Private provision of transport infrastructure – unveiling the inconvenient truth in New South Wales

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1 Background: the Public Private Partnerships policy

Public Private Partnerships[1] are public procurement policies involving the private sector providing asset-based services that are traditionally the responsibility of the government (Broadbent and Laughlin, 2004, p. 4). They are seen as an umbrella term that encompasses a range of financial and organisational relationships between the public and private sectors (Edwards *et al.*, 2004, p. 17). These relationships are established by a concession contract which enables a commercial organisation to Design, Build, Finance and Operate an asset for an agreed period, thus they are also known as DBFOs[2]. The length of the concession period is determined on the basis that the sales of the asset-based services are sufficient to discharge construction, financing, operation and maintenance costs plus a reasonable profit for private investors (Duffield, 2001, p. 27). At the conclusion of the concession, the ownership of the property will normally revert back to the public sector at no charge[3].

In the DBFO framework, the private sector is contracted to supply a bundling product which comprises two distinct elements: the creation of an asset, i.e. the construction of a physical infrastructure (common examples are hospitals, prisons, toll roads and schools); and the whole-of-life asset management (WWG, 2006, p. 8). On the other hand, the public sector purchases from the private provider a service instead of an asset, with pre-defined payment levels, which are payable only when the service meets required standards (Debande, 2002, p. 359). The payment mechanism is linked to the requirements set out in the output specification and the results of the risk assessment (Akbiyikli *et al.*, 2006, p. 72). Its objectives are to provide private proponents a number of incentives to deliver VFM. The recoupment of costs and future profit rely on a flow of suitable quality services from the asset, thus it encourages the private proponent to build the required asset on cost, and to use efficient technology (Debande, 2002, p. 360). Further, the revenue receipts flow to the private operator only when the construction of the asset has been completed and the service is fully operational, thus it also motivates the private consortium to finish the construction element early. Strong evidence suggests that the PPP contractual mechanism has better facilitated the integration between the asset creation and its ongoing management compared with contracts delivered under the traditional method (NAO, 2003). Figure 1 depicts the incentive scheme established through the interdependence of these core elements in an archetypical DBFO contract. The dashed line connecting the "payment mechanism" and the "asset" iterates the principle of DBFO, that is, the purchase of the service not the asset itself.

Transport infrastructure projects, where the private sector bears the market risk (NSW Treasury, 2007b, p. 1) are generally funded by user charges (English and Guthrie, 2003, p. 53). In these capital-intensive projects, the creation of assets is likely to dominate,

[1] It is also termed Privately Financed Projects (PFPs) in the procurement policy of NSW – WWG 2006. The early generation of the British equivalent is named Private Finance Initiative (PFI).

[2] The use of terminology varies between countries. In the UK, DBFO in transport involves the transfer of ownership at the end of concession period (Glaister *et al.*, 2000) while the similar arrangement in Australia is termed BOOT (Debande, 2002, p. 380).

[3] The zero reversion cost should not be seen as buying a property at no cost. Financial commitments from the public purchaser to the private owner during the concession period, as argued by Heald (2003, p. 359), were in fact paying for the post-concession life of the property.

whereas the provision of the associated service, e.g. toll collection, roadwork and lighting maintenance, is a relatively minor component of the arrangement (Walker, 2005). The public sector's involvement is limited to monitoring the adherence to the contract and renegotiation of changes to services supplied (Debande, 2002, p. 367). In exchange, the private operator negotiates a concession right with the government for a period (English, 2005) that warrants the rate of return to private equity (Arndt, 1998; Glaister *et al*., 2000). These projects are also known as stand-alone projects (cf. Akbiyikli *et al*., 2006; WWG, 2006, p. 55).

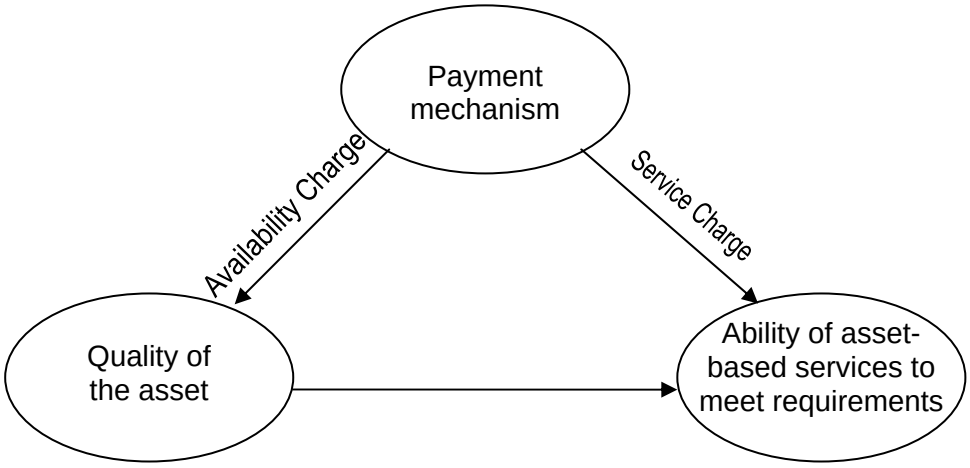

Figure 1 – Relationship between the payment mechanism, quality of the asset and asset-based services

In NSW, project financing of the DBFO model is typically 'non-recourse' to government. Cash flows generated from the project are the main source of return on equity and debt repayment. Each project is organised in a separate legal entity in the form of a "Special Purpose Vehicle (SPV)"created under private ownership. The SPV is also the legal owner of the project related assets during the concession term (Kozarovski, 2006, p. 309). Complex relationships between the SPV and the contracting government agency are intertwined by two primary documents: (i) the lease agreement that grants the SPV a leasehold estate for a specified period (Kozarovski, 2006, p. 311); and (ii) the Project Deed which specifies the financial arrangements and respective responsibilities between the various parties. The distinct quality of the DBFO package is that there is a minimum interface between the government body and other parties in the relationship cobweb. Once the project reaches financial close, most aspects of the contract's execution and management are facilitated directly by the SPV. The contractual interfaces of the DBFO road model are exhibited in Appendix A.

2 Introduction

In Australia, tollways have been one of the most active Public Private Partnership (PPP) markets. Since the 1980s, PPPs have delivered 11 toll roads equivalent to $12 billion investment in the country (Ernst and Young, 2007, p. 1). Over the years PPP toll roads have evolved to a stage where greater benefit is being delivered to the public sector. Brown succinctly describes the status quo of the Australian market of private toll roads (Brown 2005, p. 437):

> *The structure of early toll road agreements seemed to be tilted in favour of the private sector, with the existence of [material adverse events] clauses and the ability to significantly delay rent payments to the government. In more recent examples the private sector assumes more of the downside traffic risk while the government shares in excess toll revenue.*

Given that Australia's road infrastructure is in need of an urgent upgrade (cf., BCA, 2005) and the strong political will to improve our ageing transport infrastructure (cf., Scott and Hepworth, 2007; NSW Treasury, 2007a, p. 9), the popularity of PPP tollways is likely to continue. New South Wales (NSW) is the Australian state that most favours PPP schemes in tollways, both in terms of number and the total financial value (English, 2006, p. 257, Table 1), and will remain an activist in this area. Eight out of eleven PPP tollways mentioned above were developed in NSW. These are the Sydney Harbour Tunnel (SHT), the Eastern Distributor (ED), the Hills M2 Motorway (M2), the M4 Motorway (M4), the M5 South-West Motorway (M5), the Westlink M7 (M7), the Cross City Tunnel (CCT) and the Lane Cove Tunnel (LCT). The three remaining projects include the North-South Bypass Tunnel in the State of Queensland, Melbourne CityLink (MCL) and EastLink in the Victoria (Ernst and Young, 2007, Figure 1).

To date, no systematic study of PPP in the transport sector has been sighted. The lack of information has been the major obstacle for any fruitful research in the area. The information inadequacy is due to the nature of the PPP phenomenon and the transparency of PPP contracts. With an average life of 60 years (Broadbent and Laughlin, 2005, p. 75) most projects have to date only reached their operational phase. In Australia, only one tollway is approaching the end of its concession period (M4's concession ends in 2010). None of the above mentioned 11 tollways has produced a performance evaluation report by governments. Other short-lived PPP transport projects were either sold (e.g. Cross City Tunnel) or in financial turmoil (e.g. Airport Link and Lane Cove Tunnel in Sydney) soon after the construction was completed.

The most contentious reason for information incompleteness is governments' position on confidentiality. The opaqueness of PPP contracts has hindered any plausible objective study into the understanding of how the partnership arrangements were derived and subsequently executed. Contract details 'pioneer' their absence in the public domain over projects in other countries (NSWAGO, 1995). Information concerning PPP contracts is only limited to the publicly disclosed contract summaries. Their reliability was scrutinised as having notable omissions, including an absence of information about the risks undertaken and returns warranted by the government (Walker and Walker, 2000, p. 218-220), and as being inaccurate because changes could occur after they had been tabled in Parliament (NSWAGO, 2005).

This paper offers a systematic overview on the proliferation of tollroads delivered under the Public Private Partnerships structure in the Australian state of New South Wales.[4] In particular, the study proposes to disentangle the intricate web of contractual relationships to understand the underlying objectives of different types of PPP tollroads and to evaluate the effectiveness of the contractual and financial mechanisms in incentivising risk undertaking. It has long been advocated by PPP proponents that the scheme desires to achieve optimal risk allocation between the public and private sectors, thus representing value for money (VFM) to the general public. What has not been widely recognised is that initially PPPs were launched as an experiment to pave the way for widening private participation in road service deliveries. Along this road, there are many failures but there are also some promising outcomes (for example the MCL and M7). Primarily, PPPs had been implemented by cost-saving-driven governments as the vehicle to deliver infrastructure-based services, few of these progressions had taken into account the VFM to the public interest. This elucidates that no matter how carefully the scheme is designed and how much the incentive mechanism evolves, PPP deliveries will remain sub-optimal.

[4] The Victorian government is at the forefront of using PPPs to deliver public infrastructure including the two billion-dollar tollroads, the Melbourne Citylink and Melbourne Eastlink. To enable a fruitful analysis within the required word limit, discussion herein focuses on NSW experience only.

Evidence presented herein is based on data obtained from the public domain, including contract summaries of roads, parliamentary inquiries, public sector agencies' reports, academic and professional commentaries, and news press. A number of performance audit reports released by the state auditor provide resourceful data for the present research. The organisation of this paper is as follows. The next section examines the PPP terminology and the subtle relationships intertwined by the key elements in an archetypical PPP. Section three unfolds the evolution of PPPs in road infrastructure and studies a number of cases. Section four discusses these findings. The paper summarises its conclusion and suggests future research in the final section.

3 DBFO in road infrastructure

3.1 DBFO in transport: various forms

All DBFO tollways in NSW are *usus fructus*, i.e. the right to generate income from ownership (Buitelaar *et al.*, 2007), in which the private concessionaire is granted a right, after constructing the asset, to operate the facility and to charge final users. The key features of these tollroads are summarised in Appendix B. They are financed by users-pay, in which motorists are charged at the point of usage[5]. The users-pay program expands the fund available to government in two ways: a) the initial capital is sourced from private equity and debt; and b) subsidies from users to pay for the cost of capital and maintenance and operation. Three types of users-pay DBFOs are identified. At the two ends of the spectrum, there are return-guaranteed DBFOs and non-recourse DBFOs.

The return-guaranteed form obligates the government to underwrite all risks for the private proponent. It involves government taking on explicit demand risk and financial risk in the forms of interest-free loans and/or revenue guarantees. For example, the NSW Government is the sole bearer of demand risk of the Sydney Harbour Tunnel because the revenue to the private consortium has been guaranteed by the Ensured Revenue Stream (ERS) Agreement (Mills, 1991). In other cases such as the Eastern Distributor and the M2, although the private concessionaire is required to pay base and incentive rents, payments of base rent can take the form of promissory notes, and their redemption can only be triggered by the event in which private investors have earned the minimum *unusually optimistic* after-tax real rate of return (RTA, 1998; NSWAGO, 2000). In many cases, government would never receive any share of toll revenues and barely receive any of the base rent because the lower than expected traffic flows are unlikely to deliver the excessively high rate of return.

Project financing for non-recourse DBFOs relies primarily on the expected cash flow of the project and is typically on a "non-recourse or limited recourse" basis. This means recourse is limited to the SPV and its assets, and the lenders have no financial recourse for repayment of their loans against the public sector contracting entity (Debande, 2002, p. 357). Lying in between is the risk-benefit-sharing DBFOs. They are masqueraded as free from traffic risk to government, but government has committed to allowing returns on private equity to take precedence over value for money to the general public. Risk bearing is balanced by way of shifting the cost to road users. Key attributes of these three types of DBFOs are highlighted in Table 1. Table 1 indicates that gradually, the risk-sharing is moving toward an approach in which government shares more upside gains with concessionaires, whereas the downside risk has been passed on to users and the community.

[5] In NSW, no tolls are to be levied on buses providing regular public transport services or for any other vehicles exempted under the Roads Act or its Regulations (RTA, various summaries of contracts). In Victoria, no tolls are to be charged on exempt vehicles such as a police vehicle and vehicles performing emergency services under the authority of the State (CityLink, 1995).

Table 1 – DBFO Tollway Structures

Attribute	*Return-Guaranteed*	*Risk-Benefit-Sharing*	*Non-Recourse*
Program objective	Paving way for private participation in operating transport infrastructure	Moving toward a more balanced risk-benefit sharing partnership	No net cost of government
Project finance	Independent of project's expected cash flows[(a)]	In/dependent of project's expected cash flows	Dependent on project's expected cash flows
Toll variations[(b)]	Government regulated	Government regulated	Government regulated
Users' demand elasticity to toll	Low[(c)]	High (when there exist free competing routes)	High (when there exist free competing routes)
Traffic projections	Over-forecasting	Over-forecasting	Over-forecasting
Volume risk	Government	Road users/Government	Road users/Government
Design and construction risk	Concessionaire (except for SHT)	Concessionaire	Concessionaire
Maintenance & operation risk	Primarily with Government	Primarily with Government/Road users	Government / Road users
Network risk	Government	Government / Community	Government / Community
Government financial contribution	Yes (fixed sum payment / interest-free loan / revenue guarantee)	Yes	Not directly
Government guarantee to equity return	Yes	Yes	Not directly
Revenue share	No	Yes (but highly unlikely due to required return on equity is unrealistically high)	Yes (but highly unlikely due to erroneous traffic forecasts)
Traffic-volume based payment	Toll collections pay for project cost and private equity return	Presumably, concessionaire pays land rent for the license to undertake the project	Concessionaire pays BCF for the license to charge and retain toll
Payment options for rent	n/a	Cash or subordinated, non-interest bearing promissory notes	Cash only (no evidence of alternative form)
Cost saving to government	No. potentially unlimited cost to government	No, potentially unlimited cost to government	Yes, passed onto users
Examples	SHT; M4; M5	ED; M2	CCT; M7; LCT

Source: Debande (2002); NSWAGO (various years); RTA Contract Summaries (various years)

(a) Toll revenue and government contribution/guarantee to ensure repayment of all project costs plus required return on equity.
(b) Most motorway tolls are set by each motorway operator. Toll price adjustments normally follow CPI movements or AWE trend in the case of ED and must be subject to governments' agreement, except for SHT in which the RTA sets the toll.
(c) Sydney Harbour Bridge is a close substitute for the SHT. By agreement with the SHTC, toll pricing of both the government-owned bridge and the tunnel is regulated by the government and must charge the same level of toll, thus price elasticity of the SHT is expected to be low.
(d) AWE: Average Wage Earning; BCF: Business Consideration Fee; CPI: Consumer Price Index

3.2 Risk sharing in DBFO toll roads: an objective-orientated approach

Main risks that are common to urban toll roads include: design risk, construction risk, maintenance and operation (M&O) risk, traffic risk, and network risk (cf., Arndt, 1998; NAO, 1998; Debande, 2002). In many instances, risks of design and construction have been satisfactorily transferred to the private sector (Mills, 1991; Arndt, 1998). Indeed, road projects that involve the highest proportion of construction component were found to generate the greatest VFM (Debande, 2002). Another significant benefit brought about by the private sector's participation is the certainty in timing of completion. All PPP tollways in NSW were completed and operational ahead of schedule (NSWIIG, 2005). However, the haziness as to who should bear the remaining risks makes it difficult to disentangle the lines of responsibility.

It is considered that packaging construction with M&O would incentivise the private company to deliver good quality assets. But risk of M&O is affected by traffic usage and government regulations. Wear and tear of the road surface is proportional to traffic flows. The cost of M&O is therefore affected by traffic volume. In addition, it is not uncommon that road contracts have a built-in penalty to abate any service not meeting predetermined standards. Safety is one of the performance indicators. Certainly safety can be improved by better road conditions but more effective measures like safety regulations such as speed limit and seat belt enforcement are in the sole control of government. In other words, the private proponent is not in the best position to manage the risk of M&O.

Demand or traffic volume is notoriously difficult to forecast, but is crucial to the financial viability of road projects (Hensher and Goodwin, 2004). Given neither the public sector nor the private sector has control over traffic risk, hence the principle of DBFO cooperation is to shift a proportion not all of this risk to the private sector. To a very large extent, the traffic flowing over a toll road is dependent on government's town planning decisions that affect the rest of the network, the provision of competing toll-free public transport, and land use in areas feeding into the road (Quiggin, 2005, p. 18). To minimise the adverse effects of these new developments to the traffic travelling the concession road, road closures and/or suppression of competing services are often negotiated to protect private companies against network risk, thus shifting the risk to the general public.

Risk transfer had been absent in early DBFO tollways. Early experiments, e.g. the SHT and the M2 are indeed risk-free investments to private proponents. More recent projects experienced a substantial reduction in the scale of guarantees provided. Yet there still exist implicit promises to protect the private sector against downward demand risk and to warrant return on private equity. Such protection to the private consortium can be extended to unlimited guarantees through the termination clauses of "Force Majeure" (Debande, 2002) or "Material Adverse Events (MAEs)" (Arndt, 1998). The remainder of this section will examine in detail the objectives, risk profiles, incentive measures and actual performance of the three types of DBFO roads identified.

3.2.1 Return-guaranteed DBFOs

DBFO roads in this group are the first experiments to test the market's appetite and to induce private participation in the provision of road investments and operations. Not only are the private operators entitled the right to charge motorists for the use of the facility, private capital investments are immune to risks. Project financing comes from public sources in various forms: government interest-free loans (e.g. SHT, M4 and M5) and revenue transfer from an existing infrastructure (e.g. SHT). These private operators have recourse to public funding when cash flows of the project are lower than expected. In an extreme case-the SHT, recourse to public funding is independent from the service provided (Arndt, 1998), but is calculated by the departure of toll receipts from projected toll revenue (NSWAGO, 2007).

Sydney Harbour Tunnel (SHT)

> *It appears to be a private sector project when virtually all of the post-construction risks remain with the State.*
>
> NSW Audit Office (NSWAGO, 1995, p. 36)

The contract was entered into in 1987, by the Department of Main Roads NSW (now known as the Roads and Traffic Authority, or RTA) with the Sydney Harbour Tunnel Company (SHTC) (Mills, 1991). The central financing instruments were the $223 million interest-free loan (the Net Bridge Revenue Loan) provided by the RTA (NSWAGO, 2003, p. 217) and the $394 million 30-year inflation-indexed bonds issued to the market by the SHTC (Mills, 1991). The repayment of the RTA's loan is due in 2022 and is subordinate to all other obligations of SHTC (NSWAGO, 2003, p. 217). The continuously falling in toll collections and rising operational expenses (NSWAGO, 2007) have impinged on the company's ability to make the repayment. The RTA has also underwritten the principal outstanding on the bonds, irrespective of the actual usage of the tunnel (Arndt, 1998, p. 22). The net present value of this underwriting liability was estimated at $345 million as of 30 June 2006 (NSWAGO, 2006a, p. 128).

Few DBFO projects did not transfer risk of cost overruns on construction. SHT is a prime example. Entire toll revenue of both the Sydney Harbour Bridge and the Tunnel were used to support the tunnel's construction (Mills, 1991, p. 282). Potential delay in tunnel opening would not defer revenue flowing to the SHTC, because revenue was guaranteed to the company starting from October 1992 irrespective of whether the tunnel was in use by that time (Mills, 1991, p. 287). Not only did the state government directly contribute to the cost of construction, but it has also underwritten the revenue stream for the SHTC. The ERS obligates the government to top up these payments in the event that actual toll receipts fall below the predetermined threshold (SHTA, 1987, Schedule 5). As the result of the widening gap between toll collections and operating expenses incurred by SHTC, the ERS paid by the authority has amounted to $176.7 million (nominal value) for the four-year period of 2004-2007 (NSWAGO, 2007). Packaging creation and maintenance and operation of the asset into one bundle did not incite the concessionaire's efficiency in either phase, because risk of M&O, such as road conditions and slow clearance of vehicle breakdowns, did not constitute a threat to SHTC's cash flows that are guaranteed by government. This condition will instigate the company to minimise the level of expenditure on maintaining the tunnel condition (Mills, 1991, p. 287).

The financial package offered by the NSW government was rated as "unusually attractive" by international investors (Tiong, 1995). The private company only put in equity investment of $7 million, which was equivalent to 1% of the project's value (Mills, 1991). The government-underwritten bonds had a maturity longer than the usual maturity of 10 to 20 years in the Australian capital market, meanwhile private investors stood to earn a 6% risk-free inflation-indexed yield (Tiong, 1995, p. 187). The 6% estimate on the risk-free return has not included the state's liability to cover the private proponent's tax payable to the Australian Taxation Office (ATO). In 2003, a $24 million liability was added to the State's bill (NSWAGO, 2003, p. 209). The liability covers SHTC's past and future taxes as the result of the RTA's failure attempt to negotiate with the ATO for the allowance of deductible depreciation by the tunnel company.

3.2.2 Tipping the scale: toward a more balanced approach to risk-benefit-sharing

With the growing private interests in public infrastructure investments, government appears to exercise greater precision in balancing risk-benefit sharing in order to minimise financial liability to the state. Favourable contractual conditions had been negotiated, entitling the

State to benefit from upside market movements through revenue sharing. However, the occurrence of certain MAEs under which the concessionaires' capacity to earn toll revenue is adversely affected will still trigger contract renegotiations and potential financial compensation by government. Traffic risk seems to be no longer the sole responsibility of the public sector since there are no direct payments or guarantees by government. Instead, private operators are required to pay land rents for the concession right to levy tolls.

Projects of this kind include the M2 and ED. Financial benefit of government is second to that of the concessionaires. Receipts of land rent in cash are subject to the condition that required return to private equity has been realised. These annual post tax real rate of returns are 12.25% and 10% for M2 (NSWAGO, 2000) and ED respectively (RTA, 1998). The capacity to earn an internal rate of return relies on the accuracy of traffic forecasts estimated in the private proponent's Base Case Model. None of these land rents has been paid in cash, suggesting optimism in traffic projections persists across time and projects.

M2 Motorway

> *These lease arrangements for the M2 are a first, and allow the true costs of the M2 to be more accurately reflected than occurred in earlier projects.*
>
> NSW Audit Office (NSWAGO, 1995, p. 89)

The M2 sets a precedent in the Australian privately financed road market. The above quote refers to the land rent[6] payable by the concessionaire for the *usus fructus*. The present value of these rent payables was estimated at $1.1 million in 1995 (NSWAGO, 1995, p. 13), but it is equivocal that this value is realisable. Both contracting parties agreed that cash payments would not commence until 2028 (NSWAGO, 1995, p. 86). Or, it may not commence at all during the entire length of the concession if returns to private equity fall short. By this time, the Government's policy priority remained attentive to encouraging private provision in state infrastructures (NSWAGO, 1995, p. 82). The M2 project features several favourable conditions such as a safe return in a highly risky investment that is enabled by rent payment deferrals, free use of land owned by RTA, indemnity from RTA against any future increases in cost, and an exemption from state land tax. It is however, a marginal improvement over the SHT as the private operator has no recourse to the State when traffic income falls below projections.

The Hills Motorway Limited (Hills) [7] was chosen as the final bidder on the basis that the proponent was the only one offering to undertake the project "without any requirement for RTA's financial contribution or any RTA underwriting" (NSWAGO, 1995, p. 49). The concession is of 45 years length, after which the ownership of the motorway transfers to the government at no cost. It can be ended as early as in 36 years if the motorway returns investors a post tax annual benefit of 16.5% (NSWAGO, 1995, p. 22). At financial close, the annual pre-tax cash return to equity was estimated at 18.5% per annum vis-à-vis 6%[8] return to RTA (NSWAGO, 1995, p. 12). The value of rent payable by the Hills equals to $887.4m in nominal dollars (NSWAGO, 1995, p. 86). Until the project has realised a real post tax return of 12.25% per annum, Hills has the discretion to pay rent in either cash or non-interesting bearing promissory notes which are subordinated to all other debts. Until then, the RTA has no right to present any of the notes for cash payment. Although Hills requires no financial support from RTA, the government has made "in kind" contribution of $120m in land

[6] The term "rent" should not be misinterpreted as the payment for leasing the land on which the motorway is running; it indeed pays for the right to levy tolls. To avoid confusion, when discussing payment/value of the right to toll, this paper uses the term adopted by RTA and calls it "land rent" or "rent".

[7] Hills was acquired by Transurban in 2005, who now owns and runs the M2.

[8] The 6% return has not considered the value of land contributed by RTA (NSWAGO, 1995, p. 88). The inclusion of the land value will of course further deteriorate the return to RTA.

acquisition and $66.5 million in upfront capital payment (NSWAGO, 1995, p. 49; Walker and Walker, 2000, p. 218; NSWIIG, 2005, Appendix 2). The forgone benefit arising from deferment in cash receipts imposes another $28.4 million (net present value estimated by the Audit Office NSW (NSWAGO, 1995, p. 86)) on NSW taxpayers, topping the price up to $215m.

To make high return to equity plus rentals to RTA convincing, Hills' financial model had to be built on a number of risky assumptions. Its traffic projections are substantially greater than the maximum flow identified in the Environment Impact Statements (EISs). The revenue estimates assume a $2.00 toll compared with a $0.70 toll in the EISs (NSWAGO, 1995, p. 12). These assumptions signify the exposure to high market risk and reduce the likelihood of obtaining the required rate of return. The expensive toll indicates that the cost of assuming market risk has been priced into the toll, thereby passing the risk to road users.

Despite the overly optimistic expected rate of return, an interesting piece of information discloses that the forecasted real rate of return after tax given in the Base Case Model will never exceed 11.78% (NSWAGO, 2000). Contract documents also reveal that Hills expected $408.6 million financial contribution from the government in the form of RTA promissory notes to be issued between 1998 and 2025 (Walker and Walker, 2000, p. 217). Knowingly, the RTA entered into the contract notwithstanding the slim chance of receiving cash returns from the M2. The source of revenue to Hills comes from toll collections. The poor traffic performance suggests that the government would never be able to redeem these notes. By comparison, the actual Annual Average Daily Traffic (AADT) in 2004 was 72 944 (NSWIIG, 2005), barely reaching 85% of the 85 094 forecast estimated in the Base Case Model (NSWAGO, 2000)[9]. The net present value of these promissory notes, as of 30 June 2007, was $4.276 million (RTA, 2007, p. 129). There appears to be an incentive rent payable to RTA (NSWAGO, 1995, p. 89) but the circumstances under which the incentive component can be realised are unclear.

Risk allocation was asymmetric. While risks of cost inflation to the Hills are very well covered and corresponding government concessions have been sought in agreements, there is no provision for sharing upside benefits between the two (NSWAGO, 1995, p. 36). In 1999, Hills restructured the M2 debt facilities, resulting in more funds being available for early equity distribution (NSWAGO, 2000), but yet there was no renegotiation for the early cash repayment of promissory notes. Meanwhile, RTA must indemnify Hills for any future increases in state and commonwealth taxes, and council and water rates (NSWAGO, 1995, p. 66). The project was masqueraded as if Hills would carry all downside traffic risk[10], but it is highly unlikely that the state can escape the risk given that the demand for traffic is a vital component of land rent receipts. A significant proportion of M&O risk rests with RTA, only the risk of major repairs is shifted to Hills (NSWAGO, 1995, p. 44, Table 1). The Hills is protected against network risk through MAEs (NSWAGO, 1995, p. 10), which would limit the government's ability to upgrade public transport in the affected region for a period up to 45 years. If new developments in the Northwest Region of Sydney that will adversely affect Hills' capacity to collect tolls are unavoidable, the State is required to repay all debts owed by the company and is liable for financial compensation to equity investors for the notional return (NSWAGO, 1995, p. 67).

[9] Patronage seems to be improving since the opening of Lane Cove Tunnel. The AADT of M2 presented in Appendix B was the latest figure reported by the new equity owner Transurban. It appears that the actual AADT has exceeded the original forecast of 90 200. It is unclear whether this will trigger the cash redemption of the promissory notes.

[10] When the 1995 Audit Report asserted that the RTA was the co-bearer of traffic risk, the RTA disputed the assertion and argued that Hills had confirmed its status as the sole bearer as evidenced in the Project Prospectus issued by the company, "The Company carries the risk that traffic volumes and revenue are lower than those projected" (NSWAGO, 1995, p. 19).

3.2.3 Non-recourse DBFOs

By this generation, the blossom of private provision in road infrastructure has intensified the competition in the international market. In NSW, no cost to government is the norm for entering into DBFO tollways. This category includes the CCT, M7 and LCT. The government sought an upfront payment of $96.8 million, $193 million and $79 million from the winning bidders of CCT, M7 and LCT (NSWIIG, 2005, Appendix 2) to offset RTA's expenses in developing the project and undertaking associated works (NSWAGO, 2003, p. 214, p. 215). In addition, these upfront payments contained a component of "Business Consideration Fee" (BCF) in consideration for RTA granting the right to levy tolls on users and retain the tolls for the concessionaires' own benefits (RTA, 2003a, p. 19; RTA, 2003b, p. 17). All contracts removed the payment option by promissory notes.

Cross City Tunnel (CCT)

> *Because the RTA was working to an imperative of no cost to government it was very difficult to have a wider consideration of some of the other policy objectives in the project as it progressed.*
>
> David Richmond (JSCCCT, 2006a, p. 55)

Originally, CCT was part of the integrated transport networks planning. The purpose was to funnel traffic bypassing central Sydney into an underground tunnel in order to improve the public domain by reducing surface traffic and reallocating road space to public transport, pedestrians and cyclists (NSWAGO, 2006b, p. 18). The DBFO contract was awarded to CrossCity Motorway Pty Ltd (CCM) in 2002. The CCM has no financial recourse to RTA. Allegedly, the project would cost nothing to the government.

One of the remarkable differences of the CCT is the 'unprecedented'[11] concept of the BCF auctioned by the RTA. The upfront payment of $96.8m comprised a fee of $54m to reimburse RTA the costs incurred with respect to the project, and a BCF component of $46.1m for the right to operate the tunnel. Both concepts were communicated to bidders in the tender documents and they were invited to bid for both components (JSCCCT, 2006a, p. 73). This payment increased the cost to the concessionaire, who will recoup it through imposing higher tolls on users. The BCF became a decisive criterion in the bid assessments (NSWAGO, 2006b). The CCM was selected on the basis that it offered the highest upfront payment.[12] To showcase its capacity to earn greater revenue sooner and to offer the BCF (JSCCCT, 2006a, p. 81), CCM modelled unusually optimistic traffic forecasts that exceeded the ceiling capacities in its competitors' and RTA's estimates (NSWAGO, 2006b, p. 5).

Another unparalleled concept of the CCT promoted by RTA was its 'no net cost to government'. In the absence of thorough public interest evaluation (JSCCCT, 2006a, p. 35), this means no net cost to the RTA and that all cost increases would be passed on to motorists by way of higher toll price. To avoid $110 million in capital spending arising from changes that would maximise revenue to the operator (JSCCCT, 2006a, p. 75), RTA negotiated two separate deals with CCM to recover subsequent cost increases. One was to change the toll escalation formula (originally toll variation was linked to CPI increases) which would have an impact on the toll being 35% greater than originally planned by 2018. The other was to allow CCM to raise the base toll by 15 cents (30 cents for heavy vehicles). The combined effect of these two deals results in an increase of up to 51 cents to the toll on tunnel opening (NSWAGO, 2006b, p. 6).

[11] The concept of selling the right to charge toll is not new in Australia. In the 19th century, the Governor of the colony of NSW Lachlan Macquarie implemented a system of private turnpikes as a means of financing transport infrastructure. The right to collect tolls was publicly auctioned by the Government (Forward, 2006).

[12] Other bidders sought a payment from the RTA (NSWAGO, 2006a, p. 24).

The RTA's insistence on capping its capital spending has overridden the tunnel's primary objective. The main purpose of constructing the underground motorway was to clear up the congestion on surface roads in central Sydney. Ferocious public resistance to the expensive toll had resulted in low patronage. The RTA's ineffective communication about the objective of changes made to surface roads has also led to serious conflict with the community. 67 road changes had been planned or implemented to facilitate the objective of removing surface traffic, but were perceived by motorists as "funnelling traffic" to profit the private operator. Under public protest, the state government reversed some of these changes, but 21 of these changes were under the clause of MAEs (JSCCCT, 2006a, Appendix 5), their reversal would prompt renegotiation between contracting parties leading to financial compensation by RTA.

Design and construction risks were borne by the concessionaire (JSCCCT, 2006a). The government argued that the patronage risk and therefore revenue risk had been allocated out too, as reflected in the drastic devaluation of $102 million in CCT's holding by CKI (the equity holder of CCT) in 2006 (JSCCCT, 2006b, p. 67), thus the project was a success since the government was immune to financial risk. But the government has underestimated the repercussion of reputational risk arising from passing cost to motorists. The "cost nothing financially" approach has cost the government political backlash.

The tunnel was placed in receivership in December 2006, a year after its opening due to poor patronage. It was sold to another private consortium in 2007 for $700 million. By that time actual patronage had been under a third of the CCM estimates (Clegg and Poljak, 2007). The unprecedented BCF, a price auctioned for the license to collect a monopoly toll, was disparaged as the worst expedient of public finance (Quiggin, 2005, p. 26). In hindsight, CCT is a lesson that RTA promised not to repeat in the future (NSWAGO, 2006b, p. 25). It is a lesson demonstrating that underestimating the adverse impact of removing users' freedom of choice can be detrimental to the future prospects of any public private partnership.

4 Traffic projections: a "realistic" fabrication

Toll receipts are the vital source of investment return for toll roads. It is known that traffic forecasts are guesstimates at best. Although equipped with world class traffic modelling (NSWIIG, 2005, p. 23), inaccuracy in traffic forecasts is the norm for all projects investigated. Traffic projections are a derived effort by both sectors with the view of getting the contract awarded and off loading public accountability. Ample evidence indicates that forecasts have been fabricated not to show the most likely outcomes, but to satisfy political intent (Flyvbjerg *et al.*, 2006) and/or to deceive investors in order to raise finance from the market (Flyvbjerg *et al.*, 2002).

The underlying rationale of a partnership cooperative structure is the transfer of risk to the party that has the greatest ability to manage it. Transferring traffic risk to the private sector who has limited ability to control it implies an excessive risk transfer. It provides poor incentive to private companies who would be induced to be over-optimistic in predicting traffic growth in order to win the concession.

The traffic forecast methodology and the tendering process further compounded the effect leading to erroneous traffic forecasts. The RTA's current methodology sets toll independently from traffic flow. The level of toll is calculated based on its own cost and benefit analysis (CBA) which grosses up the benefits for the expected number of road users. Interested consortia are asked to bid for the project if they believe, according to their own assessment of traffic prediction, the cost of the project and the required return to capital etc., can match with the level of toll (NSWIIG, 2005, p. 24). This method may work well when the CBA framework of the private bidder bears a resemblance to that of the government, but this

hypothesis is unlikely. A public agency is expected to set a toll that maximizes welfare taking into account the reductions in social marginal costs induced by traffic congestion, road fatalities, pollution, etc. These are externalities that are unlikely to be captured by a private sector firm, thus would be left out in their CBA model, resulting in a higher cost of operation which has to be compensated by greater flows of traffic. In the tending process of CCT, all bidders were invited to bid on either the development cost or the BCF (JSCCCT, 2006a, p. 73). It was taken as providing "a perverse incentive to bid on high patronage" (comment from a tender, NSWAGO, 2006b, p. 61).

Finally, the objectives of the responsible public agency brought to these contracts may have distorted the assessments on traffic volume predictions. There is a strong link between the capacity of a proponent to offer a least cost deal to the responsible public agency and the traffic predictions underlying the proposal. It is evident from the bid assessment criteria in both M2 and CCT, that cost consideration has taken precedence over other criteria. This was so even when the forecasts of the least costly bid substantially departed from the authority's benchmark and other bidders' projections. Agencies' naïve belief that risk of inaccurate traffic forecasts lies only with the private proponent has further understated the need for rigorous evaluation of traffic forecasts.

Arguably, inaccuracy in traffic projections is inevitable because predicting future traffic flows is an imprecise science. However, it is clear from the above that traffic forecast is a manufactured process subject to governments' cost-minimising objective and private proponents' commercial necessity to win the tender.

5 Conclusion and the way forward

After two decades of development, private provision in transport infrastructure has progressively evolved into a more risk-balanced approach. The concept of bundling asset creation with the whole-of-life asset management has failed to deliver the proposed outcome of maximising VFM through cost savings to taxpayers over the asset's life cycle. These road concessions are in fact costly to both governments and the community. The sophistication of the incentive payment mechanism has yet to motivate risk undertaking. The inconvenient truth is that the design of financial mechanisms does not contemplate optimal risk allocation but is tailored to the interests of the contracting parties. The concept of sharing cost and risk with the private sector has been 'rationalised' by passing on risks and costs to the community. The private sector's participation has enabled the public sector to escape from its public accountability.

It has been documented above that erroneous traffic forecasts are the norm in all projects. A typical *ex post* solution has been the reversal of volume risk back to the public sector, either through concession period extension (e.g. ED) or permission to lift the toll cap (e.g. CCT), or government bailout (e.g. Airport Link). No noticeable developments on *ex ante* mechanisms have been progressed to offer a better solution. Attainment of optimal risk allocation requires a better understanding of each party's ability and willingness to take on certain risks, the likely benefit and cost impact on each party, and the objectives they bring to the project. There is evidence suggesting that financial restraint is the motive of the public sector, whilst the thrust of the private sector is return on capital. In many circumstances, the collaboration between the two under these driving forces has led to an excessive financial burden to the community who is the most affected party.

PPPs present a unique "compounded agency problem" in which the public authority is an agent for consumers whilst the private proponent is an agent for the authority; hence indirectly the private proponent becomes an agent for the consumers (Trailer *et al.*, 2004, p. 308). In these three-dimensional relationships, the principal (the public authority) who

delegates responsibility to the agent (the private proponent) is not the direct recipient of the delegated services. On another dimension, the consumers, who are the most affected group and the principal of the public authority, are not actively engaged in and adequately informed about the sub-delegation. The contemporary process is often discredited as being in conflict with democratic accountability (cf. Walker and Walker, 2000; Broadbent and Laughlin, 2003; Watson, 2003; Demirag *et al.*, 2004; Mulgan, 2006; NSWPAC, 2006).

One of the greatest impediments to toll roads is the public's resistance to paying tolls, especially on existing roads on which travellers are often accustomed to travel free of charge or perceive as already having paid for through tax revenues (Fishbein and Babbar, 1996, p. 30). The lack of the community's involvement in contract negotiation would have an illusory effect that users are not part of the stakeholders being affected. This may have overshadowed the imperative of public acceptance and affordability. Internationally, users' affordability and public acceptability to road pricing has been one of the biggest barriers to toll road implementations (cf. Fishbein and Babbar, 1996; Laird *et al.*, 2003). Of particular concern is the equity issue of charging the public, and the effects on low income earners (Starkie, 1990; Fishbein and Babbar, 1996; NSWPAC, 2006).

Increasing the community's engagement to enhance public accountability in the procurement process will promote better outcomes. Currently, community engagement is limited to the (dis)approval of Environmental Impact Statement (EIS). But the scope of the project can change (and has changed in some case) after the EIS. Linking the payment mechanisms to the users' level of satisfaction with the service provided is one way to further community involvement. Two DBFO transport projects in Canada (Sieera Yoyo Desan Road and Canada Line Transit) are implementing user satisfaction payments (Aziz, 2007), in which part of the income to the operators is adjusted from time to time based on the results of the users' survey. A similar contractual mechanism has been built into the concession of Eastlink in Melbourne. The public's acceptance of this system is yet to be confirmed. At present, there is no study investigating how the public perceive the road projects procured through PPPs. Developing a deeper understanding in this area may prove a fruitful avenue for future research.

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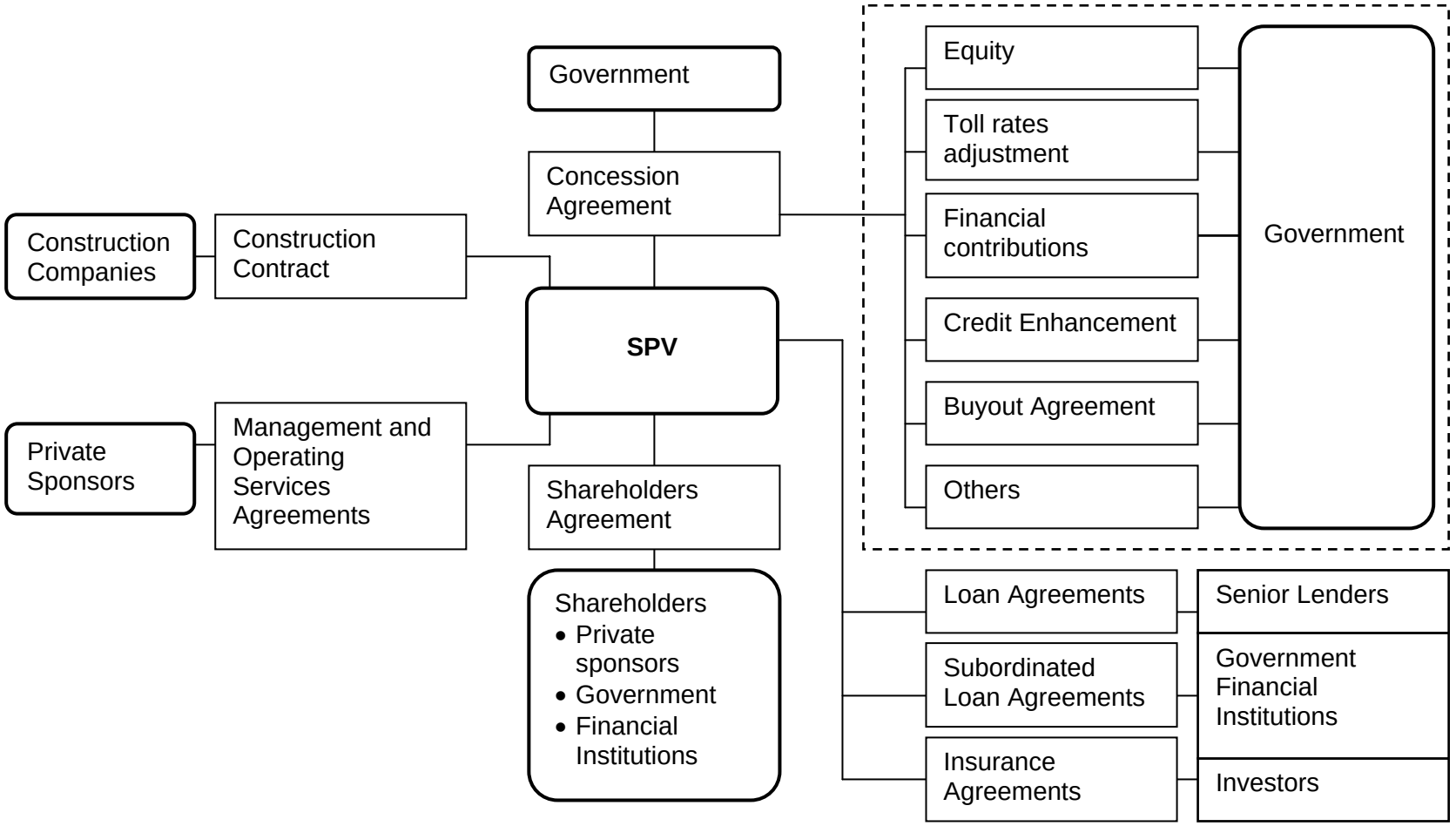
Appendix A: Interfaces of the DBFO Road Model



Source: Adapted from Lockwood *et al*., 2000, Exhibit 1

Appendix B: DBFO Motorways in New South Wales

Motorway	Sydney Harbour Tunnel (SHT)	Mays Hill – Prospect (M4)	M5 Prestons – Beverly Hills (M5)	Hills M2 Motorway (M2)	Eastern Distributor (ED)	Cross City Tunnel (CCT)	Westlink M7 (M7)	Lane Cove Tunnel (LCT)
Opening to traffic	Sep 1992	May 1992	Aug 1992 / Oct 1992	May 1997	Dec 1999	Aug 2005	Dec 2005	March 2007
Contractual Date for opening	Oct 1992	15 Feb 1993	28 Feb 1994 / 28 Feb 1995	30 Dec 1997	18 Aug 2000	18 Oct 2005	13 Aug 2006	10 May 2007
Projected Date for handover	Sep 2022	May 2010	Aug 2023	May 2042	Jul 2048	Dec 2035	Feb 2037	Jan 2037
Concession Period	30 years	20 years	31 years	45 years	48 years	30 years	30 years	30 years
Capital Cost	$683M	$246M	$380M	$644M	$700M	$680M	$1,540M	$1,142M
Upfront Payment by (-ve)/to(+ve) RTA	-$223M (interest-free loan)	Nil	Nil	-$66.5M (capital payment)	$10.2M[a]	$96.8M + gst (RDF + BCF)	$193M + gst (RDF + BCF)[b]	$79M + gst (RDF + BCF)
Financial contribution by (-ve)/to (+ve) RTA	-Revenue top up by ERS	+Land lease: $46.6m paid in advance[c]	+Land loan $22m[c]; -cash loan $63m; -Construction payment $10m	+Land rent: (basic + incentive); -$215m (see text)	- $25m; +Land rent (basic $1 + BCF $15m pa)[d]	+Land rent (basic $1 + incentive)	+Land rent (basic $1 + incentive)	+Land rent (basic $1 + incentive)
Annual Average Daily Traffic	86,800 at Dec 2005[e]	110,872 2008 financial year[f]	115,563 2008 financial year[f]	92,139 2008 financial year[f]	47,504 2008 financial year[f]	30, 000 as of June 2007[g]	114,304 2008 financial year[f][h]	104,800 from EIS for 2006
Present Toll (full length cartrip)[i]	$3.00 for all types of vehicles; southbound direction only	$2.20 (cars) $6.60 (trucks); both directions	$3.80 (cars) $8.20 (trucks); both directions	$4.40 (cars) $11.00 (trucks) full length and $2.20 (cars) $5.50 (trucks) for Pennant Hills; both directions	$5 (cars) and $9.50 (trucks); northbound direction only	full tunnel: $4.01 (cars) $8.02 (trucks) SJYC exit: $1.89 (cars) and $3.78 (trucks); both directions	Distance-based variable tolls, up to $6.33 one way; both directions	$2.65 (cars) $5.31 (trucks) for the full length and $1.33 (cars) $2.65 (trucks) for Falcon St ramps; both directions

Appendix B: DBFO Motorways in New South Wales (continued)

Motorway	Sydney Harbour Tunnel (SHT)	Mays Hill – Prospect (M4)	M5 Prestons – Beverly Hills (M5)	Hills M2 Motorway (M2)	Eastern Distributor (ED)	Cross City Tunnel (CCT)	Westlink M7 (M7)	Lane Cove Tunnel (LCT)
Consortium Partners (major equity holders)	Transfield Pty Ltd, Kumagai Gumi Corporation	SWR partners, Macquarie Infrastructure (MIG)	MIG, M5 Holdings, Cogent Nominees	Transurban from June 2005; previously Abigroup, Obayashi Corporation	MIG; previously Infrastructure Trust of Australia, Leighton Motorway Investment	ABN Amro, Leighton Holdings from June 2007; previously CKI, Bilfinger Berger, SAS Trustee Corp. JPMorgan Nominees	MIG, Transurban, Abigroup, Leighton Holdings	CKI and Li Ka Shing Foundation from July 2004; previously ABN Amro Australia
Operator	Sydney Harbour Tunnel Company	SWR Operations	Interlink Roads	Tollaust subcontracting to The Hills Motorway	Airport Motorway Ltd (AML)	CrossCity Motorway subcontracting to Baulderstone Hornibrook	Westlink Motorway	Lane Cove Tunnel Co subcontracting to Transfield Services

Source: NSWIIG (2005); NSWAGO (various years); RTA (Contract Summary, various years); RTA (2007); SHTA (1987)

(a): Two cash payments of concession fee: $2.2m in February 1998; $8m in August 2000.
(b): The federal government contributed $356m towards the M7 project (NSWAGO, 2006a).
(c): Land lease of $46.6m was paid by SWR before the commencement date. Land loan was repaid by Interlink in 1997. These two payments are treated as prepayments of the remaining lease over the concession period. They are recorded as liabilities-"unearned revenue" in RTA's book and amortised annually (RTA, 2007, p. 142). Note that the nature of these land leases differs from those in later projects. Land leases of M4 and M5 are the rents charged for the land on which the motorways were built. Land rent in later projects was the price concessionaires paid for the right to charge tolls and retain them for their own benefit.
(d): RTA's financial contribution: $5M for the transfer of risk of interest rate movements between the announcement of the preferred proponent and financial close including the risk associated with the issue of indexed bonds by the private proponent; and $20M construction cost to compensate AML for modifications added to the original project proposal, half of which was to ensure the construction of the Sydney Art Gallery landscaped canopy. Up to 65% the rent can be made in promissory notes. Notes can be redeemed only after an annual real after-tax return of 10% to equity has been earned.
(e): Data obtained from RTA website, http://www.rta.nsw.gov.au/constructionmaintenance/completedprojects/sydneyharbourtunnel/index.html, access on 11 January 2008.
(f): Data of M4, M5, M2, ED, CCT and M7 are obtained from ASX Release by Transurban, who holds equity in all these motorways. http://www.transurban.com/transurban_online/tu_nav_black.nsf/alltitle/news-stock%20exchange%20releases-2008?open, accessed on 3 August 2008.
(g): Clegg and Poljak (2007).
(h): Data include short and long trips.
(i): All are current as of June 2008.
BCF: Business Consideration Fee; EIS: Environmental Impact Statement; ERS: Ensured Revenue Stream; RDF: Reimbursement for Development Fee; SJYC: St John Young Crescent