

The **Allen Consulting** Group



Performance of PPPs and Traditional Procurement in Australia

Final Report

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Report to Infrastructure Partnerships Australia



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Infrastructure Partnerships Australia

Infrastructure Partnerships Australia is the nation's peak infrastructure body. Our mission is to advocate the best solutions to Australia's infrastructure challenges, equipping the nation with the assets and services we needed to secure enduring and strong economic growth.

Infrastructure is about more than balance sheets and building sites. Infrastructure is the key to how we do business, how we meet the needs of a prosperous economy and growing population, and sustain a cohesive society.

Infrastructure Partnerships Australia seeks to ensure governments have the maximum choice of options to procure infrastructure and use of public or private finance should be assessed on a case-by-case basis. IPA recognises the enhanced innovation and cost discipline that private sector project management and finance can deliver, especially with large and complex projects.

Our Membership is comprised of the most senior industry leaders across the spectrum of infrastructure sector, including financiers, constructors, operators and advisors. Importantly, a significant portion of our membership is comprised of government agencies.

Infrastructure Partnerships Australia is the only body that brings together the public and private sectors in a spirit of partnership to build Australia together.

Executive summary

Key findings

This study of the performance of Public-Private-Partnerships (PPPs) and Traditional procurement is the first of its kind to be undertaken in Australia. Cost performance and timeliness outcomes were measured relative to budget for the management and construction of public infrastructure projects. Based on detailed analysis of publicly available data for a sample of 21 PPP projects and 33 Traditional projects, we conclude as follows:

- PPPs demonstrate clearly superior cost efficiency over Traditional procurement, which can range from 30.8 percent when measured from project inception, to 11.4 percent when measured from contractual commitment to the final outcome.
- In absolute terms, the PPP cost advantage was found to be economically and statistically significant. On a contracted \$4.9 billion of PPP projects the net cost over-run was only \$58 million – not statistically different from zero. For \$4.5 billion of Traditional procurement projects, the net cost over-run amounted to \$673 million.
- Approximately \$400 billion is likely to be spent on Australian infrastructure over the next decade. If PPPs were to continue to account for a 10-15 percent share of this, based on the findings of this study (and net of bid costs), PPPs would generate approximately \$6 billion in potential benefit to the community, and for reasons discussed below, the potential benefit is likely to be greater than this. If PPPs were to contribute a higher share of total projects, even higher gains would be realised.
- With respect to time over-runs, on a value-weighted basis we found Traditional projects were likely to be completed later than PPPs relative to the budget. For example, between the signing of the final contract and project completion, PPPs were found to be completed 3.4 percent ahead of time on average, while Traditional projects were completed 23.5 percent behind time. This difference is statistically significant.
- While smaller Traditional projects were completed ahead of time, we found that project size had a marked (statistically significant) negative impact on time over-runs compared with PPPs, whose timeliness of completion were not negatively impacted by size of project.
- Our overall conclusion is that PPPs provide superior performance in both the cost and time dimensions, and that the PPP advantage increases (in absolute terms) with the size and complexity of projects.
- In contrast to commonly held perceptions about the relative transparency of PPPs, we found that PPP projects were far more transparent than Traditional projects, as measured by the availability of public data for this study.
- It is likely that the actual extent of benefits of PPPs to society is not fully captured by the analysis presented in this study, since:

- There is a benefit from completing projects on time and enabling the community to have access to the infrastructure facilities sooner. We have not included a valuation of this benefit;
- The PPP framework imparts another level of competition for Traditional procurement, and the lessons learned by governments participating in the PPP process with respect to risk analysis, rigorous structured project initiation through the use of business cases and other tools, have been partly transferred to the management of Traditionally procured infrastructure projects; and
- The benefits identified in this study do not include the effect of PPPs' integrated provision of management, construction and on-going operations. This is another major source of potential PPP advantage over Traditional procurement approaches that de-couple the management/construction and operations phases, creating additional sources of inefficiency.

Background to the study

Infrastructure Partnerships Australia (IPA) engaged the Allen Consulting Group, in conjunction with The University of Melbourne, to undertake a study of the efficiency of Public-Private Partnerships (PPPs) relative to Traditional procurement approaches in the provision of public infrastructure to:

- Test the commonly held notion that more competition and greater alignment of incentives and constraints would result in PPPs providing infrastructure with reduced cost over-runs compared with Traditional procurement;
- Examine the factors that account for the relative success or failure of PPPs; and
- Review the arguments and evidence for why the government's cost of capital is not the risk free rate of interest, and can be expected to be relatively similar to the private cost of capital in the market.

The government's relative cost of capital and risk allocation

The idea that PPPs need to achieve massive cost savings to overcome the disadvantage of having a higher cost of capital than government funded projects continues to be raised in Australia. This matter was widely debated in the 1990s, when the Federal Government's *Private Infrastructure Taskforce* (EPAC, 1995, p. 37) concluded that 'much of the difference in the private and public cost of capital is apparent rather than real'.

While governments can borrow at the risk free rate of interest, this is due to the fact that governments have taxing powers, and as a result investors consider that the likelihood of default is minimal. Fundamentally, government ownership of business assets does not eliminate business (or project) risk, which does not change depending on ownership and financing. The taxpayers who underwrite the risk of a government-financed project do not receive a reward in the way that private investors receive a higher expected return when bearing greater risk. It is a net cost to them that must be added back to the government borrowing rate.

The cost of capital for a project is the weighted cost of debt and equity applied to the project. The cost and proportions of debt and equity in a PPP reflect a market assessment of the risks and rewards of the project in question. The cost of debt in a government bond financed project is known, but the public sector does not have a cost of equity, and the government bond rate has nothing to do with the project's cost of capital. In Australia the price of government bonds is set without regard to the projects that are to be financed.

Put simply, the taxpayers ultimately and always bear the costs of cost over-runs and other project risks that cannot be assumed away by the fact of Traditional government procurement methods and operation. The notion that Traditional government procurement creates a 'risk free' project is deeply flawed.

Past research on the performance of PPPs

We reviewed previous studies and found that a number of Australian studies on PPPs have examined *ex ante* Value for Money (e.g. Fitzgerald, 2004), undertaken limited case studies (e.g. English, 2005), reviewed risk allocation practice in general (Brown, 2006), or looked at specific PPP contracting issues (Brown, 2005). While providing different insights into the process and performance of PPPs, these studies have not explicitly sought to test the *ex post* efficiency of PPPs against the Traditional procurement alternative in the manner of the UK's Mott MacDonald (2002) or National Audit Office (2003) studies.

The Mott MacDonald study measured 'optimism bias' as the percentage differential between the estimated project duration or capex cost at the 'Strategic Outline Case' or 'Outline Business Case' and 'Works Completion'. While the UK's PPP projects were found to exhibit relatively neutral 'optimism bias', the bias found in Traditional procurement was sometimes significant (50 percent or more). The National Audit Office (2003) found that three quarters of PPP projects were completed on time and on budget, compared with less than a third of Traditional procurement firms.

While the Mott MacDonald and NAO studies have been criticised in some quarters (Unison, 2005), the methodology applied in the current study was designed in a manner that is robust with respect to all of these concerns.

Methodology

Milestones and stages

We began by defining four milestones in a typical procurement project, which are as follows:

- *Original Approval* – original approval of the project.
- *Budget Approval* – approval of final budget prior to going to contract.
- *Contractual Commitment* – situation on signing of contracts.
- *Actual Final* – actual completion of the project.

Using these four project milestones, we defined four periods in the project lifecycle for analysis, i.e. four periods over which the relative performance of PPPs and Traditional procurement approaches could be measured and compared on the same basis. These periods were:

- Full Period - Original Approval to Actual Final;
- Stage 1 - Original Approval to Contractual Commitment;
- Stage 2 - Budget Approval to Actual Final; and
- Stage 3 - Contractual Commitment to Actual Final.

These periods were measured consistently between PPP and Traditional projects, and provide alternative approaches to the measurement of performance differentials, as well as providing a timeline of the relative progress and efficiency of alternative procurement options. Data was obtained from publicly available sources.

Efficiency measures

This study examined the project management and construction phases of infrastructure programs, i.e. capital expenditure (capex), and defined procurement efficiency in terms of time and cost dimensions as follows:

- *Normalised time* – was measured as the percentage change in the time taken to achieve the next milestone in a stage compared with the timing anticipated at the beginning of that stage. It is expressed as a percentage, where a positive percentage indicates a time over-run relative to normalised expectations, and a negative percentage indicates completion ahead of time.
- *Normalised cost* – was measured as the percentage change in the cost incurred at the next milestone in a stage compared with the cost anticipated at the beginning of that stage. It is expressed as a percentage, where a positive percentage indicates a cost over-run (over-budget) relative to normalised expectations, and a negative percentage indicates completion of the stage under budget.

Sample selection

The methodology applied in selecting the samples of PPP and Traditional projects is crucial to establishing an unbiased test of the relative performances of these approaches. Our sample selection methodology, which is detailed in Appendix B, was guided by the following five criteria:

- *Criterion 1 – Projects undertaken since about 2000.* We adopted recent projects because this would allow us to focus on PPP and Traditional projects that had been arranged under the current style of policies.
- *Criterion 2 – Largely completed projects.* We concentrated on completed or largely completed projects so that all or the majority of costs would be brought to account in most projects. All projects included data for at least one of the stages outlined above.
- *Criterion 3 – Projects with a significant capex budget.* The cut-off for project size was \$50 million for New South Wales and \$20 million elsewhere.
- *Criterion 4 – Similar number of PPP projects to Traditional projects.* We sought the population of completed PPP projects in the timeframe and chose traditional projects to broadly match this group.

- *Criterion 5 – Projects of similar complexity.* We sought to match the PPP and Traditional samples for complexity in respect to ‘iconic’ buildings, ‘greenfield’ and ‘brownfield’ projects.

The full list of projects considered and those selected, together with reasons for rejection is provided in Appendix C.

Characteristics of the sample of procurement projects

Out of a total of 206 projects that were identified as being undertaken since 2000, and met the capex size criteria, 50 were PPPs and 156 were Traditional procurement projects. The final sample was composed of:

- 21 PPP projects; and
- 33 Traditional projects.

These projects were located in New South Wales (19), Queensland (9) and Victoria (26), with projects grouped into Social (24), Transport (25), Water (3) and IT (4) infrastructure groups or sectors, creating a good balance of jurisdictions and sectors.

The availability of publicly available data was a limitation of this study. Rich data was obtained for the majority of completed PPP projects, but the availability of data for Traditional projects was limited. Frequently, approval information for Traditional projects was buried in sector or agency budgets and availability of information on time and cost at the various phases was limited. Select projects have been covered in detail by Auditor General reports. Both NSW and Victoria have started to release information on the value and timing of signed contracts, but as yet these databases are not sufficiently populated to cover the study period since 2000. For PPPs the NSW Government releases full contractual summaries, and the Victorian Government has been quite open in the level of details provided by way of media releases.

The projects detailed in Appendix C demonstrate the extent of transparency for PPPs and the lack of data, relative to the total number of projects, for the Traditional projects. In the course of our research we concluded that PPPs are far more transparent than Traditional projects. We believe that this lack of public data relating to Traditional projects may be at least partly responsible for the relative lack of a vigorous research program on the efficiency of Traditional procurement compared with the research program on PPPs.

Summary of empirical findings

The results of the analysis are presented in both statistical and graphical analyses.

Statistical analysis of optimism bias

A summary of results for the Full Period and stage 3 is displayed in Table 1 below. It should be noted that the Full Period represents all the interaction between governments/instrumentalities and bidders/contracting parties, and is heavily influenced by the former. Stage 3, by contrast, is impacted primarily by the performance of the contracting party: whether a Traditional provider, or PPP consortium.

In Table 1 we find that for the Full Period, i.e. the period from Original Approval to Final Actual, the cost over-runs experienced by Traditional projects due to a combination of scope changes and contractor efficiency were 35.3 percent. In the case of PPP projects the cost over-run was less than a third of this, at 11.6 percent. However, the most telling findings are provided by the results for Stage 3, which depend largely on the performance of the respective providers. Here we find that for the Traditional projects in our sample, an expected cost of \$4.53 billion at contract signing was over-run to the value of \$672.5 million, representing a 14.8 percent increase in cost. By contrast, the \$4.95 billion in contracted PPP projects had on average over-run their budgets by only \$57.6 million, or 1.2 percent, which is not statistically different from zero. In summary:

- **Optimism Cost Bias** - Traditional projects are found to be subject to significant optimism bias during the contracted stage, with \$672.5 million of extra costs over a contracting base of \$4.53 billion, while at the contracting stage, PPPs cannot be said to be subject to optimism bias.

Table 1

TOTAL COST OF TRADITIONAL & PPP PROJECTS (\$M)

		Expect- ed Cost	Net Cost Over- -run	Final Cost	% Cost Over- -run
Full Period:	Traditional	3,082.0	1,087.6	4,169.6	35.3%
Original Approval – Final	PPP	4,484.4	519.3	5,003.7	11.6%
Stage 3:	Traditional	4,532.6	672.5	5,205.1	14.8%
Contract - Final	PPP	4,946.1	57.6	5,003.7	1.2%

Source: ACG/University of Melbourne

In Table 2, we present the summary results investigating optimism time bias as the percentage time over/under-run weighted by project size. While smaller Traditional projects were found to perform relatively well in terms of timing bias, we found that larger project size had a strong negative impact on the timeliness of delivery. Therefore, when we weighted optimism time bias by project value, we found that Traditional procurement strongly under-performed again. While the weighted time over-run for the Full Period was roughly twice as long for Traditional projects (25.6 percent) as for PPPs (13.2 percent), for Stage 3 (Contractual Commitment to Final Actual) the Traditional projects were on average 23.5% behind time, while PPPs were 3.4 percent ahead of time. In summary:

- **Optimism Time Bias** – On a value-weighted basis, Traditional projects are found to be subject to significant optimism bias, with a 23.5 percent time over-run during the contracted stage (Stage 3), while at this stage, PPPs cannot be said to be subject to optimism bias (and on average completed projects slightly ahead of time).

Table 2

TRADITIONAL & PPP PROJECTS (%): VALUE WEIGHTED TIME OVER(UNDER)RUN

		% Weighted Time
Full Period	Traditional	25.6%
Original Approval – Final	PPP	13.2%
Stage 3	Traditional	23.5%
Contract - Final	PPP	-3.4%

Source: ACG/University of Melbourne

Graphical analysis

We also present charts that plot the range of time and cost biases during Stage 3 for Traditional and PPP projects. The most striking features of these charts are:

- The growing absolute cost and time over-run gaps that emerge (relative to PPPs) as Traditional projects increase in size; and
- The wider dispersion of outcomes for Traditional projects, particularly in the direction of cost and time overruns.

These charts graphically illustrate the greater commercial certainty associated with PPP procurement relative to Traditional procurement, particularly for larger projects.

Policy implications

Victoria has undertaken significant research and development to determine the most appropriate way to engage the private sector in large infrastructure works. The resulting policy and subsequent guidance material has become recognised internationally as the leading information on how to procure using the private sector. Victoria has continually refined its approach based on experience, as has NSW, and to a lesser extent Queensland. As a result, Australia is now considered a leading exponent of PPP developments in the world.

Despite Australia's leading position among the world's PPP markets, until this study, the outcomes of PPP policies that focus on service delivery, whole of life costs, innovation and cost certainty was in many ways good, but untested theory. This study has demonstrated that the outcomes from Australian PPP projects now confirm that:

- A high level of cost certainty has been achieved by PPPs;
- Projects, and more importantly, services are being delivered as expected using the PPP approach;
- Both Victoria and NSW (where most of the PPP projects examined in this study have been located) have benefited from the experience of multiple projects, and have demonstrable improvements in performance.

Furthermore, there are indications that the robust process introduced via PPP processes is now also being introduced into a range of Traditional projects. Thus, the influence of the PPP frameworks and processes now stretches to a wide group of projects.

Even though Australia has been described as being among the world's most sophisticated PPP markets, the PPP model is yet to be developed to its full potential. In order to reach that potential, governments and treasuries need to:

- Continue to embrace and/or develop a PPP framework that maximises competition in the market, which has the potential to drive further efficiency and innovation.
- Remove any remaining impediments to the private provision of public infrastructure, such as notions that the government's cost of capital is inherently lower than the private sector's.
- Reduce the complexity of contracting, bidding and changes in scope that would create a blow-out in the cost and time required to build public infrastructure.
- Enhance the transparency and availability of data used in the assessment of PPPs, and importantly, Traditional projects, which currently exhibit less transparency than PPPs.

While the evidence contained in this report may re-affirm to the treasuries of Victoria, New South Wales and to a lesser extent Queensland, what they have experienced in relation to PPP projects, we expect that it will be of particular interest to treasuries in other states, where the PPP model delivery has not been as fully developed.

Chapter 1

Introduction

1.1 PPPs and major government procurement in Australia

‘Public-Private Partnerships’ (PPPs) is often used as a general term to describe a range of arrangements between public and private entities. In this study however, we define PPPs specifically as a contracting arrangement in which a private party, normally a consortium structured around a Special Purpose Vehicle (SPV):

- Takes responsibility for the design and construction of a component of new infrastructure; and/or
- Takes over a long-term lease or concession over existing assets; and/or
- A long-term contract to operate and manage the infrastructure.

At one end of the infrastructure spectrum, a private party will Design and Build (DB), or Design and Construct (D&C) a facility, and at the other end a private party will Build-Own-Operate and Transfer (BOOT) to the public sector after a contract period, or simply Build-Own-Operate (BOO) indefinitely. In Australia, the numerically dominant method of procurement may be termed ‘Traditional procurement’. This includes all non-PPP procurement policies, including DB, D&C and ‘Alliances’.¹ A differentiating feature of PPPs, as defined in this study, is the use of private finance, which introduces project finance rigour to the purely physical dimension of construction and operation of infrastructure facilities.

In Australia, PPPs have been subjected to considerable controversy following some high profile ‘failures’ that have featured in the media. Critics have pointed to high bidding costs associated with PPPs, refinancing issues, cost overruns, construction failures, design irregularities, windfall profits, lack of transparency etc.

On the other hand, Australian governments continue to support the PPP model with well-developed implementation frameworks. The range of benefits that governments typically use to justify PPPs includes:²

- Improved focus on service;
- A requirement to pay only for defined assets or services when they are delivered;
- A very high level of confidence that infrastructure will be available on time and without cost blow-out;
- An ability to hold a provider financially accountable for performance;
- Access to the best technical and management skills;
- Improved outcomes, by using competitive forces to stimulate creativity, pricing and delivery; and

¹ ‘Alliances’ are agreements between private parties and government business units, which include a contractual sharing of risks and rewards.

² This list is derived from Peter Fitzgerald (January, 2004), p.4.

- Access to infrastructure financing without additional borrowing by the government.

The individual Australian state governments have information relating to the assessment, operation and performance of PPPs, and also on traditionally procured projects undertaken in their own jurisdictions. What has been missing from the debate that has taken place in the public arena, is an analysis of relative PPP and Traditional procurement performance that draws on this experience in any depth.

In the context of the on-going debate it is not sufficient to argue that PPPs are simply a policy by which ‘third-way’ governments can please financial markets (Hodge, 2007). That is why, in the absence of a fully transparent database on comparable PPP and Traditional procurement projects, the present study has undertaken to examine all the publicly available data relating to PPPs and Traditional procurement projects. In doing so, it has analysed their relative performance. The intention is for this study to contribute to a rational policy debate around the funding and delivery of Australia’s future infrastructure.

1.2 The Brief

Infrastructure Partnerships Australia (IPA) engaged the Allen Consulting Group, together with Associate Professor Colin Duffield and Dr Peter Raisbeck of The University of Melbourne, to assess the publicly available evidence on Public-Private Partnerships and Traditional procurement projects.

In particular, the deliverables under the Brief were as follows:

- *An assessment of the relative effectiveness of PPP and Traditional procurement models* - This component would test the commonly held expectation by PPP proponents that the multiple stimulants of competition, and direct consequences of failure contribute to PPP projects being built on time and within budget.
- *The relative cost of capital under Traditional procurement and PPP approaches* –There continues to be a perception that governments can finance infrastructure more cheaply than private enterprise because of an ability to borrow at the risk free rate. The study will discuss and review this area.

1.3 Structure of the Report

The Report is structured as follows:

- Chapter 2 reviews the Australian PPP market. The PPP market is divided into the main sectors of economic and social infrastructure. The nature of the PPP market in different Australian jurisdictions is considered, as is the role of PPPs in global competitiveness. The chapter concludes with an assessment of the evolution of the PPP market.
- In Chapter 3 we provide a summary review of previous studies that have compared the relative performance of PPPs and Traditional procurement. We also examine issues related to the relative cost of capital, and methodological issues, which are treated in greater detail in Appendix C in order to provide a high degree of transparency.

- In Chapter 4 we present the key research findings of the present study, ordered as comparisons based on normalised time and cost performance relative to budget.
- Chapter 5 presents a summary of the findings, and draws out some policy implications of the current study.

Chapter 2

The Australian PPP market

2.1 Introduction

The Australian PPP market is already among the most sophisticated PPP markets in the world, but continues to improve and evolve. It can be characterised by the following phases of development that are distinguished by the types of project undertaken:

1. An initial phase in which project finance techniques and instruments are developed for BOT and BOOT projects that were adapted to build transport infrastructure. Most of these projects were contracted in the market up to 2000, and completed in recent years. A number of the evaluations of the efficiency of Australia's PPP market are based on these projects.
2. The focus of the present study, however, is the second phase of development in this market, which is now underway. Social infrastructure projects are beginning to widen their dominance of the market in numerical terms. These projects are diverse and include hospitals and schools involving significant facilities management over the economic life of the asset. We expect this market to continue to develop, and for PPPs to also continue to engage in the ongoing operation of water and energy infrastructure related to Australia's future sustainability needs.

There have been several reviews of the Australian PPP market that have sought to define what PPPs are, and to monitor the growth of this form of public procurement (e.g. Malone (2005), Hodge (2005)). In this chapter we provide a review of the evolution of the market and a snapshot of its current state.

2.2 Potential of the PPP market over the next decade

Estimates of the size of the Australian PPP market vary. In 2004 the National PPP Forum estimated that at that time, over \$9 billion in PPP projects were already contracted. This comprised over \$4 billion in PPP projects currently in the market and over \$5.5 billion of projects being considered for delivery as PPPs.

According to the *Financial Times* the Australian market comprised \$9 billion of projects between 2000 and 2006, and is expected to grow to \$100 billion in the next ten years (Minder, 2006). However, the such levels would not be achieved unless the market share of PPPs rises significantly. Infrastructure spending (gross fixed capital formation) of approximately \$38 billion is indicated for 2008. State Infrastructure Plans project spending of over \$320 billion over the next decade, which could easily become \$400 billion.³ In order to achieve the \$100 billion level of PPP projects foreshadowed by the *Financial Times*, it would therefore be necessary for Australian PPPs to capture a 25 percent share of the overall infrastructure market, compared with their current share, which lies in the vicinity of 10-15 percent of total government procurement.

³ CEDA (2007), *Sustainable Queensland*, Volume 2, CEDA Information Paper 88, p.58.

2.3 The PPP market and lifecycle

The Australian National PPP Forum reports that as of July 2007, a number of PPP projects are currently underway in various phases of the PPP lifecycle. The different phases of the PPP lifecycle are as follows:

- Phase 1: Policy origination
- Phase 2: Procurement Decision: PPP or Traditional procurement
- Phase 3: Project Development
- Phase 4: Expressions of Interest (EOI)
- Phase 5: Tender and bid selection
- Phase 6: Contract sign-off
- Phase 7: Design Development and Documentation Process
- Phase 8: Construction
- Phase 9: Delivery and Commissioning
- Phase 10: Operations

The Australian National PPP Forum website lists 37 PPP projects that were contracted or completed at July 2007, with 7 projects currently in the market (EOI, tender and bid selection) and 24 future projects in the pipeline.

Table 2.1

SUMMARY OF PROJECTS INCLUDED IN NATIONAL PPP FORUM ANALYSIS, JULY 2007

Stages	Future Projects (1-3)	In the market (4-5)	Contracted & Completed (6-10)	Totals (1-10)
Commonwealth	1	1	2	4
New South Wales	4*	2	13	19
Queensland	4	2	2	8
South Australia	3	0	1	4
Victoria	7	2	16	25
Western Australia	2	0	1	3
ACT	3*	0	0	3
Tasmania	0	0	1	1
Northern Territory	0	0	1	1
Totals	24	7	37	68

Source: National PPP Forum, see www.pppforum.gov.au/national_pipeline Note: Include several 'road projects' counted as a single project.

These projects could be classified further as social or economic infrastructure. Definitions of social infrastructure generally include Housing, Educational, Recreational and Law and Order facilities that sustain and support the community's need for social interaction. Economic infrastructure includes Transport, Communications, Water and Energy facilities, which are considered essential to a well-functioning economy. One feature of the evolution of the Australian PPP market has been the increasing number of social infrastructure projects in the market as compared with economic infrastructure.

2.4 PPPs foster innovation and competition for Traditional procurement

Procurement innovation at the level of infrastructure markets, and at a project level, is important if new, sustainable social infrastructure is to be built in Australia. Given the infrastructure needs of other countries in the region such as China and India, procurement innovation is important for Australia to attract capital, knowledge and skills, in order to service its own infrastructure needs.

One issue that is not often discussed is the way in which the presence of PPPs within a particular sector or jurisdiction may increase competition and competitive choice in the broader market. From this perspective, PPPs characterise competition between different procurement methods and foster innovation within these methods. One of the proclaimed advantages of PPP procurement is the design freedom that is allowed in conjunction with performance-based output specifications. This issue needs to be studied more thoroughly, as the benefits of innovation from the PPP procurement model could conceivably also be applied to Traditional procurement models. However, there will be limits to this transfer of benefits, as it is the unique combination of incentives and constraints surrounding a PPP consortium that drives the full value contribution of the approach.

Chapter 3

Methodology and previous research

3.1 Introduction

In this section we consider previous empirical research that has reviewed the relative performance of PPPs and Traditional procurement methods. We note that there exists continuing confusion over the fundamental parameters governing the assessment of PPPs relative to Traditional procurement, in particular, the relative cost of capital. Noting the criticisms that have been levelled at previous studies, we set out the key characteristics of an objective analysis.

3.2 Previous studies

Global growth in PPP markets has been matched by a corresponding rise in PPP research across a number of fields, including public policy and governance, construction management and economics, innovation theory and project management.

Initial research tended to enthusiastically endorse the PPP model, which appeared in evaluations of the BOT and BOOT infrastructure projects of the 1980s. Using project finance techniques to quarantine risk, these projects are seen as precursors to the current cohort of PPP projects (Gann, 2005, p.572). In the present study we limit consideration to the UK, whose Public Finance Initiative (PFI) has had a considerable influence on the Australian PPP market, and on Australian research.

UK research on 'optimism bias'

In the UK, which has been at the forefront of development of the PPP procurement framework, there has been a large body of research on PPPs. The research that is most relevant to the methodology applied in the present study is that carried out by Mott MacDonald (Mott MacDonald, 2002).

The study focussed on measuring the relative degree of 'optimism bias' associated with Traditional procurement. 'Optimism bias' was defined as the percentage differential between the estimated works duration or capex cost at the 'Strategic Outline Case' (SOC) or 'Outline Business Case' (OBC) and Works Completion (WC). The results of the study are summarised in Table 3.1 below. Given that the UK's PPP projects had relatively neutral 'optimism bias', the table shows that for 'non-standard buildings, for example, the capex estimate for Traditionally procured projects suffered between 4 percent and 51 percent 'optimism bias'.

Table 3.1

UK: MOTT MACDONALD STUDY OF LARGE PUBLIC PROCUREMENT (2002)

Project Type	Optimism Bias (%)			
	Works Duration		Capex	
	U	L	U	L
Non-standard Buildings	39	2	51	4
Standard Buildings	4	1	24	2
Non-standard Civil Engineering	25	3	66	6
Standard Civil Engineering	20	1	44	3
Equipment Development	54	10	200	10
Outsourcing	N/A	N/A	41	0

Source: Mott MacDonald (July 2002), Review of Large Public Procurement in the UK, Report to HM Treasury, United Kingdom. Note: 'U' and 'L' denote upper and lower bounds respectively.

Another study that appeared in the UK soon after the Mott MacDonald study was by the UK National Audit Office (2003). The NAO compared the results of its 2002 Census on PFI Projects with the 1996 Procurement Survey for Traditionally procured projects. The NAO found that 76% of PFI projects were completed on time, and 78% were completed on budget. By contrast, for Traditional procurement only 30% of projects were completed on time and only 27% were completed on budget.

Evidence of value for money (VFM) calculations undertaken by the NAO was summarised by Allen (2001, p.30-33). There have also been a number of UK reports and academic studies that have looked at satisfaction levels and performance of PPPs. Cambridge Economic Policy Associates (2005) reported to the Scottish Executive that Scottish PPPs were generally performing well. An academic study by Kakabadse et al (2007, p.61), concluded that the 'emerging evidence is favourably inclined towards PFI' in the UK schools sector. However, a study sponsored by the UK Association of Chartered Certified Accountants (ACCA, 2004) provided a negative view of PFI projects in the roads and hospitals sectors.

In a wider review of evidence, case studies, positive and negative experiences, Pollitt (2005, p. 227) concluded:

It seems difficult to avoid a positive overall assessment. The UK PFI seems to have been generally successful relative to what might have happened under conventional public procurement. Projects are delivered on time and to budget a significantly higher percentage of the time.

Pollitt (2005, p. 226) raised the prospect that the full benefits of PPPs were not confined to PPP projects, but extended to Traditional procurement as a 'vehicle for learning'. Pollitt (2005, p. 227) also felt it was important that the benefits of the PFI were not disproportionately captured by the private sector, but was confident that financial windfalls to private investors could be addressed via 'appropriately specified contracts'.

The relatively higher bid costs of PPPs have often been commented on. Allen (2001 p.34) reported on the Adam Smith Institute's (1996) study, which concluded that tender costs expressed as a percentage of total costs were in the region of 3 percent for PPPs, and just under 1 percent for Traditional procurement.

For the purposes of making value for money assessments, the results of the Mott MacDonald study have been interpreted as requiring that an addition to cost estimates under the Traditional procurement alternative (the Public Sector Comparator, or PSC) be made in the range given by the table.

In a critique of the Mott MacDonald (MM) and UK NAO results, Unison (2005) outlined a number of methodological problems that it considered were biasing the empirical findings in favour of PPPs. These methodological issues were as follows:

- *Transparency* – The Mott MacDonald and NAO sampling methodology was not described.
- *Population analysis* – The populations from which the PPP and Traditional samples were not described.
- *Representativeness of samples* – There was no detailed description of how representative the samples were of the PPP and traditional populations.
- *Consistency and relevance of time period* - Some Mott MacDonald traditional projects were drawn from an earlier period, which pre-dated the procurement reforms of 1999.
- *Relative complexity selection bias* – A greater proportion of Traditional projects were 'non-standard', and therefore involved a higher degree of complexity than PFI (PPP) projects.
- *Measurement bias* – According to Unison, Mott MacDonald measured PFI (PPP) projects from the later time of the full business case (FBC), and traditional projects from the strategic outline case (SOC) or outline business case (OBC), which came earlier, and were therefore likely to involve greater time and cost uncertainty.

We have outlined these methodological issues here because the present study's methodology has undertaken to address each of them. Whilst not intending to provide a defence of the Mott MacDonald and UK NAO methodologies, we would note that the Mott MacDonald study did point out that its results showed an improvement (i.e. considerable lessening of optimism bias) over time, and that is why it provided a significant range for its estimate of the relative optimism bias of Traditional projects.

Previous Australian research has been sectoral and case study focussed

In Australia the early PPP research focused on explaining to policy makers the governance issues and technical aspects of this nascent market. On the other hand, PPPs have also been associated with (or seen as a proxy for) privatisation programs (Hodge, 2004) that encourage private providers to supply public services at the expense of public organisations themselves (Hodge, 2007).

The Fitzgerald Report (Fitzgerald, 2004) reviewed the *Partnerships Victoria* process for the Victorian Treasurer. The report investigated 8 case studies of PPP projects that had been undertaken within the ambit of the *Partnerships Victoria* framework since its inception in 2000. Fitzgerald reported that at the time they were entered into, on a weighted average, and using the then prevailing discount rate, the saving attributed to the PPPs was 9 percent relative to the respective risk-adjusted Public Sector Comparators (PSCs). However, it was noted that this *ex ante* estimate of the benefit was sensitive to the discount rate applied and factors such as the valuation of the risk transfer achieved in the contracts. Hence, it was not an analysis of what was actually achieved by PPPs as opposed to Traditional procurement approaches.

There have been several case studies or sectoral analyses of PPPs, including:

- English (2005) – case study of the Latrobe Hospital;
- Brown (2005) - analysis of a number of toll road agreements; and
- Hodge (2005, p.319-323) - review of the Melbourne City Link and Sydney’s M2 Road.

In general, it can be said that Australian research has tended to focus on non-empirical methods that often discuss case studies in relation to aspects of PPP contracting or operation.⁴ Scant quantitative research has focused on the linkages between concepts of procurement innovation, public interest, risk and what has actually been delivered to the Australian public. As noted by Hodge (2005, p.323), ‘there has been no comprehensive evaluation of Australia’s PPPs thus far’.

Much of the previous research is dated

In both Australia and in the British PPP market, much of the research has been framed from either an economic policy perspective, or from a contracting and procurement perspective. Economic policy debates have seen claims and counterclaims emerge between PPP proponents and detractors. In contrast, the procurement-based research has tended to avoid these debates and has focused on understanding PPPs as a new form of procurement.

Much of the previous work evaluating the PPP model in both Australia and internationally is now dated, as the maturity and sophistication of the market has evolved. This is also true of the UK results obtained by Mott MacDonald and the UK National Audit Office. In Australia most research, even some of the most current research, relates to PPP projects that were completed prior to 2004, has concentrated on physical infrastructure such as toll roads, rather than social infrastructure, and were often based on a limited sample of case studies.

⁴ For example, see Karen Brown (June, 2006).

3.3 Value-for-Money, the Public Sector Comparator and risk allocation

At the centre of any decision to pursue a PPP in preference to Traditional procurement is the establishment of Value for Money (VFM) to the state from doing so. In order to assess VFM, it is necessary to establish a benchmark against which the PPP proposals can be assessed. That benchmark is termed the Public Sector Comparator (PSC), which estimates the full cost of a project's construction and future operations, including the value of any risk transfer to the private sector, and discounts the cash flows to a present value. The Government is then able to compare the Net Present Value (or Net Present Cost) with the value (cost) associated with the stream of cash flows that would be expected under a PPP arrangement.

Critics of the PPP approach, such as Jean Shaoul (2005, p.193) in the UK, highlight the uncertainties surrounding the measurement of the risk transfer and emphasize that 'risk transfer is the crucial element in delivering whole-life economy since under PFI private sector borrowing, transactions costs and the requirements for profits necessarily generate higher costs than conventional public procurement'. Shaoul was also concerned that risk transfer is often not effective or complete, since the failure of the UK Passport Agency's IT PPP resulted in delay costs to the public at large. However, Shaoul did not demonstrate that these costs to the public had been priced into the PSC, nor that the government's requirement for profit is any different from that of the private sector. Certainly, the behaviour of government owned businesses (GBEs) does not support this.

The myth of government 'risk free' borrowing

The idea that the government has a lower cost of capital continues to be raised in Australia (Quiggin, 2007). The Federal Government's Private Infrastructure Task Force (EPAC, 1995, p.37) considered this matter more than a decade ago, and:

...rejected the argument that the cost of government debt is necessarily cheaper than the private sector cost of capital (which would have implied that government should finance most infrastructure investment). The task force argued that government's lower cost of funds largely reflects the fact that taxpayers are providing an implicit guarantee for project risks under public ownership. Thus, it concluded that much of the difference in the private and public cost of capital is apparent rather than real.

This issue was further investigated by Australian state government treasuries during the latter half of the 1990s and more recently. For example, *Partnerships Victoria* (July 2003, p.27) states explicitly that just because the government can issue bonds at the risk free rate, and corporate bonds are issued at higher rates of interest, this does not mean that the government's cost of capital is lower:

The reason government's cost of borrowing is low is that government can use its taxing powers to repay loans. Because of these taxing powers, lenders to government consider that it is unlikely to default, leading to lower interest rates on borrowings. However, when government decides whether to invest in a project, it should look at the riskiness of that project, and demand a return commensurate with the risk it is taking.

In the UK, in 1997 an entire issue of the *Oxford Review of Economic Policy* was devoted to the relative cost of capital issue in the context of public-sector investment. In their summary paper to that issue, Flemming and Mayer (1997, p.5) concluded that ‘project risks depend on the project’s design rather than on its financing – unless the latter affects the former’, and that given the ‘incentive and control advantages of the private sector’ there is a ‘strong presumption in favour of private sector investment’.

Claims that PPPs need to produce massive cost efficiencies in order to counteract the effect of the government sector’s lower cost of capital continue to persist (Hodge, Quiggin, Pollitt). PPPs have, in fact, been shown to produce large cost efficiency (Mott MacDonald). However, as noted by Klein (1997, p.38), if the government’s cost of capital was indeed significantly lower than that of the private sector, it would have some bizarre consequences, for example that:

- Governments should invest in projects and funds with high expected values, such as venture capital; or
- Private companies should benefit from free government credit guarantees on all their borrowings.

The cost of capital for a project is the weighted cost of debt and equity applied to the project. The cost and proportions of debt and equity in a PPP reflect a market assessment of the risks and rewards of the project in question. The cost of debt in a government bond financed project is known, but the public sector does not have a cost of equity, and the government bond rate has nothing to do with the project’s cost of capital. In Australia the price of government bonds is set without regard to the projects that are to be financed.

Put simply, the taxpayers ultimately and always bear the costs of cost over-runs and other project risks that cannot be assumed away by the fact of Traditional government procurement methods and operation. The notion that Traditional government procurement creates a ‘risk free’ project is deeply flawed.

3.4 Constructing an objective analytical approach

The existing research agenda has not examined Traditional procurement

The empirical research agenda on PPPs has been dominated by researchers who have generally tackled specific issues and employed case study approaches. More comprehensive empirical analysis of PPPs has been confined to studies undertaken or commissioned by governments, most notably the UK Government. Hodge (2005, p.327) considered that:

The absence of any rigorous and transparent evaluations of Australasian PPPs represents a significant accountability shortfall, and we are left relying on only a few pieces of empirical evidence when attempting to make up the accountability jigsaw.

What is forgotten in this appeal, is that if there has been an accountability shortfall, it has been disproportionately shared by Traditional procurement. In Australia there is no transparent research that investigates the efficacy and VFM credentials of Traditional procurement, and no sense of whether performance has been improving over time, as has been suggested in the UK by the Mott MacDonald and other studies.

The only comprehensive studies comparing PPP and Traditional approaches, such as Mott MacDonald, Arthur Andersen LSE, and the UK Office of National Assessments have been undertaken in the UK, are relatively dated now.

Key research question: are PPPs a better procurement model?

A key question raised in relation to PPPs is their relative effectiveness compared with Traditional models of procurement. It is commonly expected that the incentives for increased competition and direct consequences of failure contribute to PPP projects being built on time and within budget.

PPP proponents argue that there is greater design freedom, increased incentives to innovate, more opportunity for collaborative work and a more efficient allocation of risk between parties in the PPP model. PPP detractors argue that these benefits do not exist and that there are additional costs associated with PPPs such as bidding costs and complexities compounded by a perceived lack of transparency in the PPP model. Arguably, many of the issues that are seen as plaguing PPPs are also relevant to projects undertaken by governments using the Traditional models of procurement.

As we saw in the review of previous studies, a key question posed in the academic and government research agendas is whether or not PPPs provide a better procurement model than Traditionally procured projects. In short, the simple question that needs to be addressed is:

- Do PPP projects deliver better results in terms of time and cost outcomes in comparison to Traditional projects?

This was our primary research question.

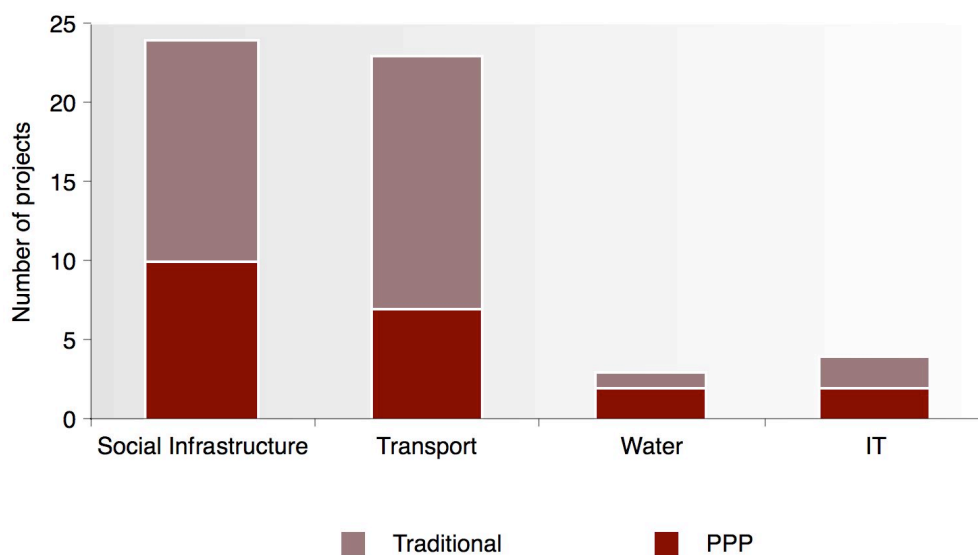
Not unlike the rest of the world, as the PPP market has developed in Australia most evaluations of PPP by researchers in Australia have focused on individual cases, or smaller project pools in order to find empirical evidence in relation to this question. Now that the Australian PPP market has grown and evolved to become one of the world's most sophisticated markets, our aim was to address this question with new data and in a more comprehensive fashion than has been attempted in previous studies.

3.5 Ensuring a transparent and unbiased research methodology

We have been requested to test whether PPP projects deliver better results in terms of time and cost outcomes in comparison to Traditional projects. To undertake this task we have established a research methodology that is designed to generate an objective set of data. Of necessity we have had to rely on publicly available data relating to Traditional and PPP projects.

A crucial part of the research design is the methodology employed to select the samples of PPP and Traditional projects. As shown in Figure 3.1, the final sample of 54 projects has a good balance between sectors. The detailed methodological issues of project sample selection, and definitions of terms are provided in detail in Appendix B (Methodology).

Figure 3.1

DISTRIBUTION OF SELECTED PROJECTS FOR THE CURRENT STUDY

Source: Source: ACG/University of Melbourne

In formulating our research methodology to compare the performance of alternative procurement approaches, we kept in mind the recent criticisms levelled at the methodologies applied in the UK studies that have been discussed earlier. In particular, in formulating our detailed research methodology we were mindful that:

- The different project pools we constructed for comparison were not biased by the inclusion of (previously known) overly successful, or under-performing Traditional projects. Similarly, we have not sought to bias the selected project pools by excluding unsuccessful PPP projects.
- We have not selected projects that were atypical and not representative of each procurement method.
- We have not biased our research findings by comparing different baselines between the two procurement methods.
- We have not biased our research findings by comparing different timelines between the two procurement methods.
- We have provided a high degree of transparency in relation to the data and sources applied, so that the research could be fully replicable by others.

By concentrating attention on PPPs undertaken in the eastern states of Australia, we have identified the population of such projects and obtained all publicly available data on them relating to time and cost outcomes relative to budget. We applied five criteria to make the selection of Traditional projects as objective as possible.

Project milestones

In order to measure normalised performance, in Appendix B we define four milestones in a typical procurement project, which are as follows:

- *Original Approval* – original approval of the project.
- *Budget Approval* – approval of final budget prior to going to contract.
- *Contractual Commitment* – situation on signing of contracts.
- *Actual Final* – actual outcome of the project.

Project stages

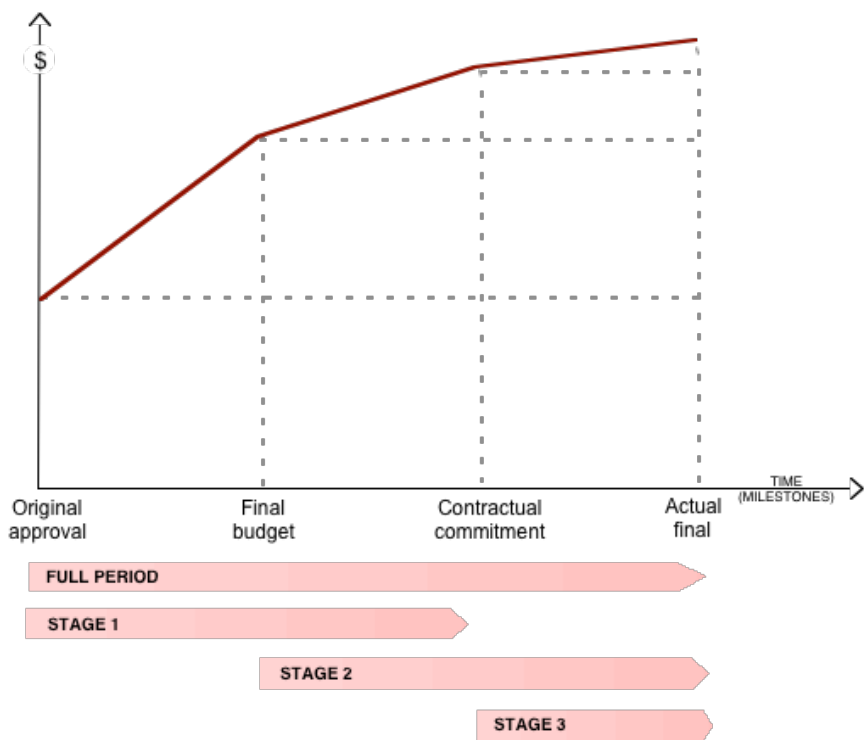
Using the four project milestones identified above, we defined the Full Project and three periods in the project lifecycle for analysis, i.e. four different periods over which the relative performance of PPPs and Traditional procurement approaches could be measured and compared. These four periods were:

- Full Project Original Approval to Actual Final;
- Stage 1 Original Approval to Contractual Commitment;
- Stage 2 Budget Approval to Actual Final; and
- Stage 3 Contractual Commitment to Actual Final.

These four periods are shown graphically in Figure 3.2 below.

Figure 3.2

COST OVER-RUNS BY STAGES AND MILESTONES



Source: ACG/University of Melbourne

Figure 3.2 shows how the Actual Final cost would be likely to build up in the case of consistent cost over-runs between the milestones. This need not be the case. Since information and commitment by the parties both increase as the stages and milestones progress, it would be expected that the degree of cost over-run would reduce in successive stages. Hence, we should expect to find the greatest degree of cost over-run over what we have termed the Full Period (Original Approval to Actual Final), with the lowest degree of over-run being experienced in Stage 3 (Contractual commitment to Actual Final).

Various periods (stages 1, 2 and 3, and the Full Period) have been calculated in order to provide alternative perspectives on the procurement process, which might be defined differently by different parties. Our interest has also been to examine whether consistent trends can be seen irrespective of the definition of milestones and stages.

In order to address alternative views, cost and time data was obtained at four different milestones in a project, and four different periods were identified. The time and cost data were normalised in order to yield percentage performance relative to the target at each successive milestone or stage. It may be expected that as these stages progressed closer to the final outcome, more information will be known about a project, and outcomes will be closer to those anticipated.

Chapter 4

Comparative analysis of PPPs and Traditional procurement

4.1 Introduction

In this chapter we perform a number of tests of the proposition that PPPs provide superior cost and time outcomes than Traditional projects. These tests are based on publicly available data for a 54-project dataset that has been described in earlier chapters and is detailed in Appendices B and C.

The approach in this chapter can be described as follows:

- A statistical analysis of time and cost over-runs under PPPs and Traditional procurement; and
- A graphical representation of the data to show the spread of outcomes.

As a generalisation, it can be said that:

- Traditional projects were the subject of significant optimism bias, while at the contracting stage PPP projects were not subject to optimism bias.

4.2 Defining ‘optimism bias’

As noted in the Mott MacDonald study:

‘optimism bias’ can be defined as the ‘tendency for a project’s costs and duration to be underestimated and/or benefits to be overestimated.’⁵

Prior to discussing specific results of the present study it is worthwhile reflecting on the interpretation of normalised results and the importance of bias. The normalising of results and the investigation of a robust sample should result in a spread of results that takes the form of a normal distribution. If results are deemed to be without bias, the variance of a particular sample may be statistically acceptable. If, on the other hand, samples have a bias this is an indication of inaccurate initial assumptions and inadequate processes. A bias would suggest that the true average of samples is not zero but rather a different outcome that corresponds to a different distribution.

4.3 Optimism bias in the cost dimension – statistical analysis

Relative optimism bias

In this section we undertake a statistical analysis of the cost dimension, which examines the relative degree of cost over-runs for each stage of the procurement process in Traditional and PPP projects. As noted in Chapter 3, as each stage of the procurement process progresses, more knowledge about the project is obtained with regard to the likely future cost, because each stage represents a step closer to project completion. We should therefore expect that cost and time over-runs will reduce through the stages.

⁵

Mott MacDonald (July, 2002), *Review of Large Public Procurement in the UK*, p.S-1.

The results in Table 4.1 demonstrate a strong advantage to PPPs in the cost dimension. In each of the four periods identified, sample PPPs were completed with a significantly lower cost over-run compared with Traditional projects. In most cases this favourable differential to PPPs is found to be statistically significant with more than 95 percent confidence.

In Stage 1 the very large observed relative cost differential (50.6 percent) in favour of PPPs was found to be the result of an outlier Traditional project. When this outlier was removed, the differential fell to 13.2 percent in favour of PPPs, but remained statistically significant with 87 percent confidence. In Stage 3, which is most directly controllable by a Traditional contractor or PPP consortium, the 13.8 percent Traditional procurement cost over-run is found to be statistically significantly larger than the 2.4 percent PPP over-run (with 99 percent confidence).

Table 4.1

COST OVER-RUNS: TRADITIONAL & PPP PROJECTS RELATIVE TO ESTIMATE (%)

	Full Period	Stage 1	Stage 1 less outlier	Stage 2	Stage 3
No. Obs.	35	22	21	36	37
Traditional	44.7%	62.1%	24.7%	24.6%	13.8%
PPP	13.9%	11.5%	11.5%	3.0%	2.4%
Difference	30.8%	50.6%	13.2%	21.6%	11.4%
Confidence	96%	89.6%	87%	96%	99%

Source: ACG/University of Melbourne

The implications of significant cost over-runs in Traditionally procured projects are displayed in Table 4.2 below. For the Full Period, which spans the entire the project, and is also influenced by the sponsors, the Traditional project costs increased from \$3.08 billion to \$4.17 billion (35.3 percent). On the other hand, the PPP projects are seen to have been more tightly controlled, with an expansion from \$4.48 billion to \$5 billion (expansion of only 11.6 percent).

The most telling statistics, however, are found in the outcomes for Stage 3. During this stage, which is the period from contractual commitment to the actual final outcome, the primary influence on the outcome is the contracting party, whether a Traditional provider or PPP consortium.⁶ In Stage 3 we find in Table 4.2 below, that for Traditional projects an expected cost of \$4.53 billion was over-run to the extent of \$672.5 million, representing a 14.8 percent increase. By contrast, the \$4.95 billion in contracted PPP projects had on average over-run their budget by only \$57.6 million, or 1.2%, which is statistically not different from zero.

⁶ While state modifications or state retained risk could impact on Stage 3, and result in time and cost over-runs, this is less likely to be the case than in stages 1 and 2.

Table 4.2

TOTAL COST OF PPP AND TRADITIONAL PROJECTS (\$M)

	Expected Cost	Net Cost Over-run	Final Cost	% Cost Over-run
Full Period:				
Traditional	3,082.0	1,087.6	4,169.6	35.3%
PPP	4,484.4	519.3	5,003.7	11.6%
Stage 1:				
Traditional	3,440.1	729.4	4,169.6	21.2%
PPP	4,543.2	460.5	5,003.7	10.1%
Stage 2:				
Traditional	4,132.0	994.1	5,126.1	24.1%
PPP	3,891.4	91.3	3,982.7	2.3%
Stage 3:				
Traditional	4,532.6	672.5	5,205.1	14.8%
PPP	4,946.1	57.6	5,003.7	1.2%

Source: ACG/University of Melbourne Note: A Traditional outlier has been removed from Stage 1, which would otherwise have been a 44% cost over-run.

For the Stage 3 data we undertook a regression analysis and found that for Traditional projects there is a highly statistically significant relationship between size of project and the value of the cost over-run. For PPPs, no statistical relationship was evident.

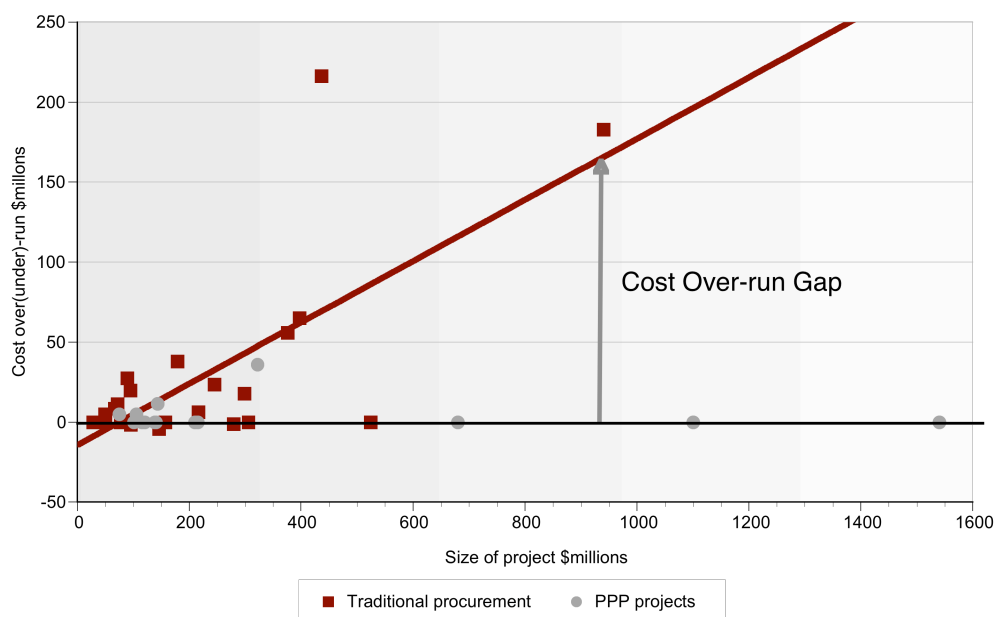
Graphical representation of normalised costs

Figure 4.1 displays the cost overruns experienced Traditional projects in Stage 3 (Contractual Commitment to Actual Final). It should be recalled that some projects that are seen as performing within budget in this stage may have been subject to cost over-runs in previous stages, which is particularly so for Traditional projects.

We found that while small value Traditional procurement projects tended to come in under-budget, higher value projects were generally completed over-budget and often by a significant margin. The trend line shows a positive slope, and is statistically significantly different from zero at 99 percent confidence.

By contrast, PPPs tended to display much greater cost discipline. Importantly, the three largest projects all came in on budget.

Figure 4.1

STAGE 3: TRADITIONAL PROCUREMENT COST OVER-RUN GAP

Source: ACG/University of Melbourne

In other words, the average Traditional project cost over-run is likely to be significantly higher than for PPPs, and the dispersion of outcomes is much greater also. While PPPs can be expected to come in tightly on budget, the outcome under Traditional projects is much less certain, indicating that much greater cost discipline is being applied to PPP projects.

4.4 Optimism bias in the time dimension – statistical analysis

We noted that greater knowledge about the project can be expected to reduce time over-runs as the stages of the project progress. There are also several reasons why PPPs might be expected to take longer than Traditional procurement:

- First, by the Original Approval stage the milestone technical specifications are generally known for Traditional projects, while for PPP projects they are not yet known.
- Secondly, since PPPs involve Design and Construct (D&C) as well as subsequent maintenance and/or operation, including monitoring for quality etc., the contracting is bound to be more complex.
- Thirdly, the process by which PPPs obtain finance is more involved than for Traditional projects financed by governments.

With these caveats in mind, we turn to an examination of the raw data on time over-runs at each procurement stage in Table 4.3 below. Over the full period we found that the results were being skewed by one outlier PPP project (in the IT sector). After removing the effect of this outlier, we found that in a majority of stages, PPP projects were completed with less time over-run than Traditional projects. However, the differential between PPP and Traditional projects was not found to be statistically significant.

Table 4.3

TIME OVER-RUNS IN TRADITIONAL AND PPP PROJECTS (%): RAW DATA

	Full Period	Full Period less outlier	Stage 1	Stage 2	Stage 3
No. Obs.	34	33	34	20	36
Traditional	17.6%	17.6%	12.7%	12.4%	3.6%
PPP	24.3%	10.1%	24.1%	11.8%	2.5%
Stat. Sig.	n.s.	n.s.	n.s.	n.s.	n.s.

Source: ACG/University of Melbourne

For the reasons outlined above, this result is highly positive to PPPs. Given that:

- Traditional procurement projects generally begin with a ‘head start’ over PPPs, since the technical specifications are generally known at the Original Approval; and
- PPP projects are subjected to additional scrutiny and interaction with governments and instrumentalities,

the fact that the PPPs in our sample were completed sooner (statistically no later) than Traditional projects is a very creditable result.

The raw data shown in Table 4.3, however, do not show the impact of timeliness of project completion when taking account of the size of projects. For example, there would be policy implications if Traditional projects were found to be timely when small, but relatively untimely in their completion when large. In Table 4.4 we have calculated an index of timeliness based on the final size of projects. That is, time over and under-runs are weighted by project size. Again, we find that in most of the stages, there is a timing advantage to PPPs.

In Stage 3, when the Traditional procurement contractor or PPP consortium have the most individual control over the time dimension of their project, we find that PPPs are completed ahead of (weighted) time by 3.4 percent, while Traditional projects are completed 23.5 percent behind time.

Table 4.4

PPP AND TRADITIONAL PROJECTS (%): VALUE WEIGHTED TIME OVER-RUN

% Weighted Time over/ under-run		
Full Period	Traditional	25.6%
	PPP	13.2%
Stage 1	Traditional	28.8%
	PPP	13.3%
Stage 2	Traditional	8.9%
	PPP	16.5%
Stage 3	Traditional	23.5%
	PPP	-3.4%

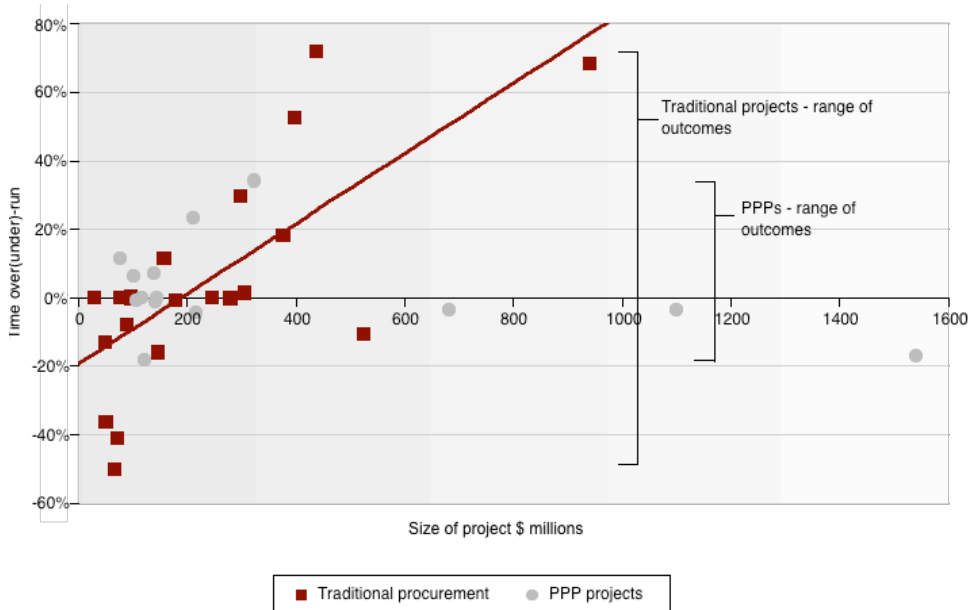
Source: ACG/University of Melbourne

Graphical representation of normalised timing

In Figure 4.2 we show the extent of time over/under-runs in Stage 3: i.e. after the signing of Contract Commitments up to the Actual Final result. A positive association between the size of the project and time over-run (which is statistically significant with 99.9 percent confidence) is evidenced in the case of Traditional projects, but no such association is apparent in PPP projects.

Figure 4.2

STAGE 3: TRADITIONAL PROJECT OPTIMISM TIME BIAS BY PROJECT SIZE



Source: ACG/University of Melbourne

As with the optimism cost bias discussed above, we find that the dispersion of completion timing bias outcomes is also greater in the Traditional projects compared with PPPs.

Traditional projects have been found to be more uncertain than PPP projects for delivery on-time, and Traditional procurement becomes more unfavourable the larger the size of the project.

4.5 Conclusion: PPPs provide greater commercial surety

In summary, based on our statistical analysis of data for 54 PPP and Traditional projects, we have found the following:

- **Optimism cost bias** - *PPPs were much more likely to be concluded on budget, providing greater commercial surety to government and the community.*

On average, PPPs have been found to be subject to a negligible degree of optimism cost bias. However, cost over-runs of \$673 million were recorded during Stage 3 of the Traditional projects in our sample that had been contracted at \$4.5 billion, and the dispersion of cost outcomes was much wider than for PPP projects.

- **Optimism time bias** - *Larger Traditional procurement projects tend to be completed well behind time, but smaller less complicated ones are generally completed on time.*

In Stage 3, when the contractor largely controls the timing, PPPs have been found to be more timely on a value weighted basis compared with Traditional projects.

Chapter 5

Concluding comments and policy implications

5.1 Summary of key findings

This study has analysed data relating to 206 government procurement projects, and has constructed a database for 21 PPP projects and 33 Traditional projects. The key research question was to analyse the relative efficacy of PPPs and Traditional procurement in relation to cost and time over-runs. The results can be summarised as follows:

- PPPs demonstrate clearly superior cost efficiency over Traditional procurement, which can range from 30.8 percent when measured from project inception, to 11.4 percent when measured from contractual commitment to the final outcome.
- In absolute terms, the PPP cost advantage was found to be economically and statistically significant. On a contracted \$4.9 billion of PPP projects the net cost over-run was only \$58 million – not statistically different from zero. For \$4.5 billion of Traditional procurement projects, the net cost over-run amounted to \$673 million.
- Approximately \$400 billion is likely to be spent on Australian infrastructure over the next decade. If PPPs were to continue to account for a 10-15 percent share of this, based on the findings of this study (and net of bid costs), PPPs would generate approximately \$6 billion in potential benefit to the community, and for reasons discussed below, the potential gain is likely to be greater than this. If PPPs were to contribute a higher share of total projects, even higher gains would be realised.
- With respect to time over-runs, on a value-weighted basis we found Traditional projects were likely to be completed later than PPPs relative to the budget. For example, between the signing of the final contract and project completion, PPPs were found to be completed 3.4 percent ahead of time on average, while Traditional projects were completed 23.5 percent behind time. This difference is statistically significant.
- While smaller Traditional projects were completed ahead of time, we found that project size had a marked (statistically significant) negative impact on time over-runs compared with PPPs, whose timeliness of completion were not negatively impacted by size of project.
- Our overall conclusion is that PPPs provide superior performance in both the cost and time dimensions, and that the PPP advantage increases (in absolute terms) with the size and complexity of projects.
- In contrast to commonly held perceptions about the relative transparency of PPPs, we found that PPP projects were far more transparent than Traditional projects, as measured by the availability of public data for this study.

- It is likely that the actual extent of benefits of PPPs to society is not fully captured by the analysis presented in this study, since:
 - There is a benefit from completing projects on time and enabling the community to have access to the infrastructure facilities sooner. We have not included a valuation of this benefit;
 - The PPP framework imparts another level of competition for Traditional procurement, and the lessons learned by governments participating in the PPP process with respect to risk analysis, rigorous structured project initiation through the use of business cases and other tools, have been partly transferred to the management of Traditional procured infrastructure projects; and
 - The benefits identified in this study do not include the effect of PPPs' integrated provision of management, construction and on-going operations. This is another major source of potential PPP advantage over Traditional procurement approaches that de-couple the management/construction and operations phases, creating additional sources of inefficiency.

5.2 Policy implications – maximising the PPP benefit

Victoria has undertaken significant research and development to determine the most appropriate way to engage the private sector in large infrastructure works. The resulting policy and subsequent guidance material has become recognised internationally as the leading information on how to procure using the private sector. Victoria has continually refined its approach based on experience, as has NSW, and to a lesser extent Queensland. As a result, Australia is now considered a leading exponent of PPP developments in the world.

Despite Australia's leading position among the world's PPP markets, until this study, the outcomes of PPP policies that focus on service delivery, whole of life costs, innovation and cost certainty was in many ways good, but untested theory. This study has demonstrated that the outcomes from Australian PPP projects now confirm that:

- A high level of cost certainty has been achieved by PPPs;
- Projects, and more importantly, services are being delivered as expected using the PPP approach;
- Both Victoria and NSW (where most of the PPP projects examined in this study have been located) have benefited from the experience of multiple projects, and have demonstrable improvements in performance.

Furthermore, there are indications that the robust process introduced via PPP processes is now also being introduced into a range of Traditional projects. Thus, the influence of the PPP frameworks and processes now stretches to a wide group of projects.

Even though Australia has been described as being among the most sophisticated PPP market, the PPP model is yet to be developed to its full potential. In order to reach that potential, governments and treasuries need to:

- Continue to embrace and/or develop a PPP framework that maximises competition in the market, which has the potential to drive further efficiency and innovation to underpin Value for Money for governments and communities alike.
- Remove any remaining impediments to the private provision of public infrastructure, with the government explicitly charging for project risk in the cost of capital calculation for Traditional procurement.
- Reduce the complexity of contracting, bidding and changes in scope that would create a blow-out in the cost and time required to build public infrastructure.
- Enhance the transparency and public availability of data used in the assessment of Traditional projects, which currently is at a low standard.

While the evidence contained in this report may re-affirm to the treasuries of Victoria, New South Wales and to a lesser extent Queensland, what they have experienced in relation to PPP projects, we expect that it will be of particular interest to treasuries in other states, where the PPP model delivery has not been as fully developed.

Appendix A

Bibliography

ACCA (2004), *Evaluating the operation of PFI in roads and hospitals*, Research Report No. 84 (undertaken by Pam Edwards, Jean Shaoul, Anne Stafford and Lorna Arblaster).

Australian Capital Territory (December, 2002), *Statement of the Objective and Principles for the Private Provision of Public Infrastructure*.

Brown, Christine (2005) “Financing Transport Infrastructure: For Whom the Road Tolls”, *The Australian Economic Review*, Vol. 38, No. 4, pp.431-8.

Cambridge Economic Policy Associates (March, 2005), *Public Private Partnerships in Scotland – Evaluation of Performance*, Final Report.

Commonwealth of Australia (June, 2000), *Australian Government Policy Principles for the use of Public Private Partnerships*, December 2006

Corner, David (2005), “The United Kingdom Private Finance Initiative: the challenge of allocating risk”, pp.44-61 in Graeme Hodge and Carsten Greve (Eds.) *The Challenge of Public-Private Partnerships: Learning from International Experience*, Edward Elgar, Cheltenham, UK, and Northampton, MA, USA.

Economic Planning Advisory Commission (1995), *Private Infrastructure Task Force Report*, Canberra.

English, Linda and James Guthrie (2003), ‘Driving privately financed projects in Australia: what makes them tick?’ *Accounting, Auditing and Accountability Journal*, Vol. 16, No. 3, pp.493-511.

English, Linda, (2005), “Using public-private partnerships to deliver social infrastructure: the Australian experience”, pp.290-304 in Graeme Hodge and Carsten Greve (Eds.) *The Challenge of Public-Private Partnerships: Learning from International Experience*, Edward Elgar, Cheltenham, UK, and Northampton, MA, USA.

Fitzgerald, Peter (January, 2004), *Review of Partnerships Victoria Provided Infrastructure*, Final Report to the Treasurer, Growth Solutions Group.

Flemming, John and Colin Mayer (1997), “The Assessment: Public-Sector Investment”, *Oxford Review of Economic Policy*, Vol.

Gann, D., T. Bradbury, and A. Davies (2005) “Can integrated solutions business models work in construction”, *Building Research and Information*, Vol. 33/6, pp. 571-579.

Hodge, Graeme, (2005), “Public-private partnerships: the Australasian experience with physical infrastructure”, pp.305-331 in Graeme Hodge and Carsten Greve (Eds.) *The Challenge of Public-Private Partnerships: Learning from International Experience*, Edward Elgar, Cheltenham, UK, and Northampton, MA, USA.

Hodge, Graeme (2007), "Public-Private Partnerships: An International Performance Review", *Public Administration Review*, Vol. 67, No. 3, May/June, pp.545-558.

Kakabadse, Nada, Andrew Kakabadse and Nick Summers (2007), 'Effectiveness of Private Finance Initiatives (PFI): Study of Private Financing for the Provision of Capital Assets for Schools', *Public Administration and Development*, Vol. 27, No. 1, pp. 49-61.

Klein, Michael (1997), "The risk premium for evaluating public sector projects", *Oxford Review of Economic Policy*, Vol. 13, No. 4.

Malone, Nonie (2005), 'The Evolution of Private financing of Government Infrastructure in Australia – 2005 and Beyond', *The Australian Economic Review*, vol. 38, No. 4, pp.420-30

Minder, Raphael (15 September, 2006), "A partnership sours as Sydney counts the cost of borrowing", *Financial Times* (London), p.15.

Mott MacDonald (July, 2002) *Review of Large Public Procurement in the UK*, Report to HM Treasury.

New South Wales Treasury (2001, 2006), *Working with Government: Guidelines for Privately Financed Projects*, (originally 2001) revised December 2006.

Northern Territory Treasury (July 2000), *Territory Partnerships: Policy Framework, April 2004* Tasmania: *Private Sector Participation in Public Infrastructure Provision – Policy Statement and Guiding Principles*.

Partnerships Victoria (July, 2003), *Use of Discount Rates in the Partnership Victoria Process*, Technical Note.

Pollitt, Michael (2005) "Learning from UK Private Finance Initiative experience", pp. 207-230 in Graeme Hodge and Carsten Greve (Eds.) *The Challenge of Public-Private Partnerships: Learning from International Experience*, Edward Elgar, Cheltenham, UK, and Northampton, MA, USA.

Queensland Treasury (September 2001), *Public Private Partnerships Policy: Achieving Value for Money in Public Infrastructure and Service Delivery*,

Quiggin, John (30 August, 2007), "Beware the PPP pitfalls", *Australian Financial Review*, p.70.

Shaoul, Jean (2005), "The Private Finance Initiative or the public funding of private profit?", pp. 190-206 in in Graeme Hodge and Carsten Greve (Eds.) *The Challenge of Public-Private Partnerships: Learning from International Experience*, Edward Elgar, Cheltenham, UK, and Northampton, MA, USA.

South Australian Treasury (September 2002), *Partnerships SA: Private Sector Participation in the Provision of Public Services*.

Tet, Gillian (6 December, 2006), PFU heading for record levels of Pounds 3.5bn" *Financial Times* (London), p.43.

UNISON (October 2005), *The Private Finance Initiative: A Policy Built on Sand*, A report for UNISON by Prof. Alyson Pollock, David Price and Stewart Player, Public Health Policy Unit, UCL.

Victorian Treasury (June 2000) *Partnerships Victoria*.

Western Australian Treasury (December 2002), *Partnerships for Growth: Policies and Guidelines for Public Private Partnerships in Western Australia*.

Appendix B

Research approach and methodological issues

B.1 Methodological issues

In order to address the main research question set out in Chapter 3 of this study, and to compare PPP projects to Traditional projects, we identified a number of key milestones. Any comparisons between these two fundamentally different procurement approaches are undeniably problematic:

- One of the difficulties of looking at projects in Australia's property and construction sector is that no two projects are alike.
- Moreover, procurement processes obviously differ both within and between projects and between different jurisdictions.
- In the case of PPPs, a 'whole of life' (or significant part of it) solution is difficult to compare with a traditional 'design and construct' project that relies on a separate operations and maintenance framework.

From these perspectives it is relatively simple to question any study such as this by arguing that methodological and comparative parity has not been achieved because of the obvious differences between projects. This could be done by pointing to the obvious difference between the two procurement models or by pointing out the unique, and hence non-comparative, characteristics between different projects themselves. In developing our methodology we were certainly aware of these issues but nevertheless felt that these potential criticisms are, given the nature of the market we were dealing with, unrealistic.

Another methodological strategy that we pursued was to source all of our data from the public domain. This had the advantage of avoiding the criticism that the data had been modified because it originated from a source with an interest in either of the procurement methods under question. There were three main sources of data:

- Parliamentary estimates committees and other budget papers;
- State Auditor General reports; and,
- Press releases and other material available on government departmental websites.

If any biases remain, they would have arisen from these public sources, and we have not had access to alternative sources that would call into question any of the data that we have used.

B.2 Research focus of the current study – PPPs vs Traditional procurement

Our focus in this study was to construct a methodology for evaluating the Australian PPP market (and by implication, the Traditional procurement route) using the most up-to-date data available in the public domain. To achieve this we set out to compare the project time and cost outcomes observed in the PPP market, with those projects delivered by governments via Traditional procurement methods. It was our aim to provide an accurate snapshot of Australia's evolving PPP market. Rather than extrapolating from, and generalising the results of a few PPP successes or failures based on a small number of case studies gathered from small populations of selected projects, our aim from the outset was to apply a rigorous methodological approach.

Originally, we had the objective of selecting matched pairs of PPP and Traditional projects. However, as the research project progressed we found that each project is a customised solution, and no two projects are exactly alike with respect to such indicators as location, size, type and value. This ruled out the matched pairs approach, as determining a 'matched pair' would have required the exercise of considerable subjective judgement, and that subjectivity would be questioned by readers.

B.3 Project selection criteria

Cognizant of criticisms that have been levelled at previous studies, we were careful not to build into our research methodology any particular bias. Given the focus of academic research on PPP projects, it was important that a methodology was developed to, in the first instance, represent the current state of the Australian PPP market. For this reason we:

- Chose to compare projects that had been contracted into the PPP market, and whose construction had been completed; and
- Did not see any methodological value in excluding or including projects that were seen as either Traditional/PPP successes or failures.

The selection criteria that we employed were designed to best reflect Australia's current PPP market alongside a pool of broadly comparable Traditional projects. These criteria were as follows:

Criterion 1: Projects undertaken since about 2000

Adopt recent projects for both PPP projects and Traditional projects. Australian governments have significantly changed and improved their PPP policies since about 2000⁷ and thus it is sensible to focus on PPP projects that have been arranged and procured using the current style of policies. Thus, we have focused the sample projects to be those primarily undertaken since 2000.

⁷ Government policy documents:

Criterion 2: Largely completed projects

To make realistic comparisons between forms of delivery for the capital component of projects (capex) all, or a majority, of the associated costs need to be brought to account. This includes preliminary works, detailed design, project management, procurement (possibly including construction) and completion costs such as settlement of any contractual disputes. We concentrated on completed or largely completed projects so that all or the majority of costs would be brought to account in most projects. All projects included data for at least one of the project stages 1 and 2 (denoted 'partial data' in Appendix C) with a majority of projects having 'full data' (i.e. data for all stages and the 'Full Period').

Criterion 3: Projects with a significant capex budget

PPP projects are generally only appropriate for large and significant projects due to the added requirement of arranging private finance as a part of the project. It is therefore appropriate to adopt a minimum project budget for projects included in the sample to ensure comparisons between Traditional and PPP procurements are comparable. Initial capex requirements chosen were:

- For NSW, projects with a capex of \$50 million or greater;
- For all other States and Territories, projects with a capex of \$20 million or greater.

Criterion 4: Similar number of PPP projects to Traditional projects

The total number of PPP projects that have been completed using current policies is relatively small. A full sample of these PPP projects was sought, and a similar number of Traditionally procured projects was chosen to broadly match this sample.

Criterion 5: Projects of similar complexity

There can be a wide differential between the relative complexities of particular projects, for example 'iconic' buildings versus 'normal' office facilities, and new developments on clear sites ('greenfields') versus refurbishments and/or upgrade projects ('brownfields'). Having prioritised projects using criteria 1 to 3, Traditional projects were selected on the basis of criteria 4 and 5. Where the number of potential Traditional projects was large (e.g. road projects), a random selection process was adopted to achieve criterion 4.

We concentrated on the eastern coast of Australia due to the larger number of projects undertaken in the region.

B.4 Formation of project pools

Application of the selection criteria outlined above means that the two different sets of project pools were formed in a way that is as far as possible unbiased, given the nature of the PPP market in Australia.

Projects considered and included in the sample came from NSW, Queensland, Victoria and a grouping titled ‘Other’ as detailed in Appendix C. A total of 206 projects undertaken since 2000 that met the capex requirements detailed under criterion 3 above were considered. Of these 206 projects:

- 50 were PPPs; and
- 156 projects were procured via Traditional governmental budgetary processes.

Based on criteria 1 to 5, the final sample set of 54 projects was chosen for analysis and comprised:

- 21 PPP projects; and
- 33 traditional projects.

These projects have been grouped into the following categories:

- Social infrastructure
- Transport
- Water and energy
- Information Technology

A summary of the spread of projects by infrastructure category, location and procurement strategy is detailed in Table B.1 and summarised in Figure B.1.

Table B.1

SUMMARY OF PROJECTS INCLUDED IN ANALYSIS

Type	NSW		Queensland		Victoria		Totals	
	PPP	Trad.	PPP	Trad.	PPP	Trad.	PPP	Trad.
Social	4	3	1	4	5	7	10	14
Transport	5	5	1	2	1	9	7	16
Water	2			1			2	1
IT					2	2	2	2
	11	8	2	7	8	18	21	33

Source: ACG/University of Melbourne

The sample exhibits a good balance between each of the infrastructure categories and a good spread between States and procurement strategy. There are sufficient samples of both Social Infrastructure and Transport projects to consider the performance of these categories in detail. The sample size is not adequate to undertake specific analysis of either IT or Water and Energy projects. The choice of projects of similar complexity was undertaken on a state-by-state basis wherever possible.

B.5 Project data

For each project, key information has been sought at the following four milestones (refer Figure B.2):

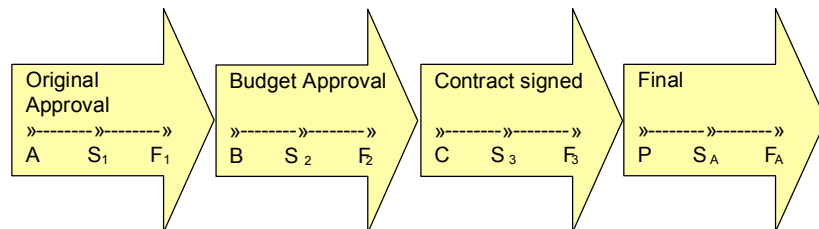
- Original approval for the project
- Approval of the final budget prior to going to contract
- The situation on signing of contracts
- The actual final project outcomes

The specific information sought at each milestone was:

- Estimated or actual project cost at the milestone
- The date
- The milestone
- Forecast or actual start of project
- Forecast or actual completion of capital component of the project

Figure B.2

SEQUENCE OF DATA (MILESTONES)



Source: ACG/University of Melbourne. Notes: A, B, C, P refer to the decision dates of each milestone ; S_n is the forecast/actual starting date of the project and F_n is the forecast/actual finishing date of each milestone.

The interpretation and definition of each milestone is important and these are detailed in Table B.2 below.

Table B.2

DEFINITION OF MILESTONE TERMS

Milestone	Definition
Original approval	The first formal approval of the project in terms of a realistic expectation that the project will proceed to market. It may be signalled by: <ul style="list-style-type: none"> • The approval of a capital budget for the project, frequently announced in government budgets; • Planning approval for a project to proceed; • Formal release of an expression of interest to the market by government; • A political announcement, often via a media release or the release of a strategic policy document.
Budget approval	Formal approved estimate of a project prior to contracting with the private sector. This data may: <ul style="list-style-type: none"> • Be identical to the original approval; • Reflect details contained in a project's detailed business case; • Be a Public Sector Comparator as used for many PPP projects; • Be a revised estimate; Be identical to the contract sum, this is generally the case for alliance contracts where the parties develop the target cost collectively.
Contract data	The prices and timing information agreed to in any contracts.
Actual (final)	The actual costs and timing of the delivered project. This amount should include any settlement from disputes.

Source: Source: ACG/University of Melbourne

B.6 Project Metrics

In terms of making sensible comparisons between Traditional and PPP project pools it is important to normalise the project data. It is well understood that the simplistic metrics in themselves do not create a true representation of a particular project due to the multiplicity and variety of changed circumstances and decisions that are a part of any major project. Nonetheless, statistical comparisons are useful indicators for comparative purposes and such comparisons are the objective of this study. A number of comparisons are made on a normalised basis for the reasons discussed below.

Overall project outcomes

A normalised comparison of original project expectation versus the actual performance was adopted, as computed via Equations 1 and 2, symbols are as defined in Figure B.2.

$$\text{Project Time Outcome (PTO)} = \frac{\text{Time}_{FA} - \text{Time}_A}{\text{Time}_{F1} - \text{Time}_A} \quad \text{Equation (1)}$$

Where,

Time_{FA} is the Final Actual completion time

Time_{F1} is the completion time forecast at the Original Approval

$Time_A$ is the time of the Original Approval

Expressed as a percentage change, a PTO result of:

- Zero percent indicates that a project was delivered as originally expected,
- Greater than zero percent means that there has been some time delay from that originally envisaged,
- Less than zero percent indicates time-savings have been made.

$$\text{Project Cost Outcome (PCO)} = \frac{\text{Actual Final Cost}}{\text{Original Cost Estimate}} \quad \text{Equation (2)}$$

Expressed as a percentage change, a PCO result of:

- Zero percent indicates that a project was delivered as originally expected,
- Greater than zero percent means that there has been some cost over-run from that originally envisaged,
- Less than zero percent indicates cost-savings have been made.

The indicators of overall project outcomes, PTO and PCO, provide an indication of the clarity surrounding the project at the time governments make key investment decisions. The closer the outcome to zero the better understood the project. Presumably the better understood the project, the better the public policy decisions surrounding priorities for investment.

Comparison of project outcomes based on final budget.

A normalised comparison of the final budget predications versus the actual performance will be adopted as computed via Equations 3 and 4, symbols are as defined in Figure B.2.

$$\text{Project Time Outcome (PTB)} = \frac{\text{Time}_{FA} - \text{Time}_B}{\text{Time}_{F2} - \text{Time}_B} \quad \text{Equation (3)}$$

Where,

$Time_{FA}$ is the Final Actual completion time

$Time_{F2}$ is the completion time forecast at the Budget Approval

$Time_B$ is the time of the Budget Approval

Expressed as a percentage change, a PTB result of:

- Zero percent indicates that a project was delivered as originally expected,
- Values greater than zero percent mean that there has been some time delay from that originally envisaged,

- A value less than zero percent indicates time-savings have been made.

$$\text{Project Cost Outcome (PCB)} = \frac{\text{Actual Final Cost}}{\text{Final Budget Estimate}} \quad \text{Equation (4)}$$

Expressed as a percentage change, a PCB result of:

- Zero would indicate that a project was delivered as expected when the project details had been properly scrutinised by professional project and departmental staff,
- Values greater than zero mean that there has been some time delay, from that originally envisaged,
- A value less than zero indicates that time savings have been made.

It would be expected that the accuracy in predictions based on Equations 3 and 4 would be more accurate (i.e. closer to zero) than for those computed based on original data (Equations 1 and 2).

The indicators of budget project outcomes, PTB and PCB, provide an indication of the expertise and general control governments have in terms of major procurement, and provide an indication of the quality and effectiveness of particular policies and processes.

Commercial commitment: Contract signing

A normalised comparison of contractual obligations versus the original expectations were computed as per Equations 5 and 6, symbols are as defined in Figure B.2.

$$\text{Project Time Outcome (PTC)} = \frac{\text{Time}_{F3} - \text{Time}_A}{\text{Time}_{FA} - \text{Time}_A} \quad \text{Equation (5)}$$

Where,

Time_{F3} is the forecast completion time at the Contract Signing

Time_{FA} is the Final Actual completion time

Time_A is the time of the Original Approval

Expressed as a percentage change, a PTC result of:

- Zero would indicate that a project was delivered as originally expected,
- Values greater than zero mean that there has been some time delay, from that originally envisaged,

- A value less than zero indicates time savings have been made.

$$\text{Project Cost Outcome (PCC)} = \frac{\text{Contractual Obligation}}{\text{Original Commitment}} \quad \text{Equation (6)}$$

Expressed as a percentage change, a PCC result of:

- Zero would indicate that a project was delivered as expected when the project details had been properly scrutinised by professional project and departmental staff,
- Values greater than zero mean that there has been some time delay, from that originally envisaged,
- Values less than zero indicate cost savings have been made.

Owing to the existence of greater knowledge about the project at contract signing, it would be expected that the accuracy of predictions based on Equations 5 and 6 would be greater (i.e. closer to zero) than for those computed on the basis of original data (Equations 1 and 2).

The indicators of contract signing outcomes, PTC and PCC, provide an indication of the expertise and general control governments have in terms of major procurement, and the commercial acumen of the personnel involved. Government should not commit to projects at this stage without a full understanding of all risks associated with a project, and without making commercial decisions to protect its position and achieve value for money outcomes. Thus, we can say:

- If the PTC and PCC indicators are not statistically close to zero, it would indicate that there are deficiencies in the procurement process.

Commercial surety

A normalised comparison of the original contract obligations versus the actual performance was calculated as shown in Equations 7 and 8. Symbols are as defined in Figure B.2.

$$\text{Project Time Outcome (ATC)} = \frac{\text{Time}_{F3} - \text{Time}_A}{\text{Time}_{FA} - \text{Time}_A} \quad \text{Equation (7)}$$

Where,

Time_{F3} is the forecast completion time at Contract Signing

Time_{FA} is the Final Actual completion time

Time_A is the time of the Original Approval

Expressed as a percentage change, an ATC result of:

- Zero would indicate that a project was delivered as originally expected.
- Values greater than zero mean that there has been some time delay from that originally envisaged.

- A value less than zero indicates time savings have been made.

$$\text{Project Cost Outcome (ACA)} = \frac{\text{Actual Final Cost}}{\text{Contractual Obligation}} \quad \text{Equation (8)}$$

Expressed as a percentage change, an ACA result of:

- Zero would indicate that a project was delivered as expected when the project details had been properly scrutinised by professional project and departmental staff.
- Values greater than zero mean that there has been some cost over-run, from that originally envisaged,
- Values less than zero indicate cost savings have been made.

ATC and ACC provide an indication of the surety of the commercial arrangements, and the protection the government has achieved from contractual gamesmanship in the procurement process.

They are clear indicators of the successful allocation of risk by the government, and of the structure supporting ongoing management of service delivery as envisaged at commercial close.

The eight indicators described by equations 1 to 8 were adopted in order to compare the performance of PPPs and Traditional arrangements in the delivery of major projects.

*Appendix C***List of PPP and Traditional projects****C.1 Full sample of PPP and Traditional projects analysed**

Table C.1

FULL SAMPLE BY STATE

Public Private Partnerships		Traditional Procurement	
NSW			
1	Alternative Waste Technology Facility	1	Bangor Bypass Stage 1
2	Cross City Tunnel	2	Bondi Junction Turnback
3	Lane Cove Tunnel	3	Bonville Bypass
4	New School Project #1	4	Lawrence Hargrave Drive
5	West Sydney Orbit (Westlink M7)	5	North Kiama Bypass
6	Bonnyrigg Living Communities Project (Social Housing)	6	Gosford and Wyong Hospitals
7	Long Bay Forensic And Prison Hospitals Project	7	Parramatta Justice Precinct
8	Mater Hospital, Newcastle	8	Sutherland Hospital Redevelopment
9	RailCorp Rolling Stock		
10	Broadwater Co-generation Plant II		
11	Parramatta Transport Interchange		
Victoria			
12	Casey Hospital	9	Albury Wodonga Freeway
13	County Court	10	Alfred Centre
14	Metropolitan Mobile Radio	11	Austin Health & Mercy Hospital for Women
15	Mobile Data Network	12	Australian Synchrotron
16	Royal Melbourne Showgrounds	13	Craigieburn Bypass
17	Southern Cross Station	14	Federation Square
18	Victorian Correctional Facilities	15	Geelong Road reconstruction
19	EastLink	16	Melbourne Sports and Aquatic Centre
		17	Middleborough Road
		18	Onelink tickets
		19	Regional Fast Rail
		20	Relocatable Classrooms
		21	Tulla Calder Interchange
		22	Calder Freeway
		23	Craigieburn Rail Project
			Dynon Port Rail Link
		24	Melbourne Theatre Company/Melbourne Recital Centre
		25	State Library Redevelopment
		26	Albury Wodonga Freeway
Queensland			
20	Brisbane North South Bypass Tunnel	27	Suncorp Stadium
21	Southbank Education and Training Precinct	28	The Upper Coomera State College (Stage One)
		29	Brisbane Correctional Centre
		30	Ipswich Motorway/ Logan Motorway Interchange
		31	Maryborough Correctional Centre
		32	Tugun Bypass Project
		33	Western Corridor Recycled Water Project

Source: Study results

C.2 New South Wales projects

We considered 25 PPP projects in NSW. Of these, 14 projects were initiated using the current NSW PPP policy and 7 of these have been completed. Of these, the station agreement was simply a finance transaction and there is incomplete data on 1 project. To supplement these results a full data has been obtained on 2 other privately financed projects completed since 2000.

Partial data is also available on 4 of the currently ongoing projects.

Comparable Traditional projects were sought for these 13 PPP projects.

Table C.2

NEW SOUTH WALES: PPP PROJECTS

Project name	Year 2000+	Completed	Comment
Alternative Waste Technology Facility	Yes	Yes	Full data
Cross City Tunnel	Yes	Yes	Full data
Lane Cove Tunnel	Yes	Yes	Full data
New School Project #1	Yes	Yes	Full data
Newcastle Community Health Centre	Yes	Yes	Insufficient data
Sydney Airport Rail – stations agreement	Yes	yes	renegotiated
West Sydney Orbit (Westlink M7)	Yes	Yes	Full data
Bonnyrigg Living Communities Project (Social Housing)	Yes	Ongoing	Partial data
Chatswood Transport Interchange	Yes	Ongoing	Insufficient data
Long Bay Forensic And Prison Hospitals Project	Yes	Ongoing	Partial data
Mater Hospital, Newcastle	Yes	Ongoing	Partial data
New School Project #2	Yes	Ongoing	Insufficient data
Police Property Portfolio	Yes	Ongoing	Not a major procurement style
RailCorp Rolling Stock	Yes	Ongoing	Partial data
Broadwater Co-generation Plant II	No	Yes	Full data
Parramatta Transport Interchange	No	Yes	Full data
Eastern Distributor Toll Road	No		
Hawkesbury Hospital	No		
M2 Toll Road	No		
M4 Toll Road	No		

Source: Study results

C.3 NSW Traditional projects

Data was sought from 77 Traditional projects in NSW that were commenced since about 2000 and had a significant CAPEX. The amount of publicly available data severely limited the number of projects where adequate data could be sourced. Full data was obtained for 5 Traditional transport projects and partial data obtained for 3 projects. Importantly, these projects broadly meet the criteria of matched projects with the NSW PPP projects.

Table C.3

NEW SOUTH WALES: TRADITIONAL PROJECTS

Project name	Year 2000+	Completed	Comment
Albury Wodonga Highway upgrade		Yes	Included under Vic
Bangor Bypass Stage 1	Yes	Yes	Full data
Bondi Junction Turnback	Yes	Yes	Full data
Bonville Bypass	Marginal ly earlier	Yes	Full data
Lawrence Hargrave Drive	Yes	Yes	Full data
North Kiama Bypass	Marginal ly earlier	Yes	Full data
Gosford and Wyong Hospitals	Yes	Ongoing	Partial data
Parramatta Justice Precinct	Yes	Ongoing	Partial data
Sutherland Hospital Redevelopment	Earlier	Yes	Partial data
14 new Hunter Valley rail cars		Yes	
41 new Outer Suburban rail cars – Stage 1		Yes	
Batlow Health Facility		Yes	
Holsworthy Sewerage Scheme Transfer Project		Yes	
Karuah to Bulahdelah – Section 1		Yes	
26 new major works projects for schools		Ongoing	
81 new Outer Suburban rail cars- Tranche 2		Ongoing	
Auburn hospital (concept plan)	Yes	Ongoing	
Bangor Bypass Stage 2	Yes	Ongoing	
Bayswater Water Pumping Station Upgrade		Ongoing	
Bondi Sewage Treatment Plant- Reliability Improvement and Modernisation Program			
Brooklyn and Danger Island Sewerage Scheme		Ongoing	
Bray Park Water Treatment Plant Augmentation		Ongoing	
Bulahdelah bypass		Ongoing	
Bus priority projects on strategic corridors			
Campbelltown Hospital Redevelopment			
Central Coast-Pacific Highway (Stage 1)			
Coolac Bypass		Ongoing	
Coopernook to Moorland		Ongoing	
Concord Hospital (Resource Transition Program)			
Conroy's gap wind farm		Ongoing	
Continuing police station upgrades			
Corrective services 1000 inmate beds		Ongoing	

Cowpasture Road Upgrade (Stage 1)	
Cronulla Line Duplication	
Dry boat storage and marine facility, Rozelle Bay	Ongoing
Epping to Chatswood rail Line	Ongoing
F3 Widening	
IICATS Wastewater (Telemetry)	
Illawarra Wastewater Strategy- Consolidation of Bellambi, Wollongong and Port Kembla Sewage Treatment Plants	
Information Management and Technology (Health)	
Leura, Mount Hay Rd to Bowling Green Ave widening to 4lanes	
Liverpool to Parramatta Transitway	
M4 East Extension	
M5 East, Mascot to Beverly Hills (Finalisation of acquisitions)	
Macquarie Generation	
Macquarie University Private Hospital Modification to North-West T-way Network Project	Ongoing
Modification-Sofitel Hotel, Sydney Olympic Park	
Mount Kuring-gai Industrial Estate Sewerage Scheme	Ongoing
New air-conditioned rail carriages for the CityRail network	Ongoing
New buses for Sydney and Newcastle	Ongoing
Newcastle Coal Infrastructure Group Coal Export Terminal, Kooragang Island	Ongoing
Newcastle Inner City By pass-West Charlestown Bypass	
Newcastle Port Multi-Purpose Container Terminal	
Newcastle Sewerage System upgrades	
Newell Highway-Upgrade	
North West Rail Link	Ongoing
Pacific Highway, Coopernook to Moorland	
Pacific Highway, Karuah to Bulahdelah-section 2 to 3	
Pacific Highway, Moorland to Herons Creek	
Pacific Highway-Brunswick Heads to Yelgun	
Pacific Highway-Coopernook Bypass	
Pacific Highway-Karuah Bypass	
Pacific Highway-Taree to Coopernook	
Parkes Intermodal Terminal	Ongoing
Parramatta Rd: Upgrade from Broadway to Woodville	
Proposed commercial office building for Sydney Water at Civic Place Precinct, Parramatta	Ongoing
Revitalisation of Inner Sydney Schools	
Sandgate Rail Grade Separation Project	
Stage 2 of the Camden Gas Project	Ongoing
Sunshine Electricity Company Co-generation Plants	
Sydney Port Corporation Intermodal Terminal Development	
Upper Georges river Wastewater	

Strategy	
Victoria Road Upgrade, Gladesville bridge to ANZAC bridge	
Windsor Rd, Boundary Rd to Henry Rd widening	
Windsor Rd, Mile End Rd to Boundary Rd widening (Planning)	
Wollongong Hospital (Illawarra Strategy)	
Woodford to Hazelbrook widening to 4 lanes (Planning)	
F3 Widening	
IICATS Wastewater (Telemetry)	
Illawarra Wasterwater Strategy- Consolidation of Bellambi, Wollongong and Port Kembla Sewage Treatment Plants	
Information Management and Technology (Health)	
Leura, Mount Hay Rd to Bowling Green Ave widening to 4lanes	
Liverpool to Parramatta Transitway	
M4 East Extension	
M5 East, Mascot to Beverly Hills (Finalisation of acquisitions)	
Macquarie Generation	
Macquarie University Private Hospital	Ongoing
Modification to North-West T-way Network Project	
Modification-Sofitel Hotel, Sydney Olympic Park	
Mount Kuring-gai Industrial Estate Sewerage Scheme	Ongoing
New air-conditioned rail carriages for the CityRail network	Ongoing
New buses for Sydney and Newcastle	Ongoing

Source: Study results

Victorian projects

C.4 Victorian PPP projects

All 18 current Victorian projects have been considered and of these 12 have completed the CAPEX component of the project. Of the completed projects the Film and Television studio, Enviro Altona and Wodonga Waste Water treatment fall outside the sample criteria. Complete data has been found for 7 of the 9 eligible projects with one of the projects with inadequate data being technically older than the timing criterion. Partial data is also available on the nearly completed Eastlink project. Comparable Traditional projects have been sought for these PPP projects.

Table C.4

VICTORIA: PPP PROJECTS

Project name	Year 2000+	Completed	Comment
Casey Hospital	Part	Yes	Full data
County Court	Part	Yes	Full data
Docklands Film & Television Studio	Part	Yes	Not representative of infrastructure
Emergency Alerting System	Yes	Yes	Insufficient data
Echuca/Rochester Water Treatment	Part	Yes	Insufficient data
Enviro Altona	Yes	Yes	No longer a PPP project
Metropolitan Mobile Radio	Yes	Yes	Full data
Mobile Data Network	Part	Yes	Full data
Royal Melbourne Showgrounds	Yes	Yes	Full data
Southern Cross Station	Yes	Yes	Full data
Victorian Correctional Facilities	Yes	Yes	Full data
Wodonga Wastewater Treatment Plant	Part	Yes	Too small
Ballarat Water Treatment	Yes	Ongoing	
Barwon Water Biosolids Treatment	Yes	Ongoing	
EastLink	Yes	Nearing completion	Partial data
Melbourne Convention Centre	Yes	Ongoing	
Royal Children's Hospital	Yes	Ongoing	
Royal Women's Hospital	Yes	Ongoing	

Source: Study results

C.5 Victorian Traditional projects

Data was sought from 47 traditional projects in Victoria that were commenced since about 2000 and had a significant CAPEX. Publicly available data was limited for many projects. Full data was obtained for 11 Traditional transport projects and partial data obtained for 6 projects. Importantly, these projects broadly meet the criteria of matched projects with the Victorian PPP projects.

Table C.5

VICTORIA: TRADITIONAL PROJECTS

Project name	Year 2000+	Completed	Comment
Albury Wodonga Freeway	Yes	Yes	Full data
Alfred Centre	Yes	Yes	Full data
Austin Health & Mercy Hospital for Women	Yes	Yes	Full data
Australian Synchrotron	Yes	Yes	Full data
Craigieburn Bypass	Yes	Yes	Full data
Federation Square	Early	Yes	Included as iconic building match to Southern Cross
Geelong Road reconstruction	Nearly	Yes	Full data
Melbourne Sports and Aquatic Centre	Yes	Yes	Partial data
Middleborough Road	Yes	Yes	Full data
Onelink tickets	No	Yes (just)	Included to match PPP IT projects
Regional Fast Rail	Yes	Yes	Full data
Relocatable Classrooms	Yes	Yes	Full data
Tulla Calder Interchange	Yes	Nearly complete	Full data
William Barak Bridge	Yes	Yes	Insufficient data
Calder Freeway	Yes	Ongoing	Partial data
Craigieburn Rail Project	Yes	Ongoing	Partial data
Dynon Port Rail Link	Yes	Ongoing	Partial data
Melbourne Theatre Company/Melbourne Recital Centre	Yes	Ongoing	Partial data
State Library Redevelopment	Yes	Ongoing	Partial data
Beacon Cove - Princess Pier		Yes	
Clifton Hill Rail Project	Yes	Ongoing	
Commonwealth Games Village	Yes		
Dandenong Rail Corridor Project	Yes	Ongoing	
Deer Park Bypass	Yes	Ongoing	
Epsom Water Recycle			
Geelong Ring Road Sec 1	Yes	Ongoing	
Geelong Ring Road Sec 2	Yes	Ongoing	
Geelong Ring Road Sec 3	Yes	Ongoing	
Goldfields Superpipe	Yes	Ongoing	
Goulburn Valley Highway			
Grace McKellar Centre, Geelong	Yes	Ongoing	
Knox Health Services	Yes	Ongoing	
Melbourne Rectangular Stadium	Yes	Ongoing	
Mildura Rail Upgrade			
Monash-City Link - Westgate Upgrade	Yes	Ongoing	
Mount Gellibrand Wind Farm	Yes	Ongoing	
National Gallery of Victoria	Nearly	Yes	
North Melbourne Station	Yes	Ongoing	
Pakenham Bypass	Nearly	Nearly complete	
Parkville Gardens (former Commonwealth Games Village)	Yes	Ongoing	
Royal Melbourne Hospital Emergency	Yes	Ongoing	

SmartBus	Yes	Ongoing
Telecommunication	Yes	Ongoing
Purchasing & Management Strategy		
Tram 109 Project	Yes	Ongoing
Vermont South Tram Extension	Yes	Ongoing
Wimmera Mallee pipeline	Yes	Ongoing
Wodonga rail bypass	Yes	Ongoing

Source: Study findings

Queensland projects

C.6 Queensland PPP projects

Queensland has been slower than either NSW or Victoria to implement their new PPP policy. Partial data is available on 2 ongoing projects shown below.

Comparable Traditional projects were sought for these PPP projects.

Table C.6

QUEENSLAND: PPP PROJECTS

Project name	Year 2000+	Completed	Comment
Brisbane North South Bypass Tunnel	Yes	No	Partial data
Southbank Education and Training Precinct	Yes	No	Partial data
Brisbane Airport Rail Link	No	Yes	Too early

Source: Study results

C.7 Queensland Traditional projects

Data was sought from 32 traditional projects in Queensland that were commenced since about 2000 and had a significant CAPEX. Publicly available data was extremely limited for the majority of projects. Full data was obtained for 1 Traditional school building, nearly all required data for a stadium and partial data obtained for 5 projects.

Table C.7

QUEENSLAND: TRADITIONAL PROJECTS

Project name	Year 2000+	Completed	Comment
Suncorp Stadium	Yes	Yes	Most data
The Upper Coomera State College (Stage One)	Yes	Yes	Full data
Brisbane Correctional Centre	Yes	Ongoing	Partial data
Ipswich Motorway/ Logan Motorway Interchange		Ongoing	Partial data
Maryborough Correctional Centre		Yes	Partial data
Tugun Bypass Project		Ongoing	Partial data
Western Corridor Recycled Water Project		Ongoing	Partial data
Abbot Point Coal Terminal Expansion Stage 2		Yes	
Abbot Point Coal Terminal Expansion Stage 3		Yes	
Arthur Gorrie Correctional Centre		Ongoing	
Beerburum to Landsborough Duplication			

Bentley Park College	
Brisbane Magistrates Court	Yes
Caboolture to Beerburrum track duplication	
Cairns City Council Administration Centre	
Corinda to Darra Third Track	
Forest Lake State High School	
Gateway Upgrade Project	
Gold Coast Convention & Exhibition Centre	Yes
Gold Coast Desalination Plant	
Ipswich Motorway Upgrade - Wacol to Darra	Ongoing
Kelvin Grove Urban Village Stage 1	Yes
Kogan Creek Power Project	
Millennium Arts	Yes
Mulligan Highway	Yes
Pacific Motorway - Neilsens Road Interchange	Ongoing
Princess Alexandra Hospital	Yes
Robina to Varsity Lakes Extension	
Stage 3 upgrade of Hinze Dam	
Townsville Women's Correctional Centre	Ongoing
Woodford Correctional Centre expansion	Ongoing

Source: Study results