, and thereby relieve taxpayers from the burden of bailing them out, thereby freeing up government funds for more productive investments.

The Australian PPP experience over almost three decades now points to a future model for infrastructure service delivery. In such a model, the government selects infrastructure projects, guided by a non-partisan, expert infrastructure prioritization panel, and contracts for the delivery of these prioritized infrastructure services with a private concessionaire financed by long-term institutional investment capital. The concessionaire is a private entity in charge of financing, designing, constructing, operating, and maintaining the infrastructure service. The government supervises the infrastructure service at a distance, and regulates rates as needed to safeguard the public interest. We call this model the PPP "infrastructure as a service" delivery model. Future research should study this model, and seek to understand the contractual and relational governance arrangements needed for coordinating participants and resources for more efficient and sustainable infrastructure service delivery to citizens worldwide.

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