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Planning and Transport Research Centre (PATREC)

Review of Infrastructure Financing Options for Transport in Western Australia

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Contents

Tables

Figures

1 Executive Summary

This report reviews the issues relating to future funding for transport infrastructure in Western Australia. The report starts with a review of the broader issues in transport infrastructure planning and funding, including the circumstances in which there can be market failure in private and public sector funding. The role of broader pricing policies compared with narrower funding instruments is considered as a precursor to a consideration of the merits of various approaches to funding. Potential research opportunities for PATREC are identified based on the review of the literature and experience elsewhere.

Like most jurisdictions, Western Australia is currently grappling with the challenge of funding the major transport investments needed to support economic growth and enhance access and equity. Currently, funding for public infrastructure is through various sources including state government taxes, local government property rates, federal grants, user and access charges, borrowing, and developer contributions.

The general tax instruments available to the state have inherent weaknesses. Payroll tax and stamp duty are inefficient taxes. Land tax has efficiency advantages and should arguably play a greater role in the State tax system. Moreover, these taxes have limited capacity to fund infrastructure. Royalties are the most significant state based revenue source but have inherent volatility. Overall, this limits the borrowing ability of the State. Practically it means that the question is not whether Western Australia should embrace private sector infrastructure funding but rather what form that funding should take and which projects are best suited to private sector involvement.

The push for greater private sector investment makes economic sense. Globally, there, is no inherent shortage of private sector funds, especially when pension funds are taken into account. The challenge in accessing these funds is to ensure that the private investor can receive an appropriate rate of return whilst at the same ensuring that the local jurisdiction achieves the best outcomes in terms of efficiency, social access and equity. Moreover, many transport investments, for example in airports and rail systems, produce services that are essentially private goods. It is preferable for these to be funded by, and in many cases owned and

operated by, the private sector. Potential market failures such as monopoly power and congestion are best dealt with through the appropriate regulation and congestion pricing policies.

However, the prerequisite to good transport investment outcomes is good planning. To get the most from private sector financing of projects Western Australia will need consistent and transparent policy settings across spatial land use planning (growth boundaries, residential location and density, infill patterns, port locations, airport locations, industrial and commercial land locations) and transport planning (road and rail corridors, high wide load corridors, port development, target modal split). It will also need consistent polices on the pricing and regulation of major infrastructure assets. Globally, many of the failures associated with private funding of transport and the use of PPPs in particular, can be traced to the lack a coherent planning and regulatory framework.

Globally the response to the challenge of infrastructure funding has been a concerted effort to use PPPs. PPPs have dominated private funding formats, especially in the UK. However, in funding transport infrastructure there is no simple 'one size fits all' solution. While PPPs will be an important component, any funding strategy needs to account for all sources of funds, and match assets to appropriate funding mechanisms. Experience with private sector funding elsewhere, especially with planning and PPPs, provides lessons for Western Australia and opportunities for future research by PATREC.

First, consistent with the beneficiary pays principle, more emphasis should be placed on user charges as a means of collecting additional revenues to fund infrastructure. Insofar as transport infrastructure is concerned, road user charges are a major opportunity. These could take the form of toll road pricing for major new roads and bridges, heavy vehicle road user charging, congestion changes or more general road user charges. Arguably in the first instance, pursuit of the heavy vehicle user charge for port access, charges for the Perth freight link and a CBD based congestion charge offer most scope. They simultaneously provide a funding stream and encourage efficient use of road, rail and bus transport infrastructure. PATREC could contribute to ensuring good congestion charge outcomes through, amongst other things, researching the most appropriate

format for a WA congestion charge and modelling the impacts of any charge on short run transport choices and long run location and transport decisions.

Second, for major projects, formalizing the role of value capture is important. The impact of major transport projects on property values is well documented as is the efficiency of a value based land tax. Value capture is an equally legitimate for projects that are government owned and funded and for projects that have private sector funding such as road and rail projects funded with PPPs. PATREC could contribute research on the design of a value capture policy for Western Australia and its integration with the existing system of developer contributions. Impact fees are a major source of infrastructure funding in the US and are used to internalize a range of marginal social costs into private location decisions. PATREC could contribute to research on the potential to use impact fees in Western Australia

Third, refinancing represents a major funding opportunity. Done well this is an opportunity to improve efficiency, raise Government net worth and create opportunities to reduce debt and/or develop new projects. Given the current limitation on government finances, generating finance through assets sales should be integral to any funding strategy. PATREC could contribute research on the merits of lease versus freehold sale for transport projects including the merits of shorter-term leases and variable concessions that allow the management of the infrastructure to be better integrated with planning in the future. The role of regulatory asset bases (RABs) in future transport funding is an area worthy of further research. PATREC could contribute research on the potential to use RABS to address some of Western Australia's transport investment issues. This would include identifying assets that could be converted into RABS and the governance arrangements that would be most efficient. For example, the research might look at whether parts of the urban or rural road networks could be established as a RAB, or whether the North West regional airports might be sold/leased as a single RAB with an independent regulator.

PPPs have been extensively used and reviewed. The identified failings of PPPs in other jurisdictions offer several research possibilities relevant to using PPPs in Western Australia. PATREC could contribute research on the most appropriate governance structures for PPPs in Western Australia and on the best way to forecast and manage demand risk, including the use of variable length

concessions, the role of regulation in PPP management and the governance issues when many projects to be financed are lumpy and may have monopoly power.

2 Introduction

Globally, economic growth and urbanization are driving a rise in demand for all forms of transport. The demand to move people and freight is exploding as people move to cities and the demand for goods and services grows. Major replacement investment supports current transport capacity. New investment is required to accommodate the growth in transport demand. Combined these are creating an unprecedented demand for infrastructure funds.

At one level, this is a straightforward funding challenge. Faced with this unprecedented demand for transport investment, governments must secure the required funds through greater reliance on private finance.

However, to see it solely, or even mainly, as a finance issue oversimplifies the challenge. The demand growth causing this finance challenge also poses challenges for setting broader planning, pricing and taxation policies. Getting these policies correct is fundamental to ensuring that infrastructure investments create the maximum benefit for society. Failure to get the planning and funding right for transport infrastructure will risk future economic and social outcomes.

Transport and communication networks are the glue that connect and bind the disparate locations in society. They determine the effectiveness of access to essential location based economic and social needs. These include health services, education, jobs and product markets. Failure to deliver enough transport capacity in a timely and efficient way will potentially compromise access and make it more costly for people. In the limit, failure to get the transport planning right will risk long-term productivity and economic growth.

The emerging shortfall in infrastructure has focused attention on funding requirements and increasing the role of private funding. The aftermath of the Global Financial Crisis (GFC) has exacerbated the funding problem. The GFC exposed the underlying weak budget position of many governments and made raising funds more difficult.

Western Australia is no different. Funding for public infrastructure in Western Australia is through various sources including state government taxes, local

government property rates, federal grants, user and access charges, other fees and charges, and developer contributions. [1]

Like most governments, Western Australia is having difficulty funding the new projects needed to support growth. [2] Public sector net debt is projected to grow from $22 billion at 30 June 2014 to $29.4 billion by 30 June 2018 (Government of Western Australia 2014, p.2).[3] The budget position is further complicated by the underlying volatility of State revenues, the declining share of GST revenue and the recent loss of the AAA credit rating. Projected general government operating surpluses are not large enough to fund the Government's proposed infrastructure program. Additional borrowings and access to alternative revenue sources are needed if the Government is to fund the infrastructure required to service the State's growth.

The budget position has required the Government to rethink its infrastructure planning and funding. On the spending side, re-prioritizing projects has meant delaying some major projects such as the MAX light rail. On the funding side, the Government is aiming for greater involvement by the private sector in providing infrastructure. This includes refinancing through asset sales and having greater private sector involvement in building and operating new projects.

However, a coherent approach to financing requires a consistent and comprehensive infrastructure-planning framework, including integrated land use planning and transport planning. This creates the framework for long-term transport and related infrastructure investment decisions. The growth in the private funding of transport and the use of PPPs in particular, has been criticized for lacking a coherent planning and regulatory framework (Balfour Beatty and

[1] The relationship between the Federal and State Governments is crucial in infrastructure funding for two reasons. First, the State Government receives a major part of its revenue from the Federal Government as grants from the combined income tax and GST revenue. Second, the Federal Government can significantly influence the process of infrastructure planning and funding by tying funds to certain State initiated projects.

[2] Not all infrastructure projects have simple connections to population and economic growth. New and expanded ports and road and rail freight capacity directly facilitate expansion of commodity exports. Investment in urban road and rail capacity facilitates urban growth and is required to secure growth in residential and commercial activity in an efficient way. On the other hand, there may be projects that are less obviously connected to economic and population growth, at least in the short run. Cultural precincts, stadiums, preservation of historic buildings are examples of projects that are often presented as community building. They are part of a growing city developing a greater degree of sophistication and a more global orientation.

[3] This is an increase from 8.4% of GSP in 2013-14 to 9.2% in 2017-18.

Parsons Brinkerhoff 2013), (Infrastructure Finance Working Group 2012) (Stanley 2011).

An effective planning system needs to encompass consistent and transparent policy settings across spatial land use planning (growth boundaries, residential location and density, infill patterns, port locations, airport locations, industrial and commercial land locations) and transport planning (road and rail corridors, high wide load corridors, port development, target modal split). Consistent polices on the pricing and regulation for major infrastructure and related services are required. The approach taken to these issues will determine the spatial structure on the economy and as a corollary the transport investments needed. For example, a city that has full marginal cost pricing of infrastructure combined with strategies to raise housing densities and encourage the use public transport will look considerably different and have very different infrastructure funding needs to one that subsidizes fringe urban infrastructure investment and promotes lower housing densities and greater use of private vehicles. [4]

Whatever the underlying philosophy of planning and funding, creating an 'appraisal culture' based on rigorous cost benefit analysis of all projects, is an essential ingredient to delivering good outcomes. This determines the suite of transport projects and their timing required to create the most efficient economic and social outcomes consistent with the underlying land use and transport planning.

Alongside the requirements to fit proposed transport and related projects into an integrated planning framework, governments also need to integrate funding for transport infrastructure into the broader funding framework incorporating general taxation and expenditure policy.

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[4] This is arguably the current position in Perth. Recent railway investments combined with the push for transit oriented developments and infill have been focussed on developing a more compact city with higher development densities. This broad philosophy is embedded in Directions 2031. Yet as recent debate indicates, Perth still has a way to go in pursuit of these particular outcomes. Employment is still heavily focussed on inner and middle metropolitan areas, journey to work times are increasing and both public and private transport appear to be at or near capacity for much of the time. A simple view is that increased investment in transport capacity and/or the .implementation of road pricing is required to alleviate these problems. These are undoubtedly required as an integral part of the long-term solution. It can be argued the failure of planning to achieve stated employment decentralisation objectives within the metropolitan area and to achieve targeted development densities that has been critical in producing the current outcomes. Private sector financing may be critical to solving the capacity investment problem but it won't solve the planning problem

The current push for greater private sector infrastructure funding reflects a view that the aggregate infrastructure funding required is unacceptably large for conventional taxpayer funding, given the competing spending priorities from general tax revenue and desired budget and tax outcomes.

At one level, switching to private sector funding is not overly complicated. Ensuring the availability of private sector funding is primarily a matter of defining projects carefully and then establishing clearly how the private investors will receive an adequate rate of return on their investment. In practice, this has proved more difficult. Transport infrastructure is long lived. A complex mix of government and market decisions over time influences its effectiveness. Seeing the future well enough to determine returns has proved difficult. Perhaps the best example here is the poor record of demand forecasting in PPPs. Moreover, purely political decisions can also negatively affect long run outcomes. An example is the experience in the UK where following political pressure, the government refused to allow previously agreed road toll increases to proceed, effectively cutting returns to private investors and requiring a greater government funding commitment. (Shaoul et al. 2012).

In transport planning and funding "there ain't no such thing as a free lunch". The funding challenge for future infrastructure provision is working out who will pay and how. From a public policy perspective, the key principle here is the beneficiary principle. That is, absent an equity argument to the contrary, the beneficiary of a service should pay for the benefit received.

The traditional infrastructure-funding model relies on government design of the system and general taxpayer funding. At the early stages in the economic development of a jurisdiction, when developing the transport network is instrumental in expanding the whole economy, broad based taxpayer funding is appropriate. At this point, the wider population are the beneficiaries of the infrastructure investment. However, at some point, the bulk of the required infrastructure is constructed, and the jurisdiction has matured around it. Urban development along road and rail corridors in a mature city is an example. Once this has occurred, upgrades and expansions to the network are likely to offer most benefits, at least in the short term, to specific locations and users. At the

very least, this will occur because project timing will ensure that some locations and user groups receive benefits earlier than others do[5]. Notwithstanding that projects and their timing are assessed through the rigorous application of benefit cost analysis, the political process makes it increasingly difficult to deliver a coherent programme of upgrades and expansions through traditional broad based tax funding when the benefits are not uniformly distributed.

These circumstances have reinforced the trend for policy makers to think more innovatively about ways to involve the private sector in funding infrastructure.

To date the focus of private sector involvement in funding transport has been PPPs. These have taken a wide variety of formats and the performance record is mixed. Many PPP funded projects have delivered the desired outcomes with respect to planning and funding of construction but have been less successful in funding the long-term operating costs. However, PPPs are only one element of the funding mix. Although important as a funding source, they are not a funding panacea. Alongside narrow project focused instruments like PPPs, consideration must also be given to broader policies such as road pricing, parking charges, vehicle mitigation charges, impact fees and tax increment funding based on property values. These can take a variety of forms. Each has advantages and disadvantages. In contrast to pure finance instruments, pricing instruments generate revenues and at the same time influence the travel and location behaviour of individuals and firms. Pricing policies influence the efficiency of the system and this in turn influences the optimal suite of infrastructure projects and the consequent funding requirement. Beyond the extension to consider broader pricing policies as an integral aspect of infrastructure planning and funding, there is also the question of adapting infrastructure policies from other areas to transport. An example would be converting network assets like roads or regional airports, or parts thereof, into regulatory asset bases (RABS). These would then be operated privately subject to regulation by the monopoly regulator.

[5] For example, expansion of the northern corridor in Perth requires major investments in water, road and rail. Yet with each marginal expansion, the primary beneficiaries are arguably the residents who will live there and the land developers who develop the residential estates. In the past, funding this infrastructure through general tax or broad based revenue sources (e.g. citywide average headwork's charges for water) was commonplace. More recently, application of the beneficiary principle has resulted in arguments for such expansions to be funded more directly by users/beneficiaries resulting in greater use of instruments like developer contributions, user charges and potentially tax increment funding.

This paper starts with a review of the broader issues in transport infrastructure planning and funding, including the circumstances in which there can be market failure in private and public sector funding. The role of broader pricing policies compared with narrower funding instruments is then considered as a precursor to a consideration of the merits of various approaches to funding. A discussion of the place of pension scheme funding for infrastructure is included along with suggestions for future research.

3 Infrastructure Investment- What is it?

Infrastructure is ubiquitous. Infrastructure planning and funding is widely recognized as essential for productivity and economic growth. Yet, infrastructure planning and investment is an area subject to wide ranging definitions of key concepts. For example, there is no universally accepted definition of PPPs.[6] What is counted as infrastructure is also subject to varying interpretations. Is a public road part of the transport infrastructure but a mine road not? Is a publicly owned port part of the transport infrastructure system but a privately owned yacht club marina not? Is a prison a private good or a piece of social infrastructure? Is a hospital a private good or a piece of social infrastructure? What about a football stadium?

The argument for government funding of transport infrastructure is essentially based on the notion that transport infrastructure long lived with large up front capital investments, resulting in long payback periods. As such, it needs to be developed and managed consistent with its role as part of a wider network and the need for it to be fully integrated with other projects (Access Economics 2003).

From an ownership and financing perspective, it is more helpful to focus on the attributes of the infrastructure, the mix of private and social benefits provided, and the potential for market failure and government failure in the provision and operation of the infrastructure.

The social consequences of failure also need to be considered. Infrastructure assets provide essential services, and disruption of those services potentially imposes significant costs on the community. Consideration of these issues is the precursor to defining the correct role for the private sector in transport infrastructure provision. This will define its role in ownership, operational management and funding.

At the most general, level infrastructure assets are the physical structures and networks that provide essential services to the community. Such a broad definition allows many projects to be classified as 'infrastructure'. Not all will be

[6] The World Bank defines it simply as a long term contract between private and public organizations for providing public assets in an arrangement where the private party takes on significant reach and management responsibility. (World Bank 2012)

suited to private sector financing solutions. Financing arrangements need to reflect the particular attributes of the project or suite of projects developed.

Despite its inherent complexity, infrastructure is often simply categorized as economic or social infrastructure. Economic infrastructure is the assets that provide services for production processes and final consumption in the economy. Ports, roads, railways are good examples. Social infrastructure is the system of networks and facilities that supports the community. Hospitals, education, housing, recreation and leisure facilities are examples.

On the service definition alone, this is a difficult distinction to sustain. A railway, a road, a prison, a hospital, a school and public housing are all infrastructure, yet the sense in which some are social and some are economic is unclear. All contribute to efficiency, productivity and economic outcomes. All contribute to social cohesion, connectedness, equity and social outcomes.

A more useful approach is to focus on the related service attributes and the way these impact how we can plan, manage, price and fund infrastructure, rather than resorting to a simple economic and social dichotomy.

Some infrastructure has the attributes of a private good. A port and a hospital are essentially private goods. They are rival in consumption and exclusion is possible subject to paying to access/use the assets/services provided. They could be developed and operated in a private market context, with suitable policies in place to deal with any associated market failures. For example, regulating port charges and access where a port is a natural monopoly or government paying/subsidizing hospital costs where social policy dictates equal access for low-income earners. On the other hand, although a jail is rival in consumption and could be built and operated privately, attendance/consumption is compulsory. Convicted individuals are required to go to jail. They would not voluntarily pay to be incarcerated. Government needs to fund these placements. Weather forecasting and the provision of forecasts to individuals and industry is an example of infrastructure services with strong public good attributes. Basic forecasts help good decision making by individuals and businesses with positive economic and social benefits, but they also have the attributes of a public good. Once a forecast is public, it is available equally to everyone. Basic forecasting infrastructure services need to be funded by government.

It is sensible therefore to look beyond the basic economic and social infrastructure distinction and to focus on functional, operational and market characteristics.

Some infrastructure has inherent private good attributes and long operational life but also has monopoly characteristics. Although private provision is possible, price regulation will be required. However, with the resulting predictable cash flows and stable rates of return, they will be relatively easy to value in economic or financial terms. Most utilities (electricity, gas, water) fit into the category. Privatization of utilities is relatively recent in Australia, but major utilities have always been regulated private firms in the US[7]. Infrastructure Australia (2012) has argued that refinancing infrastructure programmes based on selling public infrastructure assets should be part of any plan to raise infrastructure investment.[8]

Other infrastructure could be built by and operated by the private sector, but the underlying public good attributes of the service means that a heavy reliance on Government will be necessary to define the optimal volume of service, and fund it. Weather forecasts and law courts fit into this category.

Major transportation infrastructure such as roads, seaports, airports, rail and other public transport are essentially private goods. Investment in them is lumpy and large. They have long asset lives and provide essential services. In most cases, there is limited or no competition and significant barriers to entry. In private hands, these assets are likely to have predictable and steady cash flows with a strong yield component and low volatility.[9] They are attractive investments and are defined as core economic infrastructure within the investment marketplace.

On this basis, there is a case for private involvement in funding and operation in areas such as toll roads, bridges and tunnels, parking stations, gas pipelines,

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[7] Not all States have privatized their major utilities. Western Australia is still has the significant energy, port and water infrastructure operated by GTEs.

[8] They estimated that operating efficiencies achievable with private ownership would allow "the government to be paid prices for the assets in excess of the NPV of the future stream of surpluses that would arise if the asses remained in government operation.

[9] The degree of competition in some cases will reflect land use and transport planning. For example, a toll road may have public roads as substitutes. How the government manages investment and traffic on the public network will affect the attractiveness', traffic flows revenues and profit potentials for the private toll road. This in turn will influence the second best price to set on the toll road and the extent of any government subsidy required.

distribution and storage, electricity generation, distribution and transmission, seaports, airports, rail track, rail stations, track and rolling stock [10]

3.1 Transport, Economic Development and Productivity

Infrastructure investments are associated with significant economic benefits. A recent OECD study investigated the relationship between GDP and growth in 21 countries. (Egert, B., Araujo, S. and Kozluk 2009). It showed a positive relationship between infrastructure investment and GDP. More importantly, it reports marginal returns to infrastructure investment above returns to general capital stock investment for these economies.

In Australia, the Bureau of Infrastructure, Transport and Regional Economics (BITRE) has estimated the potential dividend to be gained from infrastructure investment. Their analysis found that current Australian Government investment in Australia's highways, interstate rail network and urban public transport systems will deliver a return of $2.65 on every $1 now being invested.

These results are not surprising given the relationship between infrastructure and private firm performance. The production activities of firms are dependent on the efficient provision of infrastructure, especially water, electricity, gas and transport and communications. Efficient infrastructure provision enhances the productivity of firms. Moreover, connectivity, as represented by the ability to match buyers with sellers in physical space and virtual space, is essential for efficient competitive markets.

Beyond this, the evidence is that investment in education is a key driver of economic growth in the long run. Essential to educational outcomes is the provision of efficient, high quality education and communication infrastructure.

3.2 Scale of the infrastructure funding challenge

Future aggregate infrastructure investment will have to exceed historical levels by a substantial amount to maintain long run economic growth. Spending is required to secure ongoing productivity growth. In developed countries, the systematic under provision of infrastructure in recent decades has added to the

[10] Taken one step further the private good nature of some of these series makes them ideal candidates for private ownership

level of infrastructure funding required. Developing economies now also need substantial infrastructure investment to enhance economic growth and lift economic performance to that of developed economies. It is now accepted that these requirements have created an 'infrastructure funding gap' that is beyond the capacity of traditional Government provision mechanisms and funding sources.

To suggest that the "infrastructure gap" is solely a financing problem based on the huge costs associated with infrastructure oversimplifies the issue. As we have seen, there are basic issues associated with managing the complex interaction between transport infrastructure and land use planning to determine the exact projects that are needed and their timing. The longevity of the transport infrastructure, the complex way it interacts with the economic system and the requirement to reconcile short-term political requirements with the long term planning further complicates decision making.

All the same, the scale of the required infrastructure investments is now widely accepted as a major policy issue for governments everywhere.

3.2.1 Global infrastructure funding

The global infrastructure crisis is well documented. A recent report published in February 2013 by the Group of Thirty (2013), estimated that by the end of this decade, the world's leading economies will need to inject substantial funds into infrastructure and other long-term projects to support even modest growth. They estimate that demand for infrastructure funding will be dominated by the nine major economies. These countries account for more than 60% of global GDP, and the report estimates that annual long-term investment of EUR 14.3 trillion (USD 18.8 trillion) will be needed in real terms by 2020 to sustain welfare and economic performance. By comparison, these countries' long-term investment totalled EUR 9 trillion (USD 11.7 trillion) in 2010. A separate recent report by the Asian Development Bank concludes that countries in Asia and the Pacific alone will need to invest EUR 6 trillion (USD 8 trillion) in transport until 2020.

Infrastructure UK has estimated that average annual UK investment in infrastructure will need to rise from £30 billion per year between 2004 and 2009 to £50 billion per year between 2010 and 2030. (Infrastructure UK 2010)

3.2.2 Australia and Western Australia

Australia faces the same challenges in funding major infrastructure projects. Several agencies and commentators have argued that a significant infrastructure funding gap exists.

Australian governments at all levels are grappling with budgetary difficulties.[11] It is becoming increasingly difficult for governments to finance new infrastructure construction. The margins between government revenues and the costs of constructing and maintaining infrastructure in Australia is the basis for the 'infrastructure gap' (Infrastructure Australia 2012) (Infrastructure Finance Working Group 2012). For Australia, as for any other jurisdiction, an infrastructure gap generates a risk that government may fail to meet the future demand for infrastructure with negative consequences for productivity, economic performance, economic growth and social wellbeing. The IFWG (2012) has argued that this risk has already become evident in Australia and that the infrastructure deficit is already affecting the delivery of high quality social and economic outcomes. Placing a value on the infrastructure gap is difficult. Order of magnitude analysis puts it as high as $700 billion. (Hanna 2011). The impact of a deficit in infrastructure will quickly be detected by businesses in the form of bottlenecks and consequent impacts on productivity (Wright, S and Mercer 2012). Simultaneously, congested road and public transport systems with increased travel times and queuing, are an obvious manifestation in urban areas.

One issue that needs some clarification when considering the infrastructure gap is the treatment of brownfield and greenfield assets. As noted below, there is a difference between financing the capital cost of a new asset and financing its operation. Financing the capital cost is by way of government tax revenue, bonds or equity, depending on whether we are talking about private or government ownership. Financing operations is a mix of user charges or operational subsidies, depending on the attributes of the services provided and the ability to employ user charges.

[11] One reason is the ageing population. Aging workers are leaving the workforce as they reach retirement age. This shrinks the taxpayer base and places additional pressure on government finances in areas such as health and aged care.

For a brownfield asset, the key issue is managing the asset at peak efficiency with provision to expand capacity when it is required. The main factor here is the ongoing revenue stream that can be associated with the asset through either user charges or operational subsidy payments. As such, brownfield assets are not an obvious part of the infrastructure gap. Most importantly, brownfield assets owned by government may be a part of the financial solution to the infrastructure gap. Refinancing through privatization is a potential solution to financing both expansion of these assets and the financing of new greenfield infrastructure projects.

3.3 Market failure, Government Failure and Infrastructure Funding

Successful infrastructure planning requires that projects be assessed appropriately, approved and then receive sufficient funding. Only if all these elements are in place will the wider economic benefits of infrastructure investment be realized. Good projects are ones that are consistent with good economic and social outcomes as demonstrated by a benefit cost analysis. This is a separate issue from the project financing, but the choice of financing instruments will have an impact on the efficiency with which the projects can be undertaken and on the risk that the public and private sectors bear.

If projects confer net benefits, then it might be argued that governments should be able to issue debt to fund these projects. However, governments face various funding constraints that impinge on their ability to fund projects. These include:

- Long term fiscal policy objectives. Government will set targets for indebtedness based on projected tax revenue and expenditure, conditional on preferred tax policy settings.
- Credit rating and the cost of debt to government. The credit rating reflects the balance between commitments to spending and how well these are balanced by appropriate tax measures.
- Market imposed limits on the willingness of private investors to hold government debt.

Where these constraints imply that otherwise desirable projects, in the sense of having positive assessments based on a benefit cost analysis, need to be deferred

or foregone, potential economic benefits (including productivity enhancements) are delayed or foregone. Private financing offers scope to proceed without compromising these other financial management objectives.

However, market and government failure can affect infrastructure provision and both are relevant in planning for future infrastructure.

Market failures in the private provision of infrastructure require public sector intervention in provision. On the other hand, government failure makes it necessary for the private sector to be involved. In short, neither the private sector nor government is likely to deliver socially optimal infrastructure outcomes. Left alone, the private market will produce a suboptimal level and mix of infrastructure and this implies some need for government supply involvement. However, government failure means that government cannot simply make up the shortfall.

Underinvestment by the private sector is primarily the result of market failures related to market power and externalities. In industry sectors like energy, transport, communications and water where market power exists, under investment will reflect the degree of market power. [12] Less than optimal aggregate production is also likely in areas where the primary benefits are public-good type benefits that cannot be translated into collectible revenue streams.

3.3.1 Market failure

Major infrastructure (for example transport infrastructure) has basic characteristics that make it susceptible to market failure under private provision. In large part, this is due to the long lives of these assets and their heavily front-loaded sunk cost profile. From a market perspective, such a cost profile can discourage investment in new capacity by incumbents because of the risk that such assets will become stranded if demand deteriorates or does not eventuate. Investment by potential entrants is discouraged because of the

[12] Where regulated monopolies exist in these sectors, the level of production and investment is expected to be closer to the optimal level

difficulty in matching the production costs and prices of the incumbent and by the sunk costs that will be incurred on exit. [13]

Provision of infrastructure by the private sector under these circumstances will have sustainable monopoly characteristics. [14] Left alone, the monopoly provider would be able to charge customer above marginal cost prices. Consistent with theory, such an outcome would enable owners/investors to recover the large initial capital costs associated with the infrastructure. However, this outcome comes at a cost to society due to the underinvestment, and prices to consumers that are above marginal cost. [15] Cost recovery based on allowing companies to exert monopoly pricing power is not an optimal solution.

Much investment in infrastructure is associated with positive externalities that are difficult to capture as revenue streams. Users and the wider society capture these benefits. This being the case, the value of these benefits is not considered by private firms when investing in capacity. Capacity investment decisions reflect collectible revenues. When positive externalities are present, these revenues understate the social value of the infrastructure services provided. Toll roads are a good example. Investment in a toll road improves the performance of the whole road network. Congestion is reduced across the network leading to quicker and more reliable commute times. Away from the toll road, these impacts will arise as spill over benefits to the wider community. They cannot be converted into revenue streams by the toll road investor. The toll road investor, driven by direct benefits measured as revenue, will price the toll road services accordingly, but this price is lower than the direct private marginal benefits plus marginal spill over benefits to society. This pricing causes socially suboptimal investment in the toll road.[16]

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[13] Of course, if perfect contestability is evident, neither of these concerns is relevant. However, for most of the major transport infrastructure – toll roads, seaports, airports, rail track etc. this is not the case.
[14] Indeed, major infrastructure provision often constitutes a textbook natural monopoly. This is mainly because of the large costs associated with new entry to the market and the inefficiencies and risk of duplication. For example, in most cities, once a major airport is built, it is likely to be uneconomic for another company to build its own competing airport in the hope of attracting airlines business away from the incumbent. This is equally true for major network infrastructure like electricity and gas transmission and distribution and for road networks.
[15] It may also be associated with a lack of innovation and ongoing investment to enhance productivity.
[16] From a funding perspective this may be a case where direct subsidy payments to secure the higher level of service may be needed to align the private revenue steam with the marginal social benefit stream.

Major infrastructure investments can also be associated with negative externalities. Examples are noise pollution, water pollution, severance and loss of environmental aesthetic values. In the presence of such negative externalities, the investor may be led to finance socially undesirable investment projects or at the very least, to overinvest compared to the socially optimal provision of the infrastructure.

3.3.2 Government failure

Government direct involvement has long been used as a way of dealing with market failure in infrastructure provision. Government ownership has a long history in Europe, Asia and Australia, although this has recently been reduced through privatizations. Although the private sector often built the infrastructure (as a construction contractor), ownership and operational management historically rested with the government – either as government departments or as GTEs. Governments had the control and the responsibility to develop the infrastructure assets. The most important aspect of this was that government could direct that prices cover marginal costs, with any associated deficits recovered through general taxation.

The potential failures associated with this approach are well documented. They include: public sector financing constraints preventing required capacity investment, lack of efficiency incentives, incentives for gold plating connected to risk aversion, and a lack of innovation.

These failures prompted the extensive campaigns of privatization across the UK, Europe and Australia. Private ownership offered potential productivity improvement and shifted the responsibility for investment in new capacity to private financiers. Privatization required robust regulatory regimes to mitigate the possibility of suboptimal outcomes associated with unregulated natural monopolies.[17]

From a financing perspective, the cost profile of major infrastructure is the most likely source of government failure. It potentially arises when government intervenes to regulate the private sector investment. Since the ratio of fixed

[17] A number of studies have documented productivity gains in switching to private ownership. A review of these can be found in Megginson & Netter, (2001).

capital costs to total costs is high (that is, infrastructure assets are characterized by high operational gearing), there can be a large difference between average costs and marginal costs. This difference can be extreme. Many significant infrastructure projects have public good attributes such that, up to the point of congestion, the marginal cost of serving an additional customer is close to zero.

In the literature, this has been defined as a time-inconsistency problem. It arises because of the timing difference between the investor's decision to invest in production capacity and the regulator's involvement in regulating prices for products produced with that capacity.

To justify an investment, the developer/investor needs confidence that the value of the future revenue stream will cover operating costs and that capital cost will be recovered inclusive of an agreed weighted average cost of capital. This requires average cost pricing. Once constructed however, the capital cost is sunk. There is an argument that socially optimal pricing is marginal cost pricing. In this case, there is an incentive for governments and regulatory agencies to focus on the marginal costs and to regulate prices down to this level. This regulatory decision is ex post and reflects the fact that, once constructed, the asset will be operated as long as marginal cost is covered by allowed user charges. In effect the regulation modifies the ex ante arrangement.

For the system to work, investors need a credible future commitment that they will recover their capital and operating costs inclusive of an adequate rate of return. The absence of such a commitment or the absence of clearly specified contractual and regulatory arrangements increases risk for the investor. The investor will require a higher rate of return as compensation. The outcome can be higher finance costs or a complete lack of finance.

If this political/regulatory risk exists, or is perceived to exist, one consequence is that investors will give preference to brownfield assets. Reviews have frequently noted that investors, especially pension funds, prefer brownfield assets. One advantage of such investments is that the operating costs are known and the pricing structures and regulatory arrangements are in place. Potential investors are well placed to assess the likely price trajectory and rate of return that will be allowed by the regulator. With this knowledge and with the longer-term certainty

associated with well-developed regulatory arrangements, the investor is better placed to determine an accurate purchase price. [18] [19]

[18] At one level, it is tempting to say that the time inconsistency problem should not be a problem. In advanced economics, regulatory regimes are well developed and regulators are experienced. However, not all assets are processed through a standard regulatory model and examples exist where ex post political pressure has resulted in expected price increases not being allowed. Some UK based toll road examples are discussed in Shaoul et al., (2012)

[19] It might also be tempting to argue that this is just a normal risk. However, while investors can assess the likely risk it is not within their control. This should be treated as an exogenous risk to be borne by the government, which is best placed to control it.

4 Pricing, Planning and Funding

It is tempting to lump all funding arrangements for infrastructure into a general "infrastructure financing" categorization. However, this simplification ignores important distinctions between raising the investment capital and funding the operations. It also ignores the role of pricing and planning policies in determining the best way to fund infrastructure.

A distinction should be made between raising capital for the construction/acquisition of projects, and the arrangements for servicing /repaying capital. Although raising capital and paying for that capital are linked, they are not synonymous. They represent different aspects of a project and relate to different parties. Policy can be different between them. For example, financing a major road construction and the ongoing payment for the finance is logically associated with different entities. Construction finance might be provided by a private consortium or by government. Whatever construction finance arrangements are pursued, there are various options for servicing the capital. The former does not determine the latter. The ongoing funding can be from user charges or tolls, from general tax revenue, from hypothecated land tax revenue or a combination of these.

One important aspect of the distinction is ownership. Providing the capital for a project usually confers ownership or property rights. The owner has a direct interest in the management of the asset. Government therefore needs to have a policy on ownership to sit alongside its infrastructure financing policy. The ownership policy should account for the specific attributes of the infrastructure assets, the expected performance of the assets in government compared to private ownership and the transaction costs of managing the asset in government compared to private ownership, including the way that any externalities and other social impacts will be managed.

For example, a port may be owned and operated by the government. It could just as well be owned by the government but built by the private sector with finance from the private sector and with repayments to the private sector lenders based on a combination of user charges and tax. With ownership, the government retains the right to set the management parameters, including prices. The port could be leased to the private sector without foregoing the ownership rights.

Government policy on management (for example productivity KPIs, price regulation) would then embedded in the lease terms and conditions.

On the other hand, the port may be planned by government (scale, location) but be built, owned and operated by the private sector. Responsibility for raising the finance to build the port and for servicing it rests with the private owner. If the port is a natural monopoly, there may be a regulatory role for government.

Optimal arrangements are required for both ownership/capital finance and management/operational payments but the two are conceptually separate. The optimal method of raising finance is the method that delivers overall the best value for money inclusive of the performance of the infrastructure.

4.1 Integration of spatial land use planning, transport planning and evaluation.

Most analysis of infrastructure finance implicitly assumes that all projects that require finance are necessary and configured optimally. This is likely to be an oversimplification. Papers that focus entirely on alternative finance mechanisms and risk allocation frequently fail to recognize that failures in the land use planning, broader pricing and evaluation systems result in finance being sought for poorly defined projects sub optimally configured.

Historically infrastructure in Australia, and Western Australia, has been funded through general tax revenue. This implies that infrastructure investment was a 'pure public good', or was justified by reference to other forms of market failure or on equity grounds. Road investment is an example. Both government and consumers had strong expectations of ongoing road network expansion and that the capacity would be available to consumers at no charge to use as they see fit (for example freedom to choose route and travel time). In this setting, lack of direct pricing signals has led to overuse of the system. There is consequent congestion and this congestion results in a perception that the infrastructure is deficient - at least for the affected parts of a network. Sub optimal investment and financing decisions follow.

The solution to this is the development of an efficient infrastructure market that is based on the underlying demand and supply costs.

There are three considerations. First, we need to have in place a coherent and transparent transport planning and land-use planning system that allows the socially required capacity expansions to be identified. Second, we need to have in place pricing policies, including second best pricing policies, which ensure that the available infrastructure capacity is being used optimally. Third, and given the first two, we need to have in place a formal evaluation process that assesses and ranks competing projects consistently based on an accepted evaluation technique such as cost benefit analysis. Evaluation need to incorporate shadow prices where actual prices are non-existent or suboptimal. A subset of the latter would be a formal finance evaluation process that determines the best way to finance any infrastructure project that passes evaluation and should proceed.

4.1.1 Spatial land use and transport planning

The key to good infrastructure outcomes, irrespective of financing mechanisms selected, is long-term strategic planning. For infrastructure, developing a long-term plan (at least 20 years) is generally accepted as the minimum requirement to ensure good infrastructure outcomes. However, many proponents of long-term strategic planning under represent the required elements.

Long-term strategic planning is necessary for the production of a coherent pipeline of quality projects. This is the prerequisite that ensures that potential funders/owners/operators are not forced to make investment decisions within inappropriately short time frames and which enables the cost of project development to be optimized. Long-term planning is the prerequisite for projects to be specified optimally, scheduled optimally and financed optimally. For example, selecting the most appropriate finance mechanism and the associated risk sharing is made more difficulty when projects have to be conceived, specified and funded in too short a time. The lack of strategic plans and a well-defined long-term pipeline of quality infrastructure projects is a barrier to good investment outcomes.

As part of the planning for projects, the appropriateness of financing mechanisms should be determined, at least at the preliminary level. Financing options need to be considered as part of the planning process because not all worthwhile projects are amenable to the full range of funding options. Some projects are very well suited to private ownership and price regulation. Others are best financed

through availability payments to the private operators. Still others may be best suited to government ownership and operation with taxpayer funding. Some are ideal candidates for PPPs while others are better planned as regulatory asset bases. Each of these possibilities is discussed further below. Suffice to say at this point that early elaboration of the most suitable financing methods makes it easier to plan for private sector involvement.

A major issue (see below) in securing private sector involvement in infrastructure funding is risk allocation. Various risks need to be managed. One class of risk is directly impacted by the quality of associated land use and transport planning. These are the project specific risks.

Project specific market risks relate to traffic forecasts, construction costs, operating efficiency and management. It can be argued that private firms deal with such risks better than government does. However, uncertainty about potential changes to land use planning and uncertainty about future commitments to other infrastructure projects can create considerable uncertainty about a specific project's future performance and this will affect the willingness/ability of the private sector to become involved. While it is true that good long-term infrastructure planning is a positive, it needs to be placed within a broader land use and network planning framework that allows potential private investors to assess project risks clearly.

Some examples will suffice to illustrate this point. Suppose that a government has determined that a new city road link could be privately funded by tolls. Forecasting future demand is a critical aspect of any assessment of the viability of such a project. Changes in land use and transport planning in future could potentially have a large impact on the project, negative or positive. For example, if future land use planning encourages residential and industrial development away from areas connected by the road, the risk is that traffic forests will not eventuate. Similarly, if major investments occur in other parts of the network that compete with the road, (for example in public roads, and public transport) the expected level of demand may not occur.

The proposal to develop a light-rail in Perth connecting Mirrabooka to the city and potentially through to the areas surrounding the University of Western Australia and Curtin University is another example. Private sector involvement

could be as extensive as build/own/operate with a combination of user charges and availability payments and tax increments generating revenue. It could be a PPP or as minimal as the private sector simply being the financier lending to the government but with the government owning and operating the asset. In the last case, all risks are borne by government. In the first case, the future use charges and tax increments will be heavily influenced by planning for residential and commercial developments along the route, including density policy. Uncertainties about the planning for urban and commercial development along the route and in competing spatial locations creates uncertainty about future revenue streams associated with the project. This creates an incentive for government to bear the risk and may even jeopardize private sector involvement.

4.1.2 An appraisal culture

As noted previously, discussions about financing take as given that the projects to be financed have emanated from a strategic planning process in which they have been assessed rigorously.

The infrastructure needs of a jurisdiction can only be determined and developed efficiently if all possible options have been subjected to a rigorous assessment that incorporates a thorough benefit-cost analysis. This is an important part of the process because financing is ultimately directed at projects that are the nominated options to achieve a particular outcome not at the plans per se. A rigorous use of benefit-cost analysis or as the OECD puts it, the development of an appraisal culture would allow for a better selection of options and a better ranking of projects.

The process can be illustrated using light rail. Strategic land use and transport planning determines whether a particular part of the city needs a transport capacity enhancement to deal with projected trips from and attracted to an area. The combined strategy is required because the transport needs reflect the size and composition of the projected residential population and the size and composition of the projected employment base in the area along with key planning indicators such as employment self-sufficiency. Understanding these interactions clarifies the transport task. Options to cater for increased trip volumes include upgrading the road system for private vehicles, expanding bus

transport on existing or upgraded roads, investing in a dedicated bus rapid transport system or investing in a light rail system.

Rigorous planning and cost benefit analysis is needed to determine which of these options offers the greatest net benefits and to determine the optimal timing for the best option. This preferred option then has to be financed using the most effective finance option chosen from those that are available and workable.

One advantage of adopting an evaluation or appraisal culture is that the relationship between finance and project definition can be better managed. The argument is that, in the absence a rigorous approach to strategic planning and project evaluation, private finance availability has led to proponents having too large a say in the form a project finally takes. The alternative view is that projects can be refined and made more efficient through the involvement of the private sector funders at an early stage of project definition and evaluation.

Again, some examples will suffice to illustrate the point.

In their review of PPPs in the UK, Shaoul et al (2012) review various rail and road projects that have been financially unsuccessful. Most projects reviewed were transfers of rail assets to the private sector, a small number were new road investments. Some projects failed outright. Others produced outcomes that did not match expectations and financial arrangements had to be modified. The central issues in these failures relate to risk sharing, finance costs and demand risk. However, for some road investment projects it was the interaction between planning, project definition and private finance that was critical. In order to make specific projects viable, other road projects had to be promoted up the capital project prioritization queue, though they were not part of the original planning and financing arrangements.

Britain's M6 is a further example. Britain's first private toll road, the M6 was to be built, owned and operated privately and financed through tolls. The strategic planning objective was to relieve congestion on the motorways around Birmingham and the toll road was to be operated as a concession for 53 years. The charges were unregulated. Although traffic volumes were significant, they did not equate to volumes that would produce financial success. Moreover, given that the road carries only 20% of the competing motorway traffic, it also may not have achieved the desired congestion reduction benefits. (Shaoul, J., Stafford, A.,

Stapleton, P., and Macdonald 2008). Two issues stand out in this case. First, competing roads were not priced. This is potentially a planning failure if these roads could justifiably have a congestion charge imposed. Second, given the first point, new road projects were developed that were toll free, but were specifically designed to feed traffic to the private toll road. The criticism is that these roads represent a project redefinition and they have avoided normal evaluation processes and jumped the capital prioritization queue when they may not be justified on broader economic grounds.

On the other hand, there can be potentially positive outcomes from the involvement of proponents and financiers in the process. Ugarte, Gutierrez, & Phillips (2012) offer examples where they argue projects and outcomes (transport and economic) have been improved because planners have allowed proponents and financiers a role in project definition. They quote the example of the LBJ project in Dallas, where the allocated budget was $700 million of public funds but ultimately the cost to the public purse was only $489 million. The saving was achieved by re-scoping the project, including a reduction in the length of the project from the original 33.6 km to 21.9 km. It was argued that the segment of road removed did not have enough traffic congestion to warrant the addition of managed lanes.

Neither of the above analyses should necessarily be taken at face value. If the M6 was subjected to a rigorous strategic planning and project evaluation process incorporating planning for the surrounding network and the lack of congestion charges on competing roads, the financial failure outlined by Shaoul, J., Stafford, A., Stapleton, P., and Macdonald (2008) would best be attributed to poor financial arrangements for the project, including demand forecasts. In this case adding the new connector roads may be an inefficient solution compared to adjusting the financial arrangements by offering, for example, availability payments.

Again, in respect of the LBJ project, if the strategic planning and project evaluation were rigorous, the full 33.6 km of managed lanes may be fully justified and cutting the scope may have saved public funds but at the cost of some reduced net benefits. Ideally, a determination of the benefit cost ratio for the two option lengths is needed to ascertain if the longer or shorter option is better. If the shorter option is the better one, as is implied by Ugarte et al (2012), then this

is a case where the proponent and financier have improved net benefits by improving planning and project specification, as claimed.

When projects are redefined as part of the development and financing process, there will always be a question about whether it is being done to improve the net social outcome or to achieve specific financial outcomes. This is unavoidable. However, if the strategic planning and evaluation process are rigorous, it establishes the relevant benchmarks for assessing the merits of such project changes. This is a primary reason for adhering to a stringent planning and evaluation process.

4.1.3 Optimal or well-designed second best prices to deal with externalities – shadow tolls and subsidies.

In assessing transport infrastructure projects and their financing, the general policy settings in place to deal with congestion and other transport related externalities are important.

If a set of first best charges were implemented, then all externalities would be internalized. For urban travel and freight, this would mean, for example, that roads were all correctly priced allowing for marginal private and externality costs including congestion, and that rail and bus would be priced inclusive of all marginal private and externality costs. The relative price to users of road, rail and bus would equal their relative marginal social costs. In these circumstances, decisions about choice of mode would be socially optimal, ceteris paribus.

Similarly, for regional travel and freight, first best charges would ensure that relative prices to users for use of road and rail would reflect relative marginal social costs. It would mean, for example, that the decision as to which mode to use to transport grain would be optimal and ceteris paribus, the grain harvest would be transported optimally.[20]

In the absence of first best prices, second best pricing is needed. This might occur, for example, when bus and train travel in urban areas are subsidized because road users do not pay the full marginal cost for the road resources they consume nor the congestion costs they impose. The public transport subsidy is a form of

[20] Ceteris paribus is important here as there may be sub optimal pricing of handling and storage charges at ports that impact on freight decisions.

second best pricing designed to make the relative transport prices to users reflect the underlying relative marginal social costs.

Only by having the optional first best or second best prices in place or by calculating the correct shadow prices and modelling transport outcomes based on these shadow prices, will the project evaluations generate the optimal portfolio of projects.

The approach taken to first and second best prices will influence decisions about ownership and finance. For example, if a rail system has to be subsidized to ensure that it is priced correctly relative to road private funders/owners will not be able to recoup costs fully from user charges. Government will be required to offer subsidies to ensure that the required second best prices can be sustained.

5 Risk Allocation

Private investors expect an adequate rate of return, allowing for the risks that they must bear. Risk sharing has therefore been a key issue to be resolved when government has sought to attract greater private sector funding into transport infrastructure investments. The debate around the effectiveness of PPPs largely been driven by debate about whether the risks associated with infrastructure are most appropriately borne by the government sector or the private sector and what mechanisms are most suitable for managing the risk.

The allocation and management of risk is not just an issue for the PPP mechanism. All funding options have implications for the risk to be borne by government. The development of policies to enhance private sector funding need to be transparently clear about which risks are to be allocated to government and which risks are to be allocated to the private sector.

Risk can be considered at the aggregate level - the extent to which the government or the private sector is best placed to deal with overall infrastructure investment risk. Risk also has to be considered at the project level – the extent to which the government or private sector is best placed to deal with project specific risks.

5.1 General risk considerations

The general risk consideration for transport infrastructure funding is whether the government or the private sector is better placed to bear the general risks associated with investments in transport infrastructure. There is no universally accepted answer to this question.

One argument is that the public sector is better placed to handle the infrastructure risk because of its greater ability to spread risk through pooling (Arrow, K. J. and Lind, R. C. 1970). There are two aspects to the pooling of risk by the government. First, government can pool risks over many projects. Second, government can pool risks over a large number of taxpayers, such that there is

little risk in the long run for any individual taxpayer. Under this argument, the real cost of risk is lower for government borrowing than for private borrowing.[21]

A potential complication with the above argument is that the risks shifted to the taxpayer are unpriced. These risks are implicitly borne by taxpayers, but taxpayers receive no compensation for risks allocated to them. The taxpayer is not party to the infrastructure investment decisions that originally gave rise to the loan commitments.

Allocating the risk to the taxpayer rests on the idea that the government can ultimately resort to taxation to repay infrastructure loans. It can be argued that the government-borrowing rate is lower only because private lenders know that ultimately the government will resort to taxation to repay loans. This lower rate does not necessarily reflect any superior ability of government to assess project risks and manage these risks. In this case, government can fund a portfolio of projects more cheaply than the private sector because it can resort to taxation to fund the loans. It does not reflect a lower societal risk because the public sector is providing the infrastructure.

From the societal perspective, projects with a given set of parameters would appear to have the same risk, whether they are undertaken in the private or public sector. For a portfolio of projects this implies that aggregated risk is the same, irrespective of the way the risk is distributed across the public and private sectors.

Any advantages that government has in spreading project risk must be set against potential borrowing rate advantages for the private sector. The way risk is managed is the important issue here.

The private sector may better manage the specific project risks and may better manage project cost structures. Where this occurs, the project risk will be lower under private management. The will mean, ceteris paribus, a private sector borrowing rate advantage. Project risk may also be more transparent when there is private sector funding. This is because private equity risk is priced specifically

[21] The government bond rate is often several percentage points lower than the private borrowing rate and is put forward as a reflection of the risk pooling capabilities of government.

into the project cost of capital, in contrast to the situation where the taxpayer is the funder. [22]

Jenkinson (2003) has argued that the private sector may be better at evaluating risks than the public sector. Involving the private sector in financing and risk assessment may then result in better project appraisal. An important aspect of this is that the public sector may be required to deliver projects that do not pass the standard benefit cost analysis test but are politically popular. Another aspect is that the political process may favour short-term benefits including selecting projects that have lower up-front capital costs and higher longer term operating and maintenance costs. [23]

The argument that the private sector will be more rigorous in risk assessment and project evaluation, may be an oversimplification. The interaction between the political process and the private financiers may mean that the decision to proceed with projects is more complex than the above implies. [24]

5.2 Transport project risk considerations

As noted above, managing risk at the general level is a question of whether aggregate risk across a portfolio of infrastructure projects is best placed with the government sector or the private sector.

The further question is whether the private sector manages specific project risks better than government. Arguably, private firms have a clear incentive to manage these risks by allocating the risk and responsibility to those individuals and organizations best placed to deal with it.[25] Public officials bear less responsibility for specific market risks associated with individual projects.

The management of project construction costs, operating costs, marketing costs and project efficiency are examples of specific project risks that may be better handled by the private sector.

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[22] Having equity risk specifically priced will also influence the ranking and selection of projects.
[23] Of course, if these projects have benefits that cannot be evaluated within the conventional appraisal framework, then the society may wish the project to proceed. Some projects such as cultural centres, public art and others that are defined as community building projects may fit into this category.
[24].
[25] Firms will do this within efficient principal-agent relationships.

In their review of financing arrangements Grimsey & Lewis (2004) argue that where private firms control projects, they have a strong incentive to extend planning beyond the construction phase and to plan in detail for the operational phase. One consequence is that management by the private sector is more focused on the minimization of costs over the whole life cycle of the infrastructure asset. This includes keeping maintenance costs low in the long term by selecting the most appropriate configuration of up-front capital expenditure. [26] A further reason the private sector is more likely to take the best possible long-term asset stewardship decisions, is that it is less likely to face short-term political manipulation.[27]

5.3 Demand risk

Planning and funding transport infrastructure requires forecasts of the patronage that will be generated over the life of the project. Demand risk (traffic/revenue risk) captures the potential for these forecasts to be over or underestimates of future demand. For example, when future demand is overestimated, project revenue will be lower than expected and average costs will likely be higher than expected. Combined, this will jeopardize the underlying financial viability of the project. The long-lived nature of large transport projects compounds this risk. The difficulty of forecasting traffic/revenue far into the future makes valuing projects difficult for government and the private sector.

As with other risks, demand risk needs to be allocated in the way that maximizes the long run net benefits of the project. To do this, demand risk needs to be allocated to the sector that is best placed to manage it.

Demand risk for a specific transport infrastructure project depends on several factors. Those specific to the transport system include: the nature of the feeder routes and the connections to the rest of the network; the degree of competition with alternative routes; the existence and management of intermodal competition and parking and congestion charges. Factors connected to the planning system include: conditions set for the development of housing, commercial and

[26] If the private sector is only involved at the construction stage, one argument is that competitive tendering, ensures that the project builder bears the project specific risk associated with construction and therefore has an incentive to optimize project design and construction cost

[27] A key argument here is that, unlike the private sector, the public sector has an incentive to gold plate the system based on unnecessary capital expenditure and maintenance costs designed to avoid politically damaging system downtime.

industrial property proximate to the infrastructure and the operation of broader urban policies such as city growth boundary policies. Broader economic policies and growth policies can also affect demand.

All transport projects are subject to demand forecasting risks. The management of these risks has been documented in most detail for toll roads. Toll roads have dominated PPPs. A 2005 survey (Bain & Polakovic 2005) evaluating the performance for 104 roads, bridges and tunnels in Europe, the Americas, Asia and Australia, found significant over estimates of likely traffic volumes. On average, toll road traffic forecasts were too high by 20% to 30% for traffic volumes in year one. Variability was large – a low of 15% of forecast traffic to a high of 50% above the forecast. Li & Hensher (2010) reviewed results for some fourteen Australian toll roads and found average traffic volumes in the first year of operation to be only 55% of forecast levels.[28]

One view is that toll road forecasts are less accurate than traffic forecasts for toll free roads. This was the conclusion from a review of forecasts carried out in Australia in 2012 for the Federal Government (Department of Infrastructure and Transport 2012). However, this is not clear-cut. A detailed comparative review of forecast accuracy covering tolled and un-tolled road projects found that while forecasts are around 20% overstated for toll roads, the range of forecast errors is similar. Allowing for 'optimism bias' in the toll road traffic forecasts results in similar predictive performance for toll and toll free roads. Neither has especially good traffic forecasting performance (Bain 2009).

Similar results are reported by Flyvbjerg et al. (2005). They review 210 projects and find that statistical forecasts of transport demand are poor. The difference between actual and forecast traffic is more than ±20 percent for over half of the road projects considered. [29] Moreover when looked at over the 30 year time frame covering the projects included in their study, Flyvbjerg et al. (2005) conclude that the forecasts have not become more accurate over time.

The weight of evidence on demand inaccuracy and the tendency to optimism bias means that this core element in project evaluation and funding creates

[28] Most of these road projects were PPPs.
[29] Rail projects fare no better in their study. Ninety percent of road projects studied had patronage demand overestimated with the average overestimate being 106%.

substantial risk. At its most basic, this suggests that better forecasting methods are required along with governance structures that ensure that they are implemented properly and transparently.[30]

Demand risk is not entirely exogenous. Government can influence demand factors. Land planning decisions can influence land development patterns in the area around the infrastructure. Transport planning decisions can influence pricing of and investment in other parts of the transport network.

If there are network risks for the project that government can influence, it may be appropriate that government bears some, or even all, of the demand risk. At one extreme, this might involve the government developing and managing the project. At the other, it may only influence the design of the funding arrangements by which the private sector becomes involved. For example, compared to using direct tolls, availability payments shift demand risk to the government/taxpayer.

[30] Reference class forecasting has been suggested as one strategy for dealing with forecast inaccuracy (Flyvbjerg 2009).

6 Funding Options

Funding options sit on a spectrum from total government funding and management through to the responsibility for funding and management (and as a corollary, ownership) being with the private sector. Along this spectrum, many possible funding options exist that can be used exclusively or in combination.

Evidence suggests that no one option is a complete solution for infrastructure funding. Each has a potential role. The challenge is to understand how each option fits into the broader taxation and financing policies of government and how each fares when assessed against the ability to support the underlying transport planning objectives of government including creating incentives for efficient behaviour by agents. Funding options differ in the way they relate to the beneficiary principle.

6.1 General taxation and infrastructure levies

The most general approach to funding infrastructure is through taxation. With this funding, there is no ongoing servicing charge. Tax revenues do not attach to any particular project. They can be directed to any project deemed to justify funding. The tax instrument is not connected to any specific transport planning objective.

Infrastructure levies are a form of general taxation. Like the Medicare Levy that is specifically directed to health funding, an infrastructure levy is directed to infrastructure. However, they are general funds and any project that is deemed to justify funding can be funded because funds raised through the levy are not attached to any particular project. The levy is not connected to any specific transport planning objective. A specific issue with the use of levies is whether they generate additional funds from the taxpayer for infrastructure or whether they are a substitute for general tax revenue. If the latter is the case, total tax revenues are unchanged and without the levy, a higher proportion of general tax revenue may go to infrastructure.

A criticism of taxation funding, where the infrastructure spending comes from current tax revenues, is that it is inconsistent with the beneficiary pays principle. When capital for transport infrastructure is provided from current tax revenues, current taxpayers pay for the full cost of the infrastructure at the time of

construction. These taxpayers will likely receive only a fraction of the benefits provided because the beneficial services will be delivered over many years and across many locations, to current and future taxpayers.

Neither are there significant efficiency arguments for funding infrastructure out of current consolidated revenue. No behaviour changing incentives accompany taxation funding.[31]

Although commonplace, transport-related taxes are effectively no different from general taxes. Revenue collected from excise taxes on fuel are part of consolidated revenue in the same way that taxes on tobacco, alcohol, cigarettes or the GST are general revenue inputs to consolidated revenue. Many jurisdictions hypothecate fuel levies to transport investments. Hypothecation strengthens the link between the tax base and the beneficiary – road and fuel users funding roads. Even when fuel levies are used, current taxpayers are still effectively paying the capital cost of transport infrastructure that will deliver services over many years into the future. The previous efficiency arguments applied to general taxes still hold. There are no obvious efficiency benefits from financing transport infrastructure from excise taxes on fuel.[32]

In Australia, the above arguments apply primarily to taxes collected by the Federal Government. Personal and corporate income tax and GST are all collected by the Federal Government. They are partially allocated back to the States using various revenue sharing formulas along with tied grants and direct grants.

The states have a limited set of tax instruments. In Western Australia, these are essentially mining royalties, payroll tax, stamp duty and land tax.

The heavy reliance on royalties is largely responsible for the volatility that exists in Western Australia's revenues. Royalty income was 6% of total revenue in 2004-05 and is estimated to be 21.5% in 2014-15. (Government of Western Australia 2014, p87)

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[31] Of course, most government borrowing is ultimately paid from tax revenues. However, the incidence of the payments is different because the repayments are made over time from future tax revenues.

[32] The exception may be efficiency benefits where the fuel tax is part of a policy to correct for other pricing failures. For example, it could be argued that a fuel tax provides an incentive to use less fuel and drive less which is consistent with pricing the congestion and pollution externalities. However, this is a very crude way to deal with these externalities.

This volatility has had an increasing impact on state revenue because the share of state based tax revenue in total revenue has increased significantly. This is attributable to the decline in WA's share of GST revenue, although it should be noted that combined GST and Commonwealth grant income has declined less than that of GST income alone.

Stamp duty and payroll tax are inefficient tax instruments. Stamp duty is a disincentive for buying and selling houses. It is effectively a disincentive to mobility. Payroll tax is a tax on labour and as such is a disincentive for jobs. Using these to fund higher infrastructure spending will lead to greater inefficiency. Land tax is a relatively efficient tax and at the state and local level is a preferred tax base for funding transport infrastructure (Chapman et al. 2008). In the Western Australian case, it is the least damaging to efficiency of the three. The Economic Regulation Authority has recently estimated the relative efficiency of these taxes in Western Australia, suggesting that greater reliance on land tax would allow revenue to be raised more efficiently (Economic Regulation AuthorIty 2014).

6.2 Public sector borrowing

Public sector borrowing can be through general bonds or infrastructure bonds. As with general tax revenues, general borrowing can be directed to any project and is not specifically connected to any specific transport planning objectives.

Borrowing through GTEs is somewhat different. Although operating as independent GTEs, their borrowing sits on the government balance sheet and affects the overall financial position of the government, including its credit rating. However, borrowing by GTEs (for example, by a railway company or port authority) will be directed to the particular transport infrastructure that the GTE provides.

The ongoing servicing costs can take various forms. For general borrowing, the repayments mean that, ceteris paribus, general tax rates need to be higher than otherwise would be the case. Where the infrastructure funds are raised using infrastructure bonds, ongoing service costs can still be paid from general tax revenue.

Alternatively, the servicing costs could be more closely connected to the infrastructure or the users. One option is to use direct charges. For example, where a light rail project is expanded using general public sector borrowing, government can raise user charges as a way of funding the servicing costs.

Hypothecation is also an option where a specific tax source is hypothecated to fund the repayments. An example would be allocating a portion of fuel excise revenue to fund transport infrastructure bond repayments.[33]

Moreover, there is always the option of selling an asset obtained with public sector borrowing to allow repayment.

An important aspect of government debt funding is that the cost of infrastructure is spread over current and future generations of taxpayers. By spreading the repayments on loans over future years and making the repayments from current taxation revenues generated in these future years, the burden of repayment is spread over time. This process may approximate the delivery of the beneficial services to current and future taxpayers. This is more likely when the assets being funded provide widely distributed benefits. In this case, the cost of debt is being shared across those who will use the assets today and those who will use the assets into the future.

Although this is a better approximation to the beneficiary pays principle than the straight use of general tax revenue to fund infrastructure, the match between those paying the tax and those receiving the benefits from the infrastructure is still only approximate.

Where borrowing is through a GTE, servicing the debt needs to be through user charges or through a tax funded subsidy to the GTE. Although in principle, there is little difference between borrowing by general government and borrowing by GTEs, borrowing by GTE causes the risks to be more directly connected to the management team responsible for planning, constructing and operating the infrastructure. Consistent with the Grimsey & Lewis (2004) arguments, this should engender greater management discipline.

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[33] Bonds may be tax advantaged. This means that the bondholder receives some tax concessions in relation to the interest on the bond. Use of tax-advantaged bonds has not been common in Australia. It is more common in the US where municipal bonds are generally tax-advantaged bonds.

Notwithstanding these arguments, the previously discussed revenue and debt position of the Western Australian Government means that into the future, transport infrastructure funding from public sector borrowing will be restricted.[34]

6.3 Pricing mechanisms

Several funding mechanisms fit into the category of pricing and licensing. Whenever these are used, there is a fine line between the pricing role and the tax and revenue-raising role. Road congestion charges, parking charges, specific vehicle charges and impact fees are primarily pricing policies. Yet to the extent that their rates are set above the level of marginal cost, they are effectively taxes. People and vehicle based licence fees and property-based charges (including tax increment funding) fit into this category but are more akin to taxes than prices.

6.3.1 General transport related pricing and licensing policies

Pricing approaches include general road user charges, heavy freight vehicle charges, congestion pricing, cordon area tolls, parking levies, vehicle and people based licence fees. They are general in that the setting of the price/fee is not connected to any specific project. The net revenue earned is consolidated revenue. Agencies usually have to argue the case to have a share of this revenue allocated to particular transport projects. However, unlike general taxation funding, these charges raise revenue while at the same time generating pricing signals consistent with achieving the underlying transport planning objectives.

Road pricing is especially relevant. There is growing recognition of the need to consider road pricing as part of the infrastructure investment landscape in Australia. The draft report by the Productivity Commission on infrastructure argues that reform of road-user charging is needed to address 'the disconnect' between road-related revenue and expenditure and contribute to more efficient road provision (Productivity Commission 2014). Infrastructure Partnerships Australia (2014) has also argued that the revenue model used for funding roads is unsustainable and that pricing to encourage a more efficient use of the network is

[34] GTE borrowing does not quarantine the effect of the borrowing from general government. In most jurisdictions, the government is ultimately responsible for meeting any financial obligations of its GTEs.

now needed. The Western Australian Economic Regulation Authority has argued for congestion charges in Western Australia (Economic Regulation AuthorIty 2014). [35]

For funding purposes, a distinction needs to be made between road user charges as a general usage charge and congestion charges designed to deal with congestion on a particular part of the network.

Road user charges as a general pricing tool are more extensive in that they can be applied to both uncongested and congested roads. Tolls on uncongested roads are an example. They are a general system of charging designed to recoup the costs of providing roads based on the pattern of usage and the services offered. Road user charges ideally are set equal to the long run marginal cost of supply, including marginal externality costs. It is fundamental therefore, that road user charges should be forward looking. They should be based on projected expenditure, be structured to reflect the actual road usage and cost and should vary across different vehicle types.

The Heavy Vehicle Charging and Investment (HVCI) reform project established by COAG to achieve more efficient charging and road provision for heavy vehicles is an example of general road user pricing. Under this proposal, charges would reflect mass-distance-location and the level would be set to recover the attributable infrastructure maintenance costs from heavy vehicle operators.

Although general road pricing provides an opportunity to apply user charges, including congestion charges, across the whole road network, there are caveats. There are significant barriers to implementation. First the technology involves significant up-front costs. The system requires extensive investment in physical infrastructure, collection systems and administration systems. Second, in most jurisdictions the evidence is that broad based road user charges lack broad community and political support. Third, given the cost and complexity of the systems, the net gains from comprehensive road pricing are open to dispute. The share of the revenue that will be consumed by system operating costs is an important issue (Deloitte Australia 2012). These factors, especially the heavy

[35] It should not be thought that road user charges or congestion charges are the only potential reform element. Glaister & Smith (2009) outline a raft of potential reforms in ownership and governance that could work alongside road pricing to improve efficiency and funding including privatisation and addition of a regulatory asset base framework for setting user charges.

requirement on technology investment, mean that across the board road pricing of the network is a long run strategy.

In the first instance, congestion pricing is a more realistic option. This is focused on major congestion areas and corridors where congestion is already high.

Congestion charging is designed to charge users the marginal external damage caused by their vehicle use in the presence of congestion.[36] Implementation can be based on sophisticated electronic pricing systems through to simple zonal based schemes in which a fee must be paid to drive into a congested area (typically the central city). The revenue raised does not have to be used to fund road expansions in the congested area or indeed any other specific transport infrastructure. The charge is designed primarily to influence behaviour by signalling to drivers the full marginal social cost of their actions. In doing this, congestion charges will influence the pattern of net benefits from proposed transport projects because they will change the pattern of road use and congestion.

In many cases, congestion is a peak load problem relating to vehicles entering and leaving the CBD in the morning and evening. However, it can also occur on other parts of the network and at other times. Examples of congestion pricing include the Sydney Harbour Bridge Toll, Singapore Electronic Road Pricing Scheme and Stockholm Congestion Charge.

Cordon tolls are a simplified form of congestion charge. With these tolls, motorists pay a fee to enter or drive within a restricted zone. Pay-as-you-go charges or daily entrance charges signal to the motorist that driving into and through the designated area imposes congestion costs on other area users. In Singapore and Stockholm, a congestion fee is levied every time a user crosses into the cordon area. In London, a daily fee is charged for any vehicle driving on a public road in the congestion charge zone.

General congestion charges and cordon tolls are designed to influence behaviour. In the short run, motorists can seek an alternative route, car pool or switch to

[36] The National Transport Commission and BITRE have noted that future population growth is expected to have enormous flow on implications for transport in Australia, and that the avoidable cost of congestion to the Australian economy is predicted to increase from around $9 billion in 2005 to around $20 billion by 2020

public transport. In the long run, the charges create incentives to select alternative destinations and economic activities that do not need to be in the congested area will have incentive to relocate.

Most existing congestion charges and cordon tolls focus on congested inner and central city areas, but any node with intensive economic activity and limited access can be a source of congestion in a city. In Australian cities, access to ports for trucks carrying containers has become an important issue with heavy vehicles using congested roads. The heavy vehicles impose higher maintenance costs, contribute to congestion and require capacity investments specifically to handle the heavy vehicle load. Port access fees work in much the same way as cordon tolls. A toll on heavy vehicles to enter the port area would provide an incentive to switch to rail, or assuming the fee was time of day related, would spread the load out over time. A version operates at Melbourne Port. The Port of Melbourne Corporation (PMC) is required to pay an annual port licence fee (PLF), and then recoup it back from users. It is only an approximate management solution because the impact on traffic flows will be dependent on how user groups are charged. The charge collects funds broadly from those users likely to benefit most from future investments to improve access to the port.

The toll road is part of the general road pricing system. Tolls are fee-for-service charges. A road or section of road is subjected to user pays with a fee to access/traverse the designated road. Toll revenues are usually dedicated to funding the tollway project including maintenance costs. Although tolls are just a form of road user charge, the toll road model has mostly been associated with funding a new road or road tunnel where the toll revenues are the basis of the return to the private developer.

Toll roads have been a focus of PPPs (see section 5.5.1) and in this guise have been associated with significant demand risk (see section 4.3) for operators and government (Li & Hensher 2010). As such, they need to be carefully managed (see section 5.5.1).[37]

[37] Tolls can also be applied to existing road infrastructure. For tolls to be applied to an existing part of the network there is no necessity for the private sector to be involved. In this case, tolls are simply general road pricing and are a travel demand management tool.

Western Australia has to date not sought to use general road pricing or specific congestion pricing as an integral part of the transport infrastructure management and funding regime.

Road users in Western Australia do pay vehicle licence fees, driver licence fees and fuel taxes. There is also a parking levy in the CBD. These may be considered an indirect form of road pricing. With the limited exception of the parking levy, they have no specific behaviour changing objectives. The revenue generated is consolidated revenue. Logically this revenue does not have to be used to fund road expansions in congested areas or indeed any other specific transport infrastructure, although there have always been arguments put for hypothecating all or part of these funds back to transport. These charges are only marginally consistent with the beneficiary pays principle.

When hypothecation does take place, political considerations directly affect the way fees and tax revenues are allocated to transport projects. The history of road funding in the US illustrates this. Financing of the US interstate system has largely depended on state and federal fuel taxes with the monies 'hypothecated' to a nominated fund within the Federal budget.[38] The intention was to direct funds raised with the fuel tax to road construction. Yet, the evidence is that, over time, funds raised have been directed to a broad range of transportation projects including a range of public transport and safety measures. The related difficulty with fuel taxes is that maintaining their real value can be difficult. Over time, there is a weakened relationship between fuel taxes and road use because of more fuel-efficient vehicles. Moreover, politically it is difficult to raise the tax rate.

Given the well-documented growth in congestion on main roads and freeways in Perth, there is a case to integrate some form of congestion charge into the planning framework. In the short run, this will send a signal to adjust trip start and departure times and to consider alternatives modes (public transport, bikes). Given the short run price inelasticity of demand, it will potentially generate substantial revenue that could be used to fund future transport projects consistent with optimally managing future congestion in the transport system. In the long run it will encourage changes in location for residents and businesses, with some

[38] Grants from this tax revenue are around USD35 billion per year in a total transportation budget of about USD 50 billion per year (Hasselgren 2013, p30)

decentralization of job locations away from the central area and higher density of development near public transport. For example, a simple a cordon congestion charge for the Perth CBD would change the basic economics of a project such as the MAX light rail. For those with inner city jobs, it would encourage greater use of the light rail. It would also support a higher density of residential development and employment development along the route.

To the extent that congestion charges encourage better use of existing capacity, the timing of new capacity investments is shifted back in time with a consequent further benefit to government finances.

6.3.2 Impact fees and developer contributions

Developer contributions are used in Australia as a way of funding urban infrastructure, especially water infrastructure. They can be applied to any incremental expansion of capacity, from railway extensions through to the provision of local parks.

Developer contributions ensure that new residents pay for the cost of incremental infrastructure. Their most common application in Australia has been in situations where an urban area is growing and policy requires that incremental infrastructure is at least in part paid for by the new residents in the growth areas.

Developer contributions are a form of land use exaction levied on real estate developers. Two forms are used.

In-kind provision of infrastructure arises when a developer directly provides incremental infrastructure. This could include providing streets, water mains, sewers, parks, school and preschool buildings. In most cases, policies require developer contributions as a condition of securing development approval. However, developers may opt to provide infrastructure voluntarily. This occurs most often when the developer wishes to offer a higher quality of local infrastructure (for example, community facilities, parks, fibre optic cable) or when provision of the infrastructure will secure earlier development than would otherwise be the case. Cash payments involve the developer funding or prefunding the infrastructure investment by making a direct payment to the provider.

For major incremental infrastructure investments such as sewers that connect the development to the network, developer contributions are usually cash payments from the developer to the infrastructure provider. The WaterCorp uses developer contributions extensively for this purpose.

In the United States, impact fees are a common form of charge on developers used to fund infrastructure. They are similar to developer contributions but are used to fund a wider range of incremental infrastructure. Essentially they can be applied to any incremental infrastructure expansion required in a city consequent upon a particular urban development proceeding. Their application is not restricted to infrastructure directly connected to the development. For example, an impact fee could be levied for expanded railway station parking or for expanding local library capacity. Originally, they were conceived as an externality charge with the idea being that the charge would internalize the additional cost that the development imposes on residents and providers elsewhere.

In Western Australia, developer contributions are most commonly applied to residential developments. The developer contribution is levied for infrastructure that is inside an urban estate or required to connect the estate to the network. Developer contributions are specifically defined under the State Planning policy 3.6 (Government of Western Australia 2009). The emphasis in planning on a systematic approach to developer contributions arose because of the increasing demands confronting local government to provide local infrastructure.[39]

The focus is on the use of developer contributions to fund infrastructure projects required to allow the efficient growth of an area. This policy specifies the range of infrastructure for which developer contributions can be levied. All major public utilities including water, sewerage, drainage works and electricity supply infrastructure are covered. All on-site works are covered, but off-site works can also be a requirement when the network needs additional capacity to accommodate the growth in demand generated by the development. Upgrades to pump stations, trunk sewers and transmission lines are included. [40]

[39] The current developer contribution follows on from a parliamentary inquiry into developer contributions in 2004.
[40] Standard water, sewerage and drainage head works charges can also be imposed for off-site major infrastructure works but these are more akin to direct user charges

In-kind contributions are allowed. These can be land contributions for infrastructure projects or direct construction and delivery of infrastructure projects. Land contributions can also include land for public open space, for reserves, for primary schools, land for widening local roads, for expanding primary distributor roads, for primary regional roads and railway reserves to accommodate the consequential rail travel impacts of the development.

Under the policy, local government can expand project funding in two ways. It can use developer contributions to fund community building social infrastructure such as sporting and recreational facilities, community centres, childcare centres and after school centres, libraries and cultural facilities. Beyond this, local government can establish voluntary arrangements with developers to fund infrastructure where the project is not within normal planning guidelines and standards but is desirable for the development. Examples include constructing artificial lakes and incorporating local water recycling project into a development. However, these contributions are for the initial capital requirements only and not for ongoing maintenance and/or operating costs of the infrastructure.[41]

The effect of the state planning policy is to ring fence what can be recouped through developer contributions. The effect is to connect the contributions paid directly to the estate development. To the extent that the developer contributions are reflected in land prices, these charges are paid for by the consumers and are broadly consistent with the beneficiary principle. This contrasts with the much wider use of impact fees in the US.

However, there are potential inefficiencies associated with using developer contributions as a method of raising capital to finance infrastructure. First, the agency that receives the contributions has little incentive to provide the infrastructure in a cost-effective or expeditious manner. Second, the collecting authority has no incentive to spend the funds quickly when it can accrue interest from the funds and when there is no obligation to service the capital. The process lacks the discipline normally exerted by external financiers on the delivery and

[41]. Funding operating costs is an issue for local government if the infrastructure has higher operating costs than would normally be incurred by the local government. In this case, the average rates have to be increased or the developer and the local government have to enter into alternative arrangements to fund the higher operating costs (e.g. trust funds or differential rates.)

performance of infrastructure. Developer levies to fund capacity adjustments well away from the estate or the immediate urban vicinity are more likely to be subject to these inefficiencies. These issues are likely to be less significant when the developer is directly providing or funding the infrastructure and it is directly connected to or part of the estate being developed.

The efficiency of developer contributions as a method of funding infrastructure depends on the way they are dealt with in the market. Under the current arrangements in Western Australia with standard developer contributions, the infrastructure funded by levies is a necessary element of the development and is provided at similar standards across all estates. In a competitive market, the cost of this infrastructure is capitalized into property prices and largely borne by the landowner. The assumption here is that property prices reflect the present value of the future availability of infrastructure services.

However, developer contributions also fund infrastructure that is only provided because the developer wishes to provide the service (for example, superior standard local parks, pocket parks and artificial lakes.). Without the developer contribution, the infrastructure would not be provided. Presumably, the developer provides this infrastructure because it enhances the value of the estate. In this case, the developer contributions will be passed on the homebuyer.

Developer contributions provide for higher standards of property services matched by higher property prices. Applied judiciously they are equitable and consistent with the beneficiary pays principle. So long as the expected benefits from the additional services are fully capitalized into current property prices, it does not matter that the services will be provided for years into the future. However, there are caveats. These are considered in the following section.

Although mostly applied where infrastructure services urban residential development, developer contributions have been used more widely in Western Australia. Main Roads collects direct private sector contributions to fund road infrastructure projects. From an efficiency perspective, the merit of this approach is less clear. In the classic developer contribution model, the direct benefits of the infrastructure services are capitalized into the estate property values. For main roads, establishing a clear direct benefit back to developers/consumers is more difficult because reference to market price changes is not possible. This issue is

avoided if the voluntary contribution agreement is only used when there is a clear link between the project benefits and the private sector objectives of the funder. Mining and energy companies contributing to infrastructure is an example, such as Chevron constructing a desalination plant in Onslow and contributing to the upgrade of Onslow Road and to other infrastructure for Onslow.

6.4 Value capture

The relationship between infrastructure provision and property values is well documented in the literature. This relationship is the basis for value capture. Value capture is the idea that transport infrastructure investment can be part funded through levies on the increase in property values attributable to the investment. Light rail has been a focus for value capture (Debrezion et al. 2004), (Diaz 1999), (Pan 2013).

Transport infrastructure will affect the use pattern and the value of surrounding land. This is a natural market process when transport systems are upgraded. The most obvious example is when urban transport systems are installed or upgraded. For example, upgrading a rail or bus service to an area will improve the attractiveness of proximate locations for residential and commercial activities. This will be a function of reduced travel times and the improved connectivity. Similarly, upgrading a road system will improve the attractiveness of proximate locations. The investments in the rail and road system connecting Perth to Mandurah are a good example. The upgraded systems enhanced the attractiveness of Mandurah for Perth residents because the reduced travel times made living in Mandurah and commuting to the central business district a viable option. Living in Mandurah and commuting to intermediate locations along the corridor became more attractive. The planned Mirrabooka to Perth MAX light rail would have similar potential impacts. Living along the route would be more attractive. The route would be more attractive as a business location.

Locations impacted by the infrastructure investment will experience consequential changes in property values. Generally, because transport investment makes the proximate locations more attractive property values will increase. These are the basis for a value capture policy.

Various property taxes and charges are already levied on property values In Western Australia, with the consequence that any increase in property values will

automatically generate increases in property related revenue for the relevant jurisdiction. This rise in property revenue when tax rates and base values are left unchanged is a natural outcome of the change in property values caused by the infrastructure investment.[42] It is part of general tax revenue attributable to the relevant authority, for example local government.

To apply this revenue to funding the infrastructure, it must be hypothecated to the particular project. Hypothecation can be based on existing tax rates or with a change in tax rates in areas most benefitting from the development.

Tax increment financing (TIF) is a form of value capture. A TIF instrument is specifically established to fund particular transport infrastructure projects that have positive effects on surrounding property values. As such, a TIF must relate to a well-defined geographic area that will be affected by the project. A common TIF model incorporates an estimate of the base case increase in property-based revenue (land tax or rate revenue) that would occur in the absence of the project. Projected property based tax revenues above this base case are then hypothecated to the project. Hypothecated funds will normally be managed by the authority responsible for developing the infrastructure.[43]

The increase in property prices in a competitive market will reflect the present value of the future stream of infrastructure services provided. Because the expected benefits are capitalized into current property prices, value capture levies based on increased property services and prices are in principle an equitable way to fund infrastructure. They broadly satisfy the beneficiary pays principle and are akin to user charges.[44]

A transport project will always affect nearby property values. However, the final impact on property values is in part a result of the land use planning for the surrounding areas. For example, around rail stations planning can encourage higher residential and commercial densities. Along the proposed Mirrabooka

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[42] For example, if land rental values increase then the local government area will experience an increase in rate revenue for a given tax rate.

[43] For large scale and complex projects, it has been suggested that a special purpose TIF authority may need to be established. (PriceWaterhouseCoopers 2008)

[44] The interpretation is not without caveats. User pays is much clearer cut, for example, when the beneficiary is the user of a bus or car trip and they pay a trip-based charge. The property-based charge applies to the property. It is problematical as to whether we can identify the proportion of the project benefits that can be attributed to a particular property over the assessment period when this assessment has to be made even before the infrastructure is even constructed.

MAX light rail route there was planning for higher residential, commercial and retail densities. These planning changes affect property prices and consequential tax revenues. On this basis, tax increment funding should realistically be in all financing plans for major transport infrastructure investments supported by land use planning.

6.5 Private funding

Private funding can be through private debt, private equity or a mix of the two. It can be for a whole project as in a privately owned toll road or electricity operation or it can be a partial participation. PPPs are the most common form of mixed government and private sector participation in infrastructure funding.

Depending on the particular owner and funding arrangements, ongoing service costs can be funded by a mix of user charges, general government contributions (mainly taxation), shadow tolls, subsidies (including community service payments) and availability payments.[45]

6.5.1 Public Private Partnerships (PPPs)

At the forefront of these attempts is the use of public private partnership funding models (PPPs) as a means of securing infrastructure funding.[46] As a finance instrument, PPPs are a straightforward concept. Government defines the required infrastructure projects. Government then invites the private sector to participate in funding, owning and operating the infrastructure project. The mix of private sector funding, ownership and operating control can vary from project to project.

The growth in the use of PPPs has been significant. A review of PPP contracts in Europe has identified some 1,000 long term PPP contracts established over the 15 year period between 1990 and 2006. The aggregate investment value was over €200 billion. (Blanc-Brude et al. 2008). The jurisdiction most advanced in using PPPs is the UK. Following on from the extensive privatization policies of the 1980s, UK policy has focussed strongly on private sector involvement in

[45] Private funding may entail the government guaranteeing the repayments. This may be necessary for example to assist the private sector to raise the required funds and to ensure that the infrastructure project is not put at risk by future private investor difficulties. However, if the government guarantee is unconditional then the lenders to the private developer are effectively lending to the government and it could be argued that there is really no difference between government and private funding. This goes to the issue of risk sharing, which is disused in detail below.

[46] These are known as the private finance initiative (PFIs) in the UK.

infrastructure funding. PFIs, the UK version of PPPs have been the preferred approach. Through Infrastructure UK, the national infrastructure plan identifies suitable projects and promotes PFIs. So strong is the UK use of PFIs that over the period 1990-2006 the UK accounted for 76% (57% by value) of all the European PPPs. (Blanc-Brude et al. 2008).

The global financial crisis affected the number of PPPs. The evidence suggests that their use had peaked at the time of the 2007 review. The most recent review published in 2010 notes that in 2009, PPP transactions in Europe were €15.8 billion. This was a decrease of nearly 50% compared to 2007. At the time of this survey, the UK position had changed slightly with the UK share falling below 50%. (Kappeler & Nemoz 2010).

Australia has a stated commitment to PPPs but to date they have not figured largely in infrastructure funding. A review of infrastructure funding published by the Reserve Bank notes a general reluctance to implement PPPs (Chong & Poole 2014). They are estimated to account for only A$50 billion of infrastructure investment, compared with a total of more than A$1 trillion invested in infrastructure over the period 1995 to 2013. (Chong & Poole 2014). New South Wales, Queensland and Victoria have developed the bulk of Australian PPPs. Large single projects in Australia have had a significant impact on the value of PPPs.

Chong & Poole (2014) note that the value of PPPs in Australia peaked in 2008/09, largely due to large individual projects including the BrisConnections project in Queensland. They argue that the fall in PPP usage in recent years is a result of some high profile and large scale PPPs like BrisConnections running into difficulties and needing to be restructured. They argue that the tighter financial conditions following the global financial crisis have also played a role.

The state of play for PPPs has been extensively reviewed. As expected, the record includes a mix of successes and failures. Central to the debate on ensuring that PPPs are successful is the question of risk sharing between the private and public sectors. Lack of clarity about risk sharing combined with poorly specified performance contracts are most often cited as the reasons why PPPs fail. Governments have been paying increasing attention to the performance of PPPs and restructuring their approach to using them as an infrastructure funding

instrument. Perkins(2013), summarizing thinking from the OECD, identifies measures that would improve the way PPPs for transport projects are managed.

The United Kingdom is a major user of PPPs. Originally, these financing arrangements were promoted as the Private Finance Initiative (PFI). The government encouraged the use of PFIs across a wide range of infrastructure projects in education, health and transport.

Recent reviews of the PFI policy by government and external organizations raised concerns about the effectiveness of the programme. The evidence indicated that the PFI programme had raised the total costs of the projects undertaken and had failed to deliver value for money to the taxpayer (HM Treasury 2012). In 2012, the UK Government implemented a revised infrastructure funding initiative. Called the Private Finance 2 (PF2) initiative, the focus of this policy is the clarification of the role of the public sector in providing infrastructure using PPPs. It incorporated clearer role demarcations. Financing and constructing of the infrastructure project is now essentially a private party sector role. Once construction is completed and the project is operating, the public sector, through the nominated public sector agency, pays the private partner a regular payment that secures operational performance. These payments cover maintenance costs and repayments on debt. Projects commonly run for 25–30 years.[47] The purpose of these reforms is to optimize the construction costs simultaneously with optimization of the finance costs, including the mix of debt and equity funding. Under these proposed new arrangements, equity investors will receive all remaining cash flows once the project has paid off its debt. If a project were sold at the end of its contract then after paying debt, sale proceeds would go the equity investors.

The narrow focus on PPPs in some jurisdictions has arguably been to the detriment of policy. Placing too great a weight on this one financing instrument when formulating infrastructure policy runs the risk of developing a 'one size fits all' policy. Consequently, there is insufficient focus on the broader policy questions central to having a coherent infrastructure policy and which are ultimately central to the success of any particular financing strategy.

[47] Improved procurement processes with greater transparency were also part of the reforms.

The primary issue to be resolved when using PPPs is risk management. As already noted, the performance in managing demand risk inside PPPs is especially patchy. Other risks also need to be managed. The UK Treasury (H.M. Treasury 2014) has set out the scope of the project risks that have to be managed. Table 1 summarizes these risks, excluding some risks specific to managing occupancy in buildings.

Table 1: Project Risks

Availability risk	The risk that the volume of the service provided is less than that required under a contract.
Construction risk	The risk that the construction of physical assets is not completed on time, to budget and to specification.
Demand risk	The risk that demand for a service does not match the planned level, projected or assumed. As the demand for a service may be partially controllable by the public body concerned, the risk to the public sector may be less than that perceived by the private sector.
Design risk	The risk that design cannot deliver the services at the required performance or quality standards.
Economic risk	Project outcomes are sensitive to economic influences. For example, actual inflation differs from assumed inflation rates.
Environment risk	Where the nature of the project has a major impact on its adjacent area and there is a strong likelihood of objection from the general public.
Funding risk	Where project delays or changes in scope occur as a result of the availability of funding.
Legislative risk	The risk that changes in legislation increase costs. This can be subdivided into general risks such as changes in corporate tax rates and specific ones which may affect a particular project.
Maintenance risk	The risk that the costs of keeping the assets in good condition vary from budget.
Operational risk	The risk that operating costs vary from budget, that performance standards slip or that service cannot be provided.
Planning risk	The risk that the implementation of a project fails to adhere to the terms of planning permission or that detailed planning cannot be obtained, or if obtained, can only be implemented at costs greater than in the original budget.
Policy risk	The risk of changes of policy direction not involving legislation.
Procurement risk	Where a contractor is engaged, risk can arise from the contract between the two parties, the capabilities of the contractor, and when a dispute occurs.
Reputational Risk	The risk that there, will be an undermining of customer/ media perception of the organisation's ability to fulfil its business requirements e.g. adverse publicity concerning an operational problem.
Residual Value risk	The risk relating to the uncertainty of the value of physical assets at the end of the contract.
Technology risk	The risk that changes in technology result in services being provided using nonoptimal technology.

The risks noted in Table 1 are well recognized, but are not equal. Sharma (2013) argues that demand risk and construction cost risk appear to pose the greatest concern for financial investors. They also pose the significant risk that residual shortfalls in financial performance will ultimately become a liability for government, with poor performing assets handed back or government required to fund availability payments to secure ongoing delivery of services.

The expected value for money outcomes associated with PPPs are easily overturned when projects experience cost overruns, completion delays and overoptimistic traffic forecasts occur. In their study of transport PPPs in the UK, Shaoul et al. (2012) found that the value of PPPs renegotiated under distress is significant - UK£35 billion out of a total portfolio of UK£91 billion.[48]

While these risks can be considered individually, they also have to be looked at collectively. There are important interactions. Demand risk, planning risk, policy risk and legislative risk interact with each other and with global financial arrangements for PPPs producing risks that are not fully understood when each risk is viewed in isolation.

Transport networks in urban areas are likely to be subject to these collective risks. Urban areas are dynamic systems. Growth and the evolution of economic arrangements and technology, mean that the best way to organize transport networks changes over time. Urban growth is managed with a complex mix of transport and land use planning and pricing that changes the allocation of resources across activities and locations in the urban area over time.

Local planners and residents are familiar with transport systems being networked infrastructure. Indeed managing transport as a network is the key to efficient resource allocation in the urban area. Yet as Torrance (2008) has noted, the trend to private investment in network infrastructure has meant that urban infrastructure is also becoming a networked financial product. In this form, an individual project is just one small part of a larger portfolio. For a small to moderate size city, a transport project may be significant for the city but constitute only a small part of the private investor's global portfolio.

[48] Data on cost overruns is limited. There is limited evidence that cost overruns in private projects (34%), publicly procured projects (23%) are comparable. (Flyvbjerg et al. 2004).

Simultaneously the transport project needs to deliver the required outcomes for the investor and the urban community over a long period. These will not necessarily align. Each project needs to deliver a rate of return to the private investor consistent with the rate the investor can earn on other parts of the global infrastructure portfolio and in alternative markets taking account of individual project risks. The project also needs to deliver planned outcomes to the community. It has to operate effectively as part of the transport network in a growing city where the mix of economic activities and the residential and transport preferences of individuals interact and are likely to be changing continuously.

Potentially this creates a socio political risk. The performance required from the transport network will be influenced by future transport and land use planning. This will affect the role that the particular project has in the network. In turn, this will affect future demand for the project. Yet the future required changes in planning and transport as the city grows are uncertain. From the government's perspective, committing to a planning regime consistent with the original project forecasts will potentially reduce the flexibility to adjust efficiently as the urban area grows. This risk is that ensuring the return to the private investor may come at a cost to network and land use efficiency.

From the investor's perspective, there is a risk that changes to the planning system will undermine the rate of return and make the project suboptimal as part of a global portfolio.

Stanley (2011) has argued that to secure the investment funds required, especially from pension funds, governments need to create a stable framework for planning and management. He argues that promoting a regulated asset base model (see 5.5.2.2 below) should be an integral part of this. He argues that securing long-term private sector funding using structures like PPPs also requires a stable regulatory system covering price regulation, financial, tax and planning regulations.

This may be easier said than done given the local political nature of planning, the dynamics of urban areas and changes in government. Torrance (2008) argues that the history of toll road 407 in Toronto highlights the importance of this issue. Toll road 407 was constructed by the provincial government and operated for

some years before it was effectively sold to a private consortium on a 99-year lease in 1999. The private consortium was typical of PPPs. It had multiple participants from different backgrounds. Equity investors included; Cintra from Spain[49], a subsidiary of the toll road construction company Grupo Ferrovial (61.3%), Canadian engineering firm SNC- Lavalin (22.6%) and Canadian Capital d'Amérique, a private equity subsidiary of pension fund Caisse de Depot de Quebec (16.1%) Subsequently, Australian firm Macquarie took an ownership interest, acquiring shares from Cintra and Caisse. (Torrance 2008).

Toll collection was by transponder, providing for accurate billing and giving some certainty about collections. The arrangement provided for regulation of the toll charges based on a specific formula. Toll charges under the formula were set to manage congestion and ensure capacity expansion with demand growth. Traffic volume targets were set as the reference to determine if tolls could be increased. A shortfall in volume would limit allowed toll increases.[50] Toll thresholds were adjusted based on the CPI. Toll increases could occur under the formula without specific government approval.

A series of formula based toll increases led to community criticism of the project. A change of government resulted in disputes between the toll operator and the provincial government. As Torrance (2008) points out, election promises were made to rescind the toll increases.

The complexity of the consortium complicated the dispute. The provincial government saw it as "local" dispute. However, because one consortium member was a Spanish company the European Union lodged complaints with the Canadian Government about the treatment of a Spanish firm and the willingness of Canada to allow provincial politics to override a commercial contract. News reports suggested that Spain threatened to block the 2004 Canada-EU trade agreement because of the toll road 407 dispute (Torrance 2008). Litigation continued until resolution in 2006.

Although at the extreme end of the spectrum, the case highlights the complexity of PPPs in the modern world. Local transport projects are part of global portfolios and international agreements demand that contracts are honoured, but local

[49] Cintra was also the toll road operator.
[50] This is a safeguard installed so that tolls could not simply be raised on the back of inelastic demand

economics, planning and political environments change quickly bringing into question the local merits of an otherwise legitimate contract.

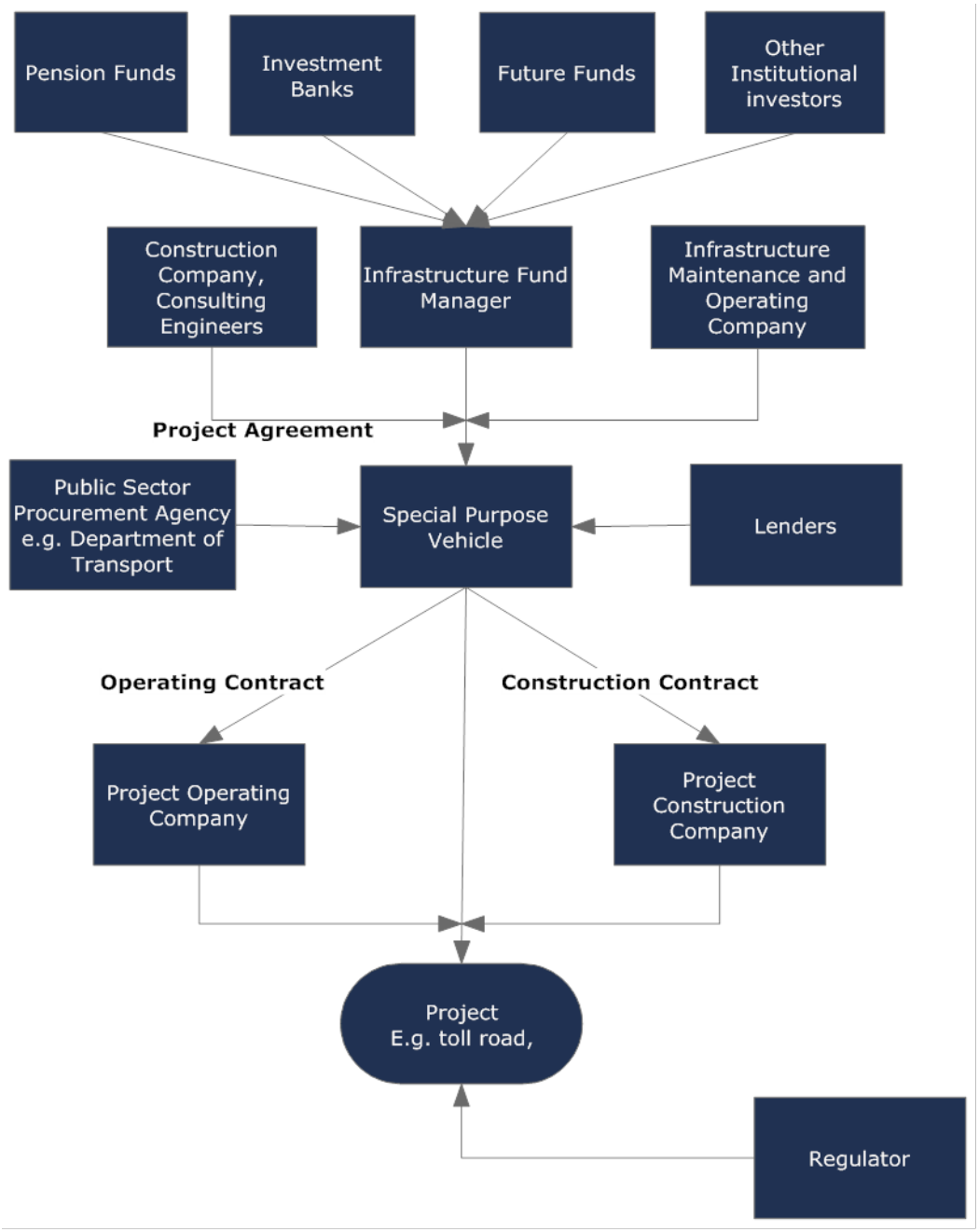
The key lesson from toll road 407 is the need to be clear about the government role in monitoring and/or approving toll setting and related expansion decisions and whether 99-year leases, without a formal regulatory structure in place, are workable in situations where local conditions can change short term.

Risks related to planning are one aspect of PPPs that has caused concern. There are other concerns. Typical PPPs are complex in their management and financing arrangements. Although many variations are possible, Figure 1 illustrates a typical structure.

Many agencies are potentially involved. They have different objectives ranging from purely finance objectives through to operational and regulatory objectives. The failure of the governance structure to deal with these potential conflicts has been the main issue where PPPs have performed poorly. The failure is an outcome of the complexity of arrangements between participants, the long project lives and the lack of flexibility to deal with the inherent incompleteness of contracts.

The complexity of the funding and management arrangements also affects basic areas such as demand forecasting. Studies show that participating consortium members often produce widely differing demand projections for a project.

Figure 1: PPP Structure



The complexity of management and financing structures has been criticized for leading to high transaction costs and inflexibility. The high transaction costs in part may be responsible for the incompleteness of contracts that has made PPPs the subject of disputation between participating parties. The difficulty of allocating risks and examples of inappropriate risk transfer leading to greater perceived risk for investors and a higher cost of capital has also been cited as cause for concern. A further criticism is that the typical PPP operates in isolation

so that beneficial technology transfer (for example: sharing of ideas across the public sector) does not take place.

Demand risk associated with PPPs was discussed in section 4.3. At one level, demand risk is simply a legitimate risk that can be reduced with better forecasting methodologies and better management of the risk allocation process. More fundamentally, it represents an opportunity for gaming. If inflated demand forecasts are accepted and turn out to be wrong the shortfall in demand will force renegotiation with the potential for government make-up payments to the funder/operator. [51]

As noted previously the UK Government is a large user of PFIs/PPPs. Health and education dominate the projects funded using PFIs. In 2011, the review of the PFI model and performance by the UK Treasury noted the various concerns. It noted that:

> "the Government shares some of the commonly identified concerns that PFI contracts can be too costly, inflexible and opaque. The Government now intends to undertake a fundamental reassessment of PFI and wants to develop a new delivery model that draws on private sector innovation but at a lower cost to the taxpayer and offering better value for our investment in public services." (H. M. Treasury 2011)

These concerns were reiterated in the final reform recommendations (HM Treasury 2012). Based on these findings the PPP model is not a funding panacea and other options should always be canvassed when financing infrastructure projects.

6.5.2 Refinancing options – regulated asset base models and privatization

PPPs have largely focussed on new projects. Yet, globally much of the private investment in infrastructure occurs in utilities (gas, electricity, water, ports and telecoms) managed through a regulated utilities model. These firms may have complete ownership of the infrastructure assets. On the other hand, in what may be described as pseudo privatizations private investors may have purchased the long term lease over designated infrastructure assets. In Western Australia, the Dampier-Bunbury pipeline is fully privatized with ownership transferred to the new private investor. On the other hand, Perth Airport is on a long-term lease

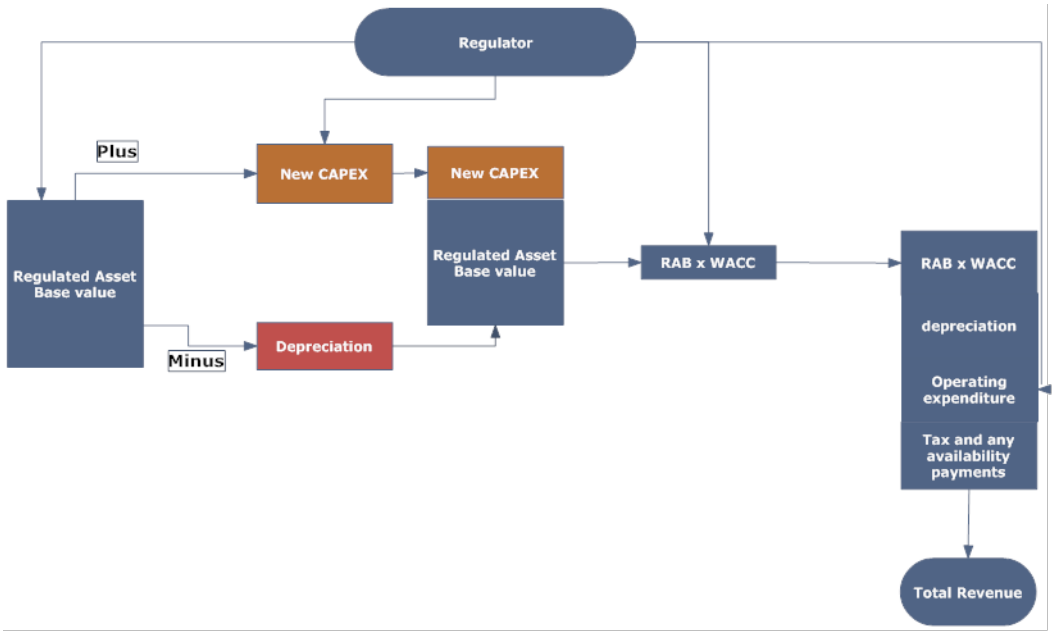
[51] Variable concession length has been suggested as one way to deal with gaming and overestimation of demand (Engel et al. 2011)(Engel et al. 2013).

from the Federal Government. The NSW Government has recently negotiated the sale of a 99-year lease for Port Botany and Port Kembla.

The central concept underpinning regulated private utilities is the regulated asset base (RAB) model. Under this model, a regulator establishes a value for the assets transferred to or leased to the private operator. The regulator is required to determine the future investment required for maintenance of capacity and for expansion of capacity. The rate of return on investment that the private investor will be allowed to earn on the regulated asset base must also be determined.

This regulatory process sets the allowed total revenues and average prices for the services to be delivered. [52] However, whatever the initial determinations, transferring ownership or selling long-term leases risks incomplete contract arrangements. The RAB model therefore requires regular reviews of all key performance parameters –traffic forecasts, allowed rates of return, required future investments, operational efficiency and prices. Such reviews are central to making the necessary dynamic responses to changing environmental and market circumstances. Figure 2 shows a typical RAB structure.

Figure 2: RAB Structure



[52] In many jurisdictions, light-handed regulation is employed whereby the private sector owner is subject to price monitoring but not full regulation. Auckland Airport and the major Australian airports are regulated in this way.

There are two important aspects of the RAB model relevant to any discussion of infrastructure finance. First, privatization of brownfield assets is a financing opportunity. Second, the extensive experience with the RAB model makes it a potentially viable alternative to reliance on PPPs in constructing and funding greenfield projects.

6.5.2.1 RABS and refinancing

Government, including the Western Australian Government, own and manage a portfolio of assets that should be factored into infrastructure finance planning.

Operating assets require finance for expansion and maintenance. Major expansions require up-front capital. This funding could be sourced using any of the sources considered previously – general tax funding, user charges, value capture, developer contributions and tax increment funding, with all the associated advantages and disadvantages.

The critical difference between existing businesses and new projects or greenfield assets is that brownfield assets have well documented performance. Market conditions, costs and revenues are documented and understood. This makes them potentially attractive candidates for privatization. The sale proceeds could be used to finance new projects.

The characteristics of the asset, the strategic importance of the asset and the specific objectives for the financing process will determine how government approaches privatization. Whatever privatization is considered, the form and operation of the regulatory function is central to the outcome.

Arguably, the cleanest approach to privatization is the outright sale of public assets to the private sector through a public offering of shares or through a private 'trade' sale. (Jenkinson & Mayer 1988).

The returns from any sale will be influenced by the quality of the assets and the regulatory structure to be imposed. A sale that disposes of the asset without changes to its structure or environment makes sense when monopoly power in the market served by the asset is not an issue. Yet these types of privatizations do

not appeal to institutional investors because of the potential for competition and the associated dynamic market risks.[53] Sale prices will not command a premium.

Where the government business to be sold is a natural monopoly and no or limited competition is expected, the privatization process will need to be accompanied by regulation. Consistent with the structure in Figure 2, the regulator is required to ensure that consumers pay a fair price for the product or service while at the same time ensuring that operators are able to achieve a reasonable return on investment and can finance expansion of the system as required.

The success of the privatization exercise depends largely on having a regulatory system that is independent, accountable, and resistant to capture by the private provider or the state. Estache(2001) cites the critical components of good regulation as coherent policies, transparency in decision making, predictability, a proper balance between autonomy and accountability, and adequate institutional capacity.

The robustness of the regulatory framework will directly affect the prices that private investors are willing to pay for the assets. The simple view of this trade-off is that signalling a tougher regulation regime will elicit lower bids whereas signalling a less strict regulation will elicit higher bids. This is an oversimplification. This is because investors taking over ownership of former government infrastructure incur a risk that regulatory rules will change. Changes may occur ex post once the financial performance is revealed, or may occur based on short term political decisions, as demonstrated by toll road 407.

Having in place a robust regulation system that implements well documented and established regulatory principles will generate confidence in the long run stability of the system. Arguably, greater certainty about the regulatory regime will give investors more confidence about the expected long run returns.

Moreover, governments that establish minimal regulation with a view to securing higher initial bid prices, run the risk of inflicting higher costs on consumers if prices and the returns turn out to be above expectations. Moreover, there may

[53] However, if the asset is truly operating in a competitive private market, there may be little justification for government involvement in the first place. Government undertaking fully commercial residential land development may well be in this category.

also be significant future costs to government and taxpayers if tougher regulation is ultimately required, but results in the private owner being compensated.

Privatization is not solely about funding. There is also the potential for the private sector to operate the natural monopoly, with greater efficiency generating long run benefits for consumers. Arguably, this is where the real benefit lies and it should not be jeopardized in the interests of securing a higher bid price.

A successful regulatory system requires that the regulator have the resources and capacity to operate and enforce the regulations. Resources are required for effective regulation. Poor regulation design and lack of resources runs the risk that contracts will have to be renegotiated with cost to government and consumers. According to Stanley (2011) investors report that having an understandable asset based regulatory model provides clarity when assessing infrastructure investments.

Although the regulation issue is critical in achieving successful privatization of transport infrastructure, various other issues also need to be considered as part of the process. First, the government needs to ensure that the private investor has robust, transparent corporate governance structures for managing the infrastructure assets. This is especially important when management of the transport infrastructure assets requires a balancing of commercial and public service benefits.

Private firms will make decisions to maximize returns for their shareholders given the rules imposed by the regulatory regime. Yet, many transport infrastructure assets are politically sensitive and economically significant. This narrow focus on returns then has to be balanced against the wider stakeholder interest in these assets.

In Western Australia, Perth Airport and Fremantle Port are often considered in this category because of their general community significance. However, in a sparsely populated state like Western Australia, local and regional transport assets may have an equally important community role. Regional airports, ports and the grain storage and grain freight railways might fit into this category. If there is an essential public service aspect to the infrastructure, and this is not properly provided for, the government may be forced to incur significant future costs to rectify the situation. Governments need to consider the public service

aspect as part of the privatization process. For example, for some assets, leasehold with shorter lease periods and periodic reviews may be superior to freehold sale if it gives greater influence to specify community oriented KPIs. For some assets where disinvestment is inconsistent with good social outcomes, leasehold with 'use it or or lose it' clauses may be an option.

As part of the process, the financial aspect of corporate governance must also be considered. In particular, government may wish to have some influence in determining the appropriate amount of financial leverage that is commensurate with the long-term nature of the investment. A particular consideration here is the role of financial engineering and its impact on performance. The use of a weighted average cost of capital (WACC) when the marginal cost of debt is below the WACC allows arbitrage opportunities based on the difference between the WACC and the marginal cost of debt. This results in a direct transfer of wealth from customers to shareholders. Invoking short term financial engineering strategies that seek to take advantage of such opportunities exposes the privatized operation, and ultimately government, to long term risks. Helm & Tindall (2009) explored the above issues and concluded that these strategies are an inappropriate way of financing infrastructure companies. They argue that they place too higher a reliance on debt and that investors using them do not place enough emphasis on the long-term quality and robustness of the infrastructure networks they have acquired.

6.5.2.2 RABS as an alternative to PPPs

Wider adoption of the RAB model is suggested as an alternative to the PPP as a way of developing infrastructure with private finance. The argument is that the RAB has some inherent advantages over the PPP and that it can be set up in a way that overcomes some of the well-documented failings of PPPs.

The primary advantage of the RAB is that it places the asset into a well-established transparent regulatory structure. This structure is designed to provide flexibility. The periodic reviews that are part of the process allow for adjusting contracts in response to changes in external economic factors over the long term. At the same time, the regulatory system provides independence from short-term political influence.

Transport infrastructure is long-lived requiring long-term PPP contracts. These contracts (up to 30 years) are invariably incomplete. Incomplete contracts are cited as a primary cause of the difficulties when PPPs have not lived up to expectations.

A potential advantage of the regulated utility model is that the periodic reviews that are integral to the system allow adjustment in a transparent way based on agreed regulatory principles and processes known in advance. This offers a more efficient way to renegotiate performance and expected outcomes. With stable and independent regulators, negotiation and renegotiation of regulatory conditions is routine. It is a central part of the regulator's role. The regulators are therefore well placed to deal with the full range of risk management issues set out in Table 1. This includes dealing with strategic behaviour in forecasting demand and estimating costs. Moreover, in properly designed systems, transparency of decision making (including publishing reasons for decisions and findings of reviews) is required under the legislation governing the regulator. This lowers risk for the regulated firm and the government while still allowing some flexibility.

RABS are not without their issues. Setting the WACC and the potential negative impact of financial arbitrage have been noted above. Setting the starting value for the regulated asset base is challenging for long-lived assets (for example dams). The capital expenditure requirements to replace and expand system infrastructure can be disputed. Similarly, setting the productivity parameters to be used in price setting and agreeing service performance KPIs, is not straightforward. Yet, these disputes would arguably be better handled within a well established regulatory framework where the decision-making principles and requirements for transparency are written in the governing legislation than within a single agency overrated PPP contract.

6.5.2.3 Refinancing and RABS for Western Australia

Western Australia is well placed to pursue privatization as part of the broader strategy to fund new transport infrastructure projects. There is a well developed system for regulating privatized natural monopolies operated through the Economic Regulation Authority. It has the capability to deal with pricing, service quality, access rules and capacity expansion. There is a valid argument that this

structure has not been used as effectively or extensively as it could be. There appear to be ideal candidates for privatization that have yet to be privatized. Regional airports and major ports along with water provision, electricity generation, transmission and distribution fit into this category.

Insofar as extending the use of RABS is concerned, the independent regulation model would be too high an impost to apply to a single transport project. For it to be considered, bundling several potential PPP projects into a regulated network would make sense. This would take advantage of scale efficiencies and would make regulation more cost effective. By bundling in this way and invoking the regulatory principles and reviews, the RAB model is likely to mitigate the opportunities for project based strategic behaviour. Ad hoc renegotiations that have proved so costly to participants, especially government, in some PPPs could be avoided. In addition, bundling of individual projects/assets into a RAB would allow transparent cross subsidization where this was desirable.

Roads are a potential candidate for a RAB model. Two possibilities exist.

First, if toll roads are part of future road planning, then instead of treating each toll road as a single transport project, a suite of toll roads or road sections could be assembled as a RAB, and offered to the private sector. It could be a mix of existing and new roads.

Second where user charges are included in planning, already constructed roads could be managed under the RAB model. This would require a sufficiently large part of the network to be incorporated into the regulated asset base. This would be required for two reasons. First, it needs to be large enough to make independent regulation efficient. Second, it needs to be large enough to incorporate feeder and competing roads. The external consequences associated with any major road would need to be internalized with the larger RAB.

Extending RABS in this way is a recent idea. The recent report on planning and funding strategic roads in the UK recommended incorporating the English strategic highway network into a RAB type structure. The Highway Agency would take a commercial view of roads being formalized as a government commercial enterprise. User charges would be the focus for revenues. New roads would be developed as toll roads and added as increments to the asset base (Cook 2011).

General user charging for roads is a prerequisite for the RAB model to be applied to roads. Some form of user charge is needed to provide an incentive for efficient behaviour.

7 Conclusion - Preferred mechanisms

7.1 Funding options

This report highlights the breadth of approaches to infrastructure funding. Although popular, public-private partnerships (PPPs) are but one option.

Table 2 summarizes the funding mechanisms considered in the report along with their primary advantages and disadvantages.

There is no one size fits all solution. The policy objective should be to select the best capital raising / capital servicing option for an infrastructure project. This should be based on evaluation of the project and project service characteristics and the available risk allocation options.[54]

In broad terms, where project capital cost is to be fully serviced from general tax revenue, the up-front capital cost would logically also be provided by the public sector. Ownership logically rests with the public sector because it has assumed responsibility for the ongoing financial obligations of the project.[55] Projects that exhibit close to pure public good attributes are candidates to be managed in this way because the ability to apply user charges is limited or non-existent.[56]

When the infrastructure services provided have private good attributes such that a high proportion of the capital can be serviced from user charges, there is a case for private sector financing and potentially private sector ownership. The availability of user charges means that the private parties that raise the finance and hold the liability for servicing and repayment have the means (user charges) to repay the capital. [57]

User charges are easier to implement when the good/service provided is a private good and there are no externalities.[58] In these circumstances, user charges based on the long run private marginal cost of provision are socially

[54](Herin et al. 2014) in their submission to the recent Productivity Inquiry on infrastructure funding have argued that developing assessment strategies and assessment criteria to select the best finance option is just as important as the primary evaluation of the project based on cost benefit analysis.
[55] Of course, private ownership is still possible in this case. However, private firms do not have the power of taxation and therefore would require the government to provide them with a revenue stream from general tax revenue to service the capital.
[56] In the pure public good case, the extreme free rider problem ensures that a revenue stream based on user charges cannot be sustained.
[57] The government could contribute capital servicing and repayment costs.
[58] In this case, there are no second best pricing issues, so that subsidizing the service is not required.

optimal. Charges that reflect marginal costs provide signals to producers and consumers about the cost of the services provided. They provide an incentive for the efficient allocation of resources. Given that equity can be dealt with through transparent community service payments, whenever these conditions are met there is a prima facie case for private financing combined with user charges. [59]

Conversely, there are many situations where user charges are either not feasible or not appropriate. For example, fine-tuned road pricing in congested urban areas may not be technically feasible at a reasonable cost. User charges may not be appropriate when there is excess capacity and the marginal cost of use is very low. Full marginal cost pricing may also be inappropriate if there are positive externalities, when second best pricing is required or for equity reasons. For example, when public transport is safer or environmentally preferable to private vehicle use, and private road usage is under priced, optimal pricing of public transport may require subsidies.[60] In these circumstances, private financing is not ruled out, but private investors will need to receive availability payments from government to justify funding the project.

7.2 Options for Western Australia

Of the funding options canvassed in Table 2, only a subset is relevant to Western Australia.

General tax (GST, income and corporate tax) is collected by the Federal Government. The availability of these funds for Western Australia is dependent on the arrangements for revenue sharing including Federal Government direct grants. Western Australia's declining share of GST and the consequent increased greater reliance on grants is well documented. This has put pressure on the State in funding the infrastructure to support recent and projected high economic and population growth. Given the apparent reluctance to revisit revenue sharing arrangements, general tax funding for infrastructure is a limited option for Western Australia.

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[59] An example is rural water services in Western Australia. Commitment to a uniform pricing policy ensures that rural water is sold below it marginal cost of provision. Yet as long as a community service payment is made such that the combined user charge and community service charge covers the long run marginal cost of provision, there is no barrier to private ownership and funding.

[60] This is of course a classic case of second best prices. That is, subsidizing public transport in the absence of full marginal social cost pricing of private vehicle use.

Moreover, the tax instruments that are available to the state have inherent weaknesses. Payroll tax and stamp duty are inefficient taxes. Land tax has efficiency advantages and should arguably play a greater role in the State tax system. However, while some efficiency gains could arise from switching focus to land taxes, these taxes can only make a limited contribution to infrastructure funding. Royalties are the most significant state based revenue source but have inherent volatility.

One well documented consequence of limited revenue streams and revenue volatility is the risk to Western Australia's credit rating from any excessive borrowing. The recent loss of the AAA credit rating highlighted the difficulty of having a limited and volatile revenue base, a declining share of GST and recourse to borrowing to finance a large infrastructure programme.

The revenue sharing issue will not be resolved quickly. Moreover, the desire to maintain the current credit rating and potentially regain a higher rating combined with a volatile revenue stream will limit the ability to borrow to finance major infrastructure programmes.

Although taxes, royalties and debt will remain important elements in funding future expenditure, the various constraints on their use means that the State needs to factor in additional funding options.

Practically these must all involve the private sector. The question is not whether Western Australia should embrace private sector infrastructure funding but rather what form that funding should take and which projects are best suited to private sector involvement. There are three broad options.

First, place more emphasis on user charges as a means of collecting additional revenues to fund infrastructure where this is of direct benefit to the users. Insofar as transport infrastructure is concerned, road user charges are a major opportunity. These could take the form of toll road pricing for major new roads and bridges, heavy vehicle road user charging, congestion changes or more general road use charges. Arguably in the first instance, pursuit of the heavy vehicle user charge for port access, charges for the Perth freight link and a CBD based congestion charge offer most scope. They simultaneously provide a funding stream and encourage efficient use of road, rail and bus transport infrastructure.

Second, for major projects, formalizing the role of value capture is important. The impact of major transport projects on property values is well documented as is the efficiency of value based land tax. Institutional structures need to be established that facilitate the efficient use of value capture for projects such as light rail and heavy rail extensions and upgrades. Value capture is an equally legitimate funding instrument for projects that are government owned and funded and for projects that have private sector funding such as road, rail and bridge projects funded with PPPs.

Third, refinancing represents a major funding opportunity. Done well this is an opportunity to improve efficiency, raise Government net worth and create opportunities to reduce debt and/or develop new projects. The State is involved in many sectors where the main products and services produced are essentially private goods. They can be efficiently produced and sold by private firms. Where these activities are essentially private goods, operating in otherwise competitive markets there is little rationale for ongoing government ownership. Where they are natural monopolies, the available regulatory framework means that Western Australia has little reason to remain in ownership and control. In the short run therefore, refinancing or privatization is arguably the major strategy to raise funds to reduce debt and free up resources to facilitate further infrastructure projects.

Insofar as new projects are concerned, the same logic should apply as for privatization. If a project supplies a private market good and can be financed totally or in large part from user charges, then having the private sector own and operate the project is appropriate. Effective regulatory arrangements will have to be in place for the private provider.

There are clear opportunities for refinancing including electricity, water and ports. Long term leases should be seen as an alternative to freehold sale. Leases may result in lower sale prices, depending on lease length and conditions. However, this may be justified if social objectives need to be part of the infrastructure planning and management and these cannot be readily achieved through regulation of a freehold asset. Perth Airport is operated privately under a long term lease. Regional airports could be sold/leased using a similar approach.

The case for privatization is not based on funding alone. The precursor is that the private sector could operate the business more efficiently. This is the requirement for sale at market value to enhance government net worth.

However, there may be activities that produce private goods but are government operated because price has to be held below marginal cost for social reasons. In these cases, the use of availability payments to private operators may allow provision of infrastructure services at lower cost. Hospitals and buses potentially fall into this category.

Table 2: Options for Funding Transport Infrastructure Costs

Up-front capital investment	Ongoing servicing costs	Advantages	Disadvantages
Taxation			
Consolidated revenue Income tax and GST	None	Efficient tax if structured correctly.	Not consistent with beneficiary principle. Limited source of finance. Inequitable. Lacks efficiency incentives – no transport behaviour signals.
Consolidated revenue Payroll tax and stamp duty	None		Not consistent with beneficiary principle. Very limited source of finance. Inequitable. Lacks efficiency incentives – no transport behaviour signals. Inefficient tax.
Land tax	None	Consistent with beneficiary pays principle, but this is dependent on exact project and form of tax. Relatively efficient tax.	
General Infrastructure levies	None	Can be equitable.	Not consistent with beneficiary principle. Lacks efficiency incentives - no transport behaviour changing signals.
Pricing and licensing			
Road user charges – congestion charges	None	Consistent with beneficiary pays principle. Provides transport behaviour signals consistent with efficiency.	Sophisticated systems expensive to set up and operate. May be inequitable.
Licence fees – parking levies		Can be consistent with beneficiary principle for parking levies if levies structured appropriately.	May be inequitable.

		Limited but positive incentive for efficient behaviour.	
Licence fees – vehicle, people based		Efficient tax collections. Hypothecation increases consistency with beneficiary pays principle.	No incentive for efficient behaviour.
Developer contributions	None	Well established system. Can be consistent with beneficiary pays principle.	Narrow focus – primarily local infrastructure.
Value capture	None	Can be integrated with existing property tax system. Can be consistent with beneficiary pays principle.	Usually only partial funding.
Public sector borrowing			
Borrowing – general bonds	State taxes, user charges, licence fees, sale of assets	Low cost of finance. Suitable for public projects.	Constrained by limited and volatile State revenues and impact on AAA credit rating. Not consistent with beneficiary principle.
GTE Borrowing	User charges	May encourage efficiency as the management of the agency responsible for debt also bears some risk. Consistent with beneficiary pays.	Debt appears as State debt and impacts AAA credit rating.
Special purpose infrastructure bonds	Tax revenue hypothecated to servicing debt	Low cost of finance. Suitable for public projects.	Constrained by limited and volatile State revenues and impacts on AAA credit rating. Not consistent with beneficiary principle.
Private sector financing			
Mixed private public instruments PPPs – user charges fund private investment PPPs – user charges do not fully fund private investment	None Tax revenue hypothecated to availability	Can combine advantages of public and private sectors. Offers scope for greater efficiency in construction and operation Can be structured to allow for appropriate sharing of risks between government and private sector – allocate	Requires clear contracts to ensure efficiency gains and to manage project and social risks. Long contracts necessarily incomplete and not conducive to periodic reviews. History of managing risk, especially demand risk is problematic.

	payments/ subsidies for service delivery	risk to sector best able to manage it. Potential to divorce projects from short term political; influences.	Potentially constrains future spatial planning if changes impact on future returns to private investor. Need to balance local planning and social issues with global financial issues.
Privatization Privatization is efficient, sale is at market price with full articulated regulatory regime	none	Government net worth enhanced. Sale proceeds exceed present value of foregone revenues. Funds can be used to reduce debt and/or fund new infrastructure. Removes political influences over prices.	Reduces Government direct control over pricing, technology choice and capacity expansion plans. Other policies needed to achieve equity outcomes.
Privatization is efficient, sale is at less than market price with full articulated regulatory regime.		Government net worth enhanced. Sale proceeds exceed present value of foregone revenues. Passing some benefits to private buyer may reduce risks to buyer. Funds can be used to reduce debt and/or fund new infrastructure.	As above plus Some of net benefits are passed to buyer which reduces refinancing value.

8 Future Research

Based on this review of infrastructure funding options there are several areas of research where PATREC could potentially add value to the policy debate.

Although Western Australia is a logical focus for the suggested research, the topics have wider relevance. The underlying theory and principles are universal.

8.1 Congestion charges

Road user charges and congestion charges are suggested as a potential solution for funding Australian road infrastructure, encouraging efficient use of roads and reducing congestion. However, as noted in the text, there is a distinction between general road user charges for roads and specific congestion charges. The latter can be implemented with less extensive investment in systems and are targeted at specific parts of the network.

Road congestion has increased in all Australian cities and congestion charging is firmly on the agenda. For Perth, planning for congestion charges needs to be an integral element of the transport planning framework. However, while there are obvious potential benefits from congestion charges, there are also costs. Moreover, cities cannot afford to experiment with important policy initiatives. Substantial prior research is needed to ensure that any charging system considered best suits the conditions in Perth and delivers maximum net benefits

Planning for a congestion charge would benefit from research on:

- The different types of congestion charge that could be used in Perth, the experience elsewhere when these types of congestion charge have been implemented, and the applicability of the results to Perth. This review would need to provide initial indications as to how drivers in Perth might react and what consequential adjustments would be needed elsewhere in the system.

- The best form of congestion charge for WA. The most likely form of a congestion charge would be a cordon charge for access to, and possibly for travel through, the central city area. The charge would vary by time of day. Research is needed on the charging technology to be used, on the charge

area, the charge level required to initiate behavioural change and on the mechanism for adjusting the charge.

- Policy makers cannot afford to introduce major policies without adequate estimates of all the potential impacts. Modelling of the congestion charge options for Perth is required to determine the likely impacts on revenue, short run modal choice and on the capacity of the transport system to accommodate the expected short run changes in modal split. This would require simulations of impacts on model choice, trip destinations and time of day of travel for the various charging options. The modelling would have to build in public transport capacity constraints and their impact on short run outcomes.

- The major benefits of a congestion charge occur in the long run after planning is adjusted, transport capacity is adjusted and location decisions are adjusted. Modelling is needed to simulate the long run implications of a congestion charge when there is incremental investment in public transport capacity and changes to land use planning to secure a target long run reduction in congestion. Simulations of congestion charge and resultant transport and land planning changes are needed to allow the optimal structure of charges and investment to be determined. [61]

- Location decisions can only be adjusted if the system can accommodate the relocation of businesses. Research is required on the changes in land use and transport in locations outside the congested area that will be needed to facilitate the relocation of economic activities consistent with changing the pattern of car use.

8.2 PPPs

Western Australia will need to access private finance if it is to achieve its desired investments in new infrastructure. PPPs are likely to be an important consideration for any greenfield transport project. The identified failings of PPPs

[61] This task and the one below are effectively an integration of the current MLUFS and STEM models used in forecasting land use and transport demand. To model the long run impact of a congestion charge the integration would need to allow feedback from transport to land use.

in other jurisdictions offer several research possibilities relevant to using PPPs in Western Australia.

Research is needed on:

- The reasons for PPP failures overseas and in the rest of Australia and the governance structures that Western Australia could put in place to get the best outcomes from using PPPs. This research should consider whether in a small state, one agency should be responsible for all PPP design and oversight.

- The best way to manage demand risk when there are thin markets and single product markets, of the kind that exist in WA. Demand forecasting is subject to greater uncertainty if future demand is conditional on lumpy projects commencing.

- Demand forecasting methodologies. Greater clarity is required about the methodologies that are acceptable for forecasting traffic flows and demand. Even allowing for the recognized optimism bias in PPP forecasts, there is still a high error component in traffic forecasts. Research into the most appropriate methodology for projects in Western Australia would potentially lead to better project specification and cost savings. The potential use of reference class forecasting should be a part of this research.

- Integrating a conventional regulatory structure into PPPs, including five yearly reviews, as a general way of managing PPP risks. The potential to use variable length concessions as a way of specifically managing demand risk should be part of this research.

8.3 Refinancing with Privatization and RABS

Many elements of transport infrastructure are essentially private goods. Given the current limitation on government finances, generating finance through assets sales will be integral to any funding strategy. Sale of transport assets freehold or on long term lease is an important element of refinancing.

Several topics for further research are relevant to Western Australia.

- Western Australia is a small state. Often there are only limited alternative transport options. Competition is limited. In these circumstances the merits of lease versus freehold sale for transport projects needs to be fully researched, including the merits of shorter term leases so that the management of the infrastructure can potentially be better integrated with other planning in the future. A particular consideration is the trade-off between the flexibility that could be gained through this approach and the sale price.

- Optimal form of regulation for monopoly transport infrastructure when owned privately or leased on long term leases. The focus should be on fitting all monopoly transport assets into a single coherent regulation framework that can account for the conventional pricing, efficiency and rate of return issues as well as the wider social and economic benefits that are associated with transport.

- The potential to use RABS to address some of Western Australia's transport investment issues. This would include identifying assets that could be converted into RABS and the governance arrangements that would be most efficient. For example, the research might look at whether parts of the urban or road networks could be established as a RAB, or whether the North West regional airports might be sold/leased as a single RAB with an independent regulator.

- The potential to develop toll roads as a RAB. Would it be more efficient from a cost and transport planning perspective if future toll roads were developed as a single RAB? Rather than have each toll road developed as a separate project, future toll roads would be added as incremental investments into a toll road RAB. A single regulatory structure would then apply to the RAB.

8.4 Value Capture

Major transport projects in Western Australia have affected property values substantially. However, mostly developers and land owners have captured these financial gains. The Mandurah railway line is a good example. The objective was to produce an efficient transport network and property value changes were an incidental consequence, not factored into financing.

The Economic Regulation Authority has recommended winding back payroll tax in favour of a greater focus on the more efficient land tax. Land tax in Western Australia is already well established. Property value changes cause tax collections to change through the application of the standard property tax rate.

Value capture for a given project effectively means hypothecating some of the land tax to the project. This can be based on the existing tax rate of a higher tax rate applied in the designated project area.

Research is needed into the general applicability of value capture for Western Australian major transport projects. This research would need to cover:

- The basic design of a value capture policy. Should it be based on a differential tax rate applied in a project area or on a hypothecated share of tax collected at the standard rate?
- A differential rate is more clearly identified with a project. Research is needed on rules for setting the rate, mechanisms for implementing the value capture model (for example establishing a TIF entity), and the period over which the differential rate would be collected.
- Modelling to determine the geographic area relevant to implementing value capture for large projects. This would be project specific but is critical input to the decision making relating to the value capture tax.
- A methodology for understanding and quantifying the trade-off between value capture and land use planning when evaluating major projects. For example increasing density along light rail routes increases potential patronage. However, higher densities may impact negatively on property values. The density that optimizes value capture through land tax may not be the one that optimizes patronage.
- Legal and institutional changes needed to allow systematic use of value capture need to be researched. Local government currently is not permitted to use differential rates to fund higher levels of service provision in subareas. Research is needed on whether a value capture policy could be a general policy or whether it should it be reserved for major transport projects only, for example MAX light rail.

- A more general policy would approach the impact fee model used in the US, incorporating elements of developer contribution and value capture. Many US cities use impact fees. The fees cover various infrastructure items where incremental cost can be attributed to individual developments. They can align closely with the beneficiary pays principle. US cities have begun using differential impact fees to signal that some locations are less costly compared to others. For example, the impact fees associated with an office development where workers can use public transport may be lower than one where they are required to use private transport. Research on the applicability of a more general impact fee model in Perth covering the financial and efficiency implications would be useful.

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