

Productivity Commission

Public Infrastructure Inquiry

Public Infrastructure Inquiry
c/- Productivity Commission
LB2 Collins Street East
Melbourne VIC 8003
(E) www.infrastructure@pc.gov.au

Submission Date: Friday 20th December 2013

Authors: Robert J. Bianchi* and Michael E. Drew**

Department of Accounting, Finance and Economics
Griffith Business School
Griffith University
Nathan QLD 4111

* Robert J. Bianchi is an Associate Professor of Finance at Griffith University, Griffith Business School, 170 Kessels Road, Nathan, QLD 4111. Email: r.bianchi@griffith.edu.au

** Michael E. Drew is a Professor of Finance at Griffith University, Griffith Business School, 170 Kessels Road, Nathan, QLD 4111. Email: michael.drew@griffith.edu.au

Introduction

The following submission to the Productivity Commission Inquiry into Public Infrastructure considers the following issues:

- The importance of public infrastructure;
- The provision of public infrastructure;
- Funding mechanisms; and,
- Financing mechanisms.

A number of the papers by Bianchi and Drew (see reference list, attached) cited in this submission have been supported by the Australian Research Council (ARC) (Linkage Project No. LP0989743). We thank the ARC and partners for their support.

The Importance of Public Infrastructure

It is generally recognised that investment in new infrastructure projects delivers significant positive effects on output and growth. (Demetriades and Mamuneas, 2000; Heintz, 2010; Hulten, 1996; Kamps, 2001 & 2004; Munnell, 1992). The OECD (2007a, 2007b) estimates that global annual infrastructure requirements to 2030 are expected to be 3.5% of global gross domestic product (GDP) or approximately US\$2 trillion per annum. In terms of Australian comparisons, the Business Council of Australia (2013) and Productivity Commission (2013) estimate current infrastructure spending at 4% and 2%-2.25% of GDP, respectively. These statistics suggest that Australian infrastructure spending is at or slightly below the global average depending on the calculation of the Australian infrastructure spending statistic.

It is difficult for governments to evaluate the circumstances of over- or under-investment in infrastructure without linking future accretive benefits to GDP growth. The assessment of the economic benefits of new infrastructure proposals can only be made via a genuine infrastructure project appraisal which discriminates projects that are marginal versus those that provide meaningful benefits to the Australian economy. Viable infrastructure projects are those where the quality of investment translates into clear and measurable benefits in the form of higher levels of GDP growth (including spillover effects) over the short, medium and long-term. (Asensio and Roca, 2001; Campbell and Brown, 2003; Martland, 2012).

The Provision of Public Infrastructure

The Public Private Partnership (PPP) model

Public infrastructure outcomes can be achieved via the traditional delivery mechanism of the public sector or through the use of the private sector. One form of private sector involvement is the use of public private partnerships (PPPs). There are advocates and critics of the PPP model. Some favour the use of the PPP model in terms of the efficiency, cost and time savings gained in the construction phase of infrastructure projects (Raisbeck et al, 2010; Fitzgerald, 2004; Auditor General of New South Wales, 2006). However, the evidence on the benefits of the PPP model beyond the construction phase of an infrastructure project remains unclear. The controversy surrounding the PPP model relates to whether this form of infrastructure delivery provides the long-term outcomes for all stakeholders involved (ie. government, users, the taxpayer, equity holders, debt holders) over the long-term (English and Walker, 2004; Ng and Loosemore, 2007; Quiggin, 2005; Regan, Smith and Love, 2011a).

There are three broad challenges to the efficacy of the PPP model. First, due to the complexity associated with PPP transactions, it is highly likely that infrastructure delivered under this model may result in the mis-allocation the risks between the public sector and the private sector (Grimsey and Lewis, 2002; Quiggin, 2004; Stanley and Hensher, 2004). In terms of transportation infrastructure, regardless of the model (either public or private), the most difficult challenge is the chronic over-estimation of demand for rail and road based projects (Flyvbjerg, Skamris Holm and Buhl, 2005). From a PPP perspective, when the overly optimistic traffic forecasts are not realised, this new information entering the market changes the value of the underlying asset, and therefore, changes the intrinsic value of the equity and debt of the PPP (Bianchi, Drew and Whittaker, 2013b), which results in financial distress or collapse of the PPP. In the Australian setting, we have empirically witnessed the financial collapse of a variety of PPPs due to overly optimistic traffic forecasts (Regan, Smith and Love, 2011b).

Second, some infrastructure transactions are structured whereby the PPP is not exposed to demand risk, but rather, the public sector makes an availability payment to the PPP for the construction and on-going operations of the asset. In this transaction, the PPP is no longer exposed to the demand risk as it is passed onto the public sector. Under this scheme, a PPP which is not fully utilised means that the public sector commits to large availability payments to the private sector based on pre-determined long-term contracts. When the asset is not fully utilised, the PPP may receive a low-risk (nearly risk-free) payment for the delivery of an under-utilised infrastructure project which results in the PPP earning a higher than expected return as it is operating an asset with an under-utilised cost structure (Ng and Loosemore, 2007; Vecchi, Hallowell and Gatti, 2013). In this case, the public sector is paying a larger than necessary availability payment to the private sector for an infrastructure asset which is not being utilised efficiently.

Third, regardless of the public or private sector delivery mechanism, many infrastructure projects are exposed to the risks and uncertainties associated with the estimation of market (demand) forecasts (Flyvbjerg *et. al.*, 2005). Numerous PPPs in Australia have failed on the basis of poor demand forecasts (Regan *et. al.*, 2011b). Some argue that the quality of forecasting of demand and costs of infrastructure projects as well as the demographics of population projections for small areas are

fraught with errors of significant magnitudes (van Wee, 2007; Wilson and Rowe, 2011). One solution being offered to address this demand risk is for the public sector to make availability payments to the PPP, however, this simply transfers the demand risk from the private sector to the public sector (and ultimately the taxpayer). Credible and genuine infrastructure appraisal will minimise the problem of market (demand) risk, however, it will not eliminate this problem from the project. To address this issue, the financing of future infrastructure projects must be structured so that variations inherent in forecasting future demand will not place the project in financial distress. In the context of PPPs, we suggest that the debt/equity ratio of a project is sufficiently low so that private sector organisations can withstand this variation in demand risk in future years.

Funding Mechanisms

Issues When the Private Sector Bears the Demand Risk:

The work of Bianchi, et al., (2013b) examined Australian publicly listed toll road PPPs. The research suggests demand risk is acute when the PPP projects shift from the *construction phase* to the *operations phase*. When actual traffic statistics do not meet traffic demand forecasts, the value of the PPP asset suddenly falls in value. The demand risk is borne by the equity financiers (and at times the debt-holders also) as the financial risk of the firm suddenly changes when actual traffic demand does not meet forecast traffic demand expectations.

Issues When the Public Sector Bears the Demand Risk:

To address the above concerns, an alternative funding model being proposed and used is the development of PPPs whereby the public sector absorbs the demand risk. More specifically, the PPP constructs the infrastructure asset based on pre-agreed specifications and then the public sector makes an availability payment to the PPP as its rate of return on the infrastructure asset. This availability payment model removes the demand risk from the PPP and transfers the problem to the public sector. Whilst the private sector is more willing to invest in these projects (because the demand risk is removed), it must be acknowledged that the potential under-utilisation of an infrastructure asset is simply being borne by the public sector. Long-term availability payments from the public sector to the PPP means that the private sector may receive the revenue for providing the infrastructure asset, yet the taxpayer is paying the full price of a piece of infrastructure that is not being fully utilised by the Australian economy. In this case, the taxpayer bears the demand risk and pays the full price for an under-utilised infrastructure asset over the long-term. One of the solutions to this problem is the thorough evaluation of future infrastructure projects to ensure that the asset operates as close to full capacity as quickly as possible (Ng and Loosemore, 2007).

Financing Mechanisms

Research on Australian PPP Debt Instruments:

Recent findings suggest that PPP debt instruments in the secondary market earn the same level of risk-adjusted returns as other bonds in the Australian debt market (Bianchi, Drew, Roca and Whittaker, 2013; Bianchi, Drew and Whittaker, 2013a). After controlling for systematic risk factors, these papers suggest that there are no excess returns to be gained in owning PPP bonds over the long-term. The secondary market appears to be mostly efficient, particularly when considering well known systematic risk factors in the bond market.

Research on Australian PPP Equity and a Project's Lifecycle:

The work of Bianchi *et. al.*, (2013b) examined ASX-listed PPPs and analysed the value of a PPP's equity investment from the construction phase to the operations phase. Conventional thinking suggests that the construction phase of a PPP exhibits greater levels of risk than the operations phase. This viewpoint stems from the fact that there are no incoming revenue streams/cash flows in the infrastructure asset during the construction phase and the risk of cost overruns may be experienced in the early stages of the project. Conventional thinking suggests that the risk of the PPP decreases when the project moves from the construction phase to the operations phase as the asset begins to receive revenues/cashflows from the users of the infrastructure.

The research in Bianchi *et. al.*, (2013b) finds that the opposite can occur in terms of the risk profile of PPPs. The findings suggest that some PPPs exhibit increasing risk (rather than decreasing risk) as it progresses from the construction phase to the operations phase. The study observes that company specific risk (ie. idiosyncratic risk) can radically change at the commencement of the operations phase. The time-varying nature of PPP company-specific risk can be isolated at the point in time when actual traffic demand differs to the forecast traffic expectations. The commencement of the operations phase is the point in time when the valuation of the asset can suddenly change when actual traffic statistics do not meet traffic forecasts.

It is important to understand that in the case of the ASX listed PPPs, the equity and bond-holders bear the demand risk in these projects. Some commentators argue that that the 'availability payment' model can resolve this inherent problem in infrastructure projects. Under this alternative funding model, any GDP growth or productivity benefits accruing to government from the use of the infrastructure would be offset by a high but unnecessary availability payment from the public sector to the PPP if the infrastructure asset is under-utilised. Going forward, it is important to acknowledge that minimising demand risk provides the best outcomes for both public and private sectors parties and this can only occur through genuine infrastructure project appraisal before the infrastructure has reached the approval stage.

Issues Relating to the Involvement of Superannuation Funds

One of the major impediments to greater private sector involvement in the financing of public infrastructure is the issue of risk and uncertainty of many greenfield investments. New infrastructure projects are generally termed ‘greenfield’ investments where the assets are yet to be constructed. These greenfield projects are perhaps the types of infrastructure most required by the Australian economy for the future. These new infrastructure projects may carry enormous risks (including demand risk), which require three to five year (maybe decade long) forecasts on which investment decisions are to be made. These risk dimensions may be why pension (or superannuation) funds are reluctant to invest in greenfield or new infrastructure projects (Della Croce, 2012).

The issues raised by Della Croce (2012) suggests that pension funds may prefer to purchase mature infrastructure assets (that is, assets in the operations phase). From a public sector perspective, one solution to overcome the risks and uncertainties of greenfield infrastructure is for the public sector to finance the construction and early operations phases of public infrastructure with the expectation that the infrastructure project will be on-sold to superannuation funds when it is a mature infrastructure asset (Bianchi and Drew, 2013; Della Croce, 2012).

One possible solution to overcome the undesirable risks and uncertainties of greenfield investments is to structure new PPPs with a combination of availability payments and demand risk. An infrastructure project could be structured whereby the public sector makes availability payments to the superannuation fund in the first few years of a greenfield infrastructure project. The availability payment provides superannuation funds with the incentive to finance greenfield infrastructure projects when they are operating at their highest level of risk. After a period of time (for example, five to ten years), the availability payment ceases and the superannuation fund is exposed to the demand risk beyond a specific date in the future.

Research on the Investment Characteristics of U.S. Listed Infrastructure

The work of Bianchi, Bornholt, Drew and Howard (2013) examined the investment behaviour of U.S. listed infrastructure from 1927 through 2010. Some researchers and commentators suggest that infrastructure investments are a low-risk investment proposition. Contrary to this view, the findings show that U.S. listed infrastructure is not low-risk, but rather, the returns and risks of U.S. listed infrastructure are commensurate with the return/risk profile of broad U.S. stocks. These findings suggest (as with the bond market paper) that the market is relatively efficient in pricing the risk of these U.S. listed infrastructure investments.

Thank you for the opportunity to submit this review. We would be most happy to discuss these papers with the Productivity Commission as part of its deliberations.

References

- Asensio, J. and Roca, O., 2001, Evaluation of Transport Infrastructure Projects Beyond Cost-Benefit Analysis. An Application to Barcelona's 4th Ring Road, *International Journal of Transport Economics* 28(3), October, 387-403.
- Auditor-General of New South Wales, 2006, The New Schools Privately Financed Project, performance audit, March, Sydney, <http://www.audit.nsw.gov.au/publications>
- Bianchi, R., Bornholt, G., Drew, M. and Howard, M., 2013, Long-Term US Infrastructure Returns and Portfolio Selection, *Working Paper*, 23rd November, Griffith University.
- Bianchi, R. and Drew, M., 2013, Financing Infrastructure Investment: Old Roads and New Paths?, *Think20 Papers 2014: Policy Recommendations for the Brisbane G20 Summit*, 5th December, edited by Mike Callaghan and Hugh Jorgensen, Lowy Institute for International Policy, Sydney.
- Bianchi, R., Drew, M., Roca, E. and Whittaker, T. 2013, Systematic Risk Factors in the Returns of Australian Bonds, *Working Paper*, 24th April, Griffith University.
- Bianchi, R., Drew, M. and Whittaker, T. 2013a, Systematic Risk Factors in the Returns of Australian PPP Bonds, *Working Paper*, 27th August, Griffith University.
- Bianchi, R., Drew, M. and Whittaker, T., 2013b, The Behavior of Listed Toll Road Public-Private Partnerships: A First Look at the Australian Evidence, *Working Paper*, 26th July, Griffith University.
- Business Council of Australia, 2013, *Securing Investment in Australia's Future: Infrastructure Funding and Financing*, November, 42/120 Collins Street, Melbourne, VIC, 3000, ISBN 9781922058621.
- Campbell, H. and Brown, R., 2003, *Benefit-Cost Analysis. Financial and Economic Appraisal Using Spreadsheets*, University of Queensland Press, Brisbane.
- Della Croce, R., 2012, Trends in large pension fund investment in infrastructure, *OECD Working Papers on Finance, Insurance and Private Pensions*, No. 29, OECD Publishing.
- Demetriades, P. and Mamuneas, T., 2000, Intertemporal output and employment effects of public infrastructure capital: evidence from 12 OECD economies, *Economic Journal* 110(465), 687-712.
- English, L. and Walker, R., 2004, Risk Weighting and Accounting Choices in Public-Private Partnerships: Case Study of a Failed Prison Contract, *Australian Accounting Review* 14(2), 62-77.
- Fitzgerald P, 2004, *Review of Partnerships Victoria Provided Infrastructure*, Final Report to the Treasurer, Growth Solutions Group, Melbourne.

- Flyvbjerg, B., Skamris Holm, M. and Buhl, S., 2005, How (in)accurate are demand forecasts in public works projects? The case of transportation, *Journal of the American Planning Association* 71(2), Spring, 131–146.
- Grimsey, D. and Lewis, M., 2002, Evaluating the Risks of Public Private Partnerships for Infrastructure Projects, *International Journal of Project Management* 20(2), 107-118.
- Heintz, J., 2010, The impact of public capital on the U.S. private economy: New evidence and analysis, *International Review of Applied Economics* 24(5), 619-632.
- Hulten, C., 1996, Infrastructure capital and economic growth: How well you use it may be more important than how much you have, *National Bureau of Economic Research (NBER) Working Paper*, No. 5847. Cambridge, MA, NBER.
- Kamps, C., 2001, New estimates of government net capital stocks for 22 OECD countries 1960-2001, *Public Economics* 5(6), 1-15.
- Kamps, C., 2004, The dynamic effects of public capital: VAR evidence for 22 OECD countries, *International Tax and Public Finance* 12(4), 533-558.
- Martland, C., 2012, *Toward More Sustainable Infrastructure: Project Evaluation for Planners and Engineers*, John Wiley and Sons, New York.
- Munnell, A., 1992, Policy watch: Infrastructure investment and economic growth, *Journal of Economic Perspectives* 6(4), 189-198.
- Ng, A. and Loosemore, M., 2007, Risk Allocation in the Private Provision of Public Infrastructure, *International Journal of Project Management* 25(1), 66-76.
- OECD, 2007a, *Infrastructure to 2030: Volume 2: Mapping Policy for Electricity, Water and Transport*, Organisation for Economic Co-operation and Development, July, OECD Publishing, Paris.
- OECD, 2007b, *Principles for Private Sector Participation in Infrastructure*, Organisation for Economic Co-operation and Development, OECD Publishing, Paris.
- Productivity Commission, 2013, *Productivity Commission Issues Paper: Public Infrastructure*, Australian Government, November, Melbourne.
- Quiggin, J., 2004, Risk, PPPs and the Public Sector Comparator, *Australian Accounting Review* 14(2), 51-61.
- Quiggin, J., 2005, Public-Private Partnerships: Options for Improved Risk Allocation, *Australian Economic Review* 38(4), 445-450.

- Raisbeck P., Duffied C. and Xu M., 2010, Comparative performance of PPPs and traditional procurement in Australia, *Construction Management and Economics* 28(4), 345-359.
- Regan, M., Smith, J and Love, P., 2011, Impact of the capital market collapse on public-private partnership infrastructure projects, *Journal of Construction Engineering and Management* 137, 6-16.
- Regan, M., Smith, J and Love, P., 2011, Infrastructure procurement: learning from private-public partnership experiences 'down under', *Environment and Planning C: Government and Policy* 29, 363-378.
- Stanley, J. and Hensher, D., 2004, Melbourne's Public Transport Franchising: Lessons for PPPs, *Australian Accounting Review* 14(2), 42-50.
- van Wee, B., 2007, Large Infrastructure Projects: A Review of the Quality of Demand Forecasts and Cost Estimations, *Environment and Planning B: Planning and Design* 34(4), 611-625.
- Vecchi, V., Hellowell, M. and Gatti, S., 2013, Does the private sector receive an excessive returns from investments in health care infrastructure projects? Evidence from the UK, *Health Policy* 110(2-3), 243-270.
- Wilson, T. and Rowe, F., 2011, The Forecast Accuracy of Local Government Area Population Projections: A Case Study of Queensland, *Australasian Journal of Regional Studies* 17(2), 204-243.