2 Financing public infrastructure

Key points

- Many public infrastructure projects are unlikely to be financially self-sufficient because of the inherent characteristics that prompt governments to provide them. The cost to the taxpayers of funding the expected revenue shortfall, while it must be taken into account in the investment decision to ensure allocative efficiency, is independent of the financing vehicle.
- Nevertheless, the financing vehicle may promote capital market and governance disciplines that affect project selection and hence improve allocative efficiency.
  - Information asymmetry is a major hurdle to allocative efficiency, and the financing vehicle may help address this problem.
- Efficient financing for public infrastructure investment depends on selecting a financing vehicle that minimises the total cost of finance over the lifetime of the infrastructure asset.
- The total cost of finance is made up of:
  - the return paid to the investors who provide the capital for the investment
  - any contingent liabilities arising from financial claims associated with the infrastructure investment
  - transactions costs of negotiating and managing the financial vehicle, including any costs associated with delay in commencement of a project.
- Transaction costs aside, in general the total cost of finance is minimised where the financing vehicle assigns project risks to those parties to the transaction that are best able to manage those risks.
- Governments have employed a variety of financing vehicles. They fall into two broad categories:
  - 'pay-as-you-go' (cash flow) financing — based on current revenues or savings within the public sector
  - capital-market financing — based on borrowings or equity contributions from private sources.
- During the past two decades, significant innovation in project financing, credit enhancement and securitisation has contributed to the potential for increased financing efficiency, enabling a combination of debt and equity financing from both private- and public-sector sources.
- Governments finance infrastructure with different degrees of dependence on particular vehicles, subject to numerous influences such as infrastructure characteristics, fiscal and macroeconomic conditions, institutional arrangements and prevailing views about the role of government.

Investment can be regarded as an act of forgoing current consumption by allocating economic resources such as labour and capital to create increased capacities for future production and income. In the case of infrastructure, investment typically involves building new or maintaining existing long-lived physical assets.[1]

Infrastructure investment mostly requires significant outlays during the asset-building phase of a project. On the other hand, the revenue flow to be generated from an infrastructure project, or its funding (in the case with social infrastructure) is spread over the economic life of the asset. This can lead to a divergence between the supply of and demand for project funds over time — even for projects that have the potential for full cost recovery.

Financing and refinancing — that is, raising and allocating cash flows to meet resource costs — play a crucial role in overcoming inter-temporal funding constraints. This enables productive infrastructure investment to be realised sooner than otherwise possible (or which might not otherwise have occurred).

The context and rationale within which governments undertake infrastructure investment and financing is discussed in section 2.1. The core conditions for efficiency in financing arrangements are discussed in section 2.2. The diversity of financing vehicles used by governments, as well as the multiplicity of influences on their applications, is discussed in section 2.3.

2.1 Why governments provide infrastructure

Historically, governments have played a dominant role in owning and operating infrastructure facilities such as schools, hospitals, roads, bridges, railways, ports, telecommunications networks, and water and electricity supply facilities. The main reasons for government involvement have been the natural monopoly and/or public good characteristics of many infrastructure services.

- Because of the lumpiness of infrastructure investments and related economies of scale and/or scope, one firm or entity may be able to supply a local market at a lower cost than two or more firms — a natural monopoly. The concern was that a *private* infrastructure monopoly provider would raise prices excessively, resulting in an inefficiently low level of consumption. Even if market power were not exercised, a private provider must cover all costs, fixed and variable. Consequently, with marginal costs declining as output expands, prices cannot be set equal to marginal cost for all units sold.

1 Maintenance is considered as investment because it entails certain costs and in return gives rise to a stream of future benefits. Further, the determinant of maintenance are the same as those for new investments, namely cost of funds and rate of asset utilisation (Bitros 1976).

- Where one person's consumption of a service does not affect the amount available to others and, moreover, people cannot be prevented from consuming the good (even if they refuse to pay for it), the service is a 'public good'. A private provider simply will not provide services the costs of which cannot be recouped in some way.

However, decades of experience revealed a number of problems arising from public provision of infrastructure. In particular, immunity from market signals and commercial disciplines (including from capital markets), resulted in high cost and poor quality services, a lack of innovation and sub-optimal investments. From the early 1990s, the response has been a swing back to more commercial or fully private provision of much public infrastructure in order to promote productive efficiencies and innovation, albeit within regulatory frameworks designed to constrain misuse of market power.

Nonetheless, government ownership prevails in infrastructure such as roads, water and some postal services, and it remains substantial in rail, ports, electricity generation and telecommunications. While there probably remains scope for increased commercial provision in some of these areas, strong public good features make it difficult, even undesirable, to privatise some infrastructure services including, for example, the bulk of the (non-trunk) road networks and many services which benefit the broad community.

2.2 Efficient infrastructure investment

The provision of public infrastructure involves interrelated activities of investment, funding and financing — which all have distinct implications for economic efficiency.

- For investment, the central issue is whether or not community welfare can be improved by governments allocating resources to create, expand or augment a particular infrastructure service.
- For funding, the central issue is whether governments should depend on user charges or taxes *over time* to pay for the ongoing costs of infrastructure operation, including interest payments and principal repayments. Public funding makes up the gap between these costs and the revenue from user charges.
- For financing, where the decision is whether to use fiscal reserves, sell assets, raise new taxes or other revenues, or borrow to pay for the investment's *upfront* costs, the central efficiency issue is which vehicle best manages project risk.

Efficient investment decisions

A basic tenet of investment theory is that an efficient investment is one in which a project is expected to yield benefits that exceed risk-adjusted costs. Where there are constraints on the availability of finance, efficiency requires optimising across projects to ensure the highest overall returns. Infrastructure investment has multiple consequences and, therefore, governments typically have to consider a range of macro and micro factors when undertaking project appraisal and comparisons.

The nature and size of a project's benefits and costs are influenced by the policies that underpin government decisions to provide infrastructure services (section 2.1). For example, profitability alone is an inappropriate criterion for infrastructure projects with significant spillover benefits that are not fully captured in market prices. As noted by Brealey, Cooper and Habib (1997),

> [the criteria for public-sector investment] cannot be identical to those for private-sector investment for … government intervention in the economy is motivated by the very limitations of the criteria for private-sector investment. (p. 18)

Generally, it is not straightforward to identify and estimate project benefits and costs. Obtaining accurate cash flow forecasts, identifying an appropriate discount rate, and assessing risk evolution over the project life in a realistic manner are some of the difficult tasks in investment evaluation. These difficulties are compounded by the presence of embedded contract options in some infrastructure projects.

For projects that require large and substantially irreversible commitment of capital funds (sunk costs), there could be some value attached to waiting for new information on project benefits and costs (Pindyck 1991; Dixit 1992; Dixit and Pindyck 1994). This 'delay value' is equivalent to a call option, which should be taken into consideration when making investment decisions.

Accordingly, the decision rule is to invest when the net present value of project benefits exceeds that of investment costs by an amount no less than the value of keeping the investment option alive. This rule is consistent with the setting of a 'hurdle rate' on net returns in excess of the risk-adjusted cost of capital.

Efficient funding decisions

The main reason why some public infrastructure services will not be financially self-sufficient is the presence of public good benefits. Governments may also choose to subsidise services which could be self-financing in order to promote distributional objectives, although they would forgo the benefits of price signals revealing willingness to pay and informing investment decisions.

The approach to funding of community service obligations can impact on the financing of the project. The payment for such obligations should be directly funded through budgetary processes to help ensure transparency and accountability of project funding decisions (chapter 6).

Considerations of intergenerational equity can affect investment decisions as most infrastructure is long lived, and there is often a trade-off in construction costs and maintenance costs. Funding decisions too have implications for future generations as commitments to subsidies can impose burdens on future generations. Yet intergenerational equity has little intrinsic implication for the use of particular financing vehicles (Brennan 1996) because the costs of money over time is offset by the discount rate.

Efficient financing decisions

Irving Fisher (the Fisher Separation Theorem) postulated that investment and financing decisions can be regarded to be independent of each other — that is, productive investment opportunities that maximise present value can be determined independently of the optimal way of financing (Fisher 1930). This raises the question of whether financing decisions, in contrast with funding and investment decisions, have implications for allocative efficiency in public infrastructure investment at the economy-wide level.

In principle, well-functioning capital markets can provide 'signals' to motivate and reward the 'sustainable' use of capital. This would help allocate funding and, hence, capital inputs to those investments that offer the highest returns (Modigliani and Miller 1958; Fisher 1961; Jorgenson 1996). Public infrastructure investment, however, may not be subject to the same discipline as private investment even if financing is arranged using the capital market.[2]

Use of capital funds is *sustainable* when investment is undertaken for projects that ensure the *solvency* of the service provider. This means that the project must yield more than it costs in net present value terms and thus increase net worth. Public infrastructure investments that require public funding (the costs exceed the revenue flow) will be assessed by the market based on the government commitment to the funding. This will be affected by the nature of the financing vehicle as well as views on sovereign risk. It may or may not be influenced by the characteristics of the

[2] Government may also take an interest in infrastructure investments that are sustainable, but may be constrained by policy settings such as access regulation. In these situations, the government may facilitate the investment process, but not be involved in financing arrangements. These situations are not considered in this study.

infrastructure investment itself. The study returns to this question about the impact of the financing vehicle on allocative efficiency in detail in chapter 10.

At a project level, efficient financing vehicles are those that minimise the total cost of finance. As discussed above this cost is made up of the return on the funds, the cost of contingent liabilities, and transactions costs. The main factors affecting this total cost of finance are the allocation of project risk, negotiation and management costs, other costs associated with the adequacy of finance and its flexibility, and the disciplines brought to bear on investment decisions, notably addressing informational asymmetries.

Allocation of project risk and risk management

A financing vehicle can reduce the overall cost of financing if it can align responsibilities for managing project risks with the incentives to do so. With full information, investors, whether private or public, require a premium to take on risks that they cannot reduce. The lower the risk, the lower the premium required and hence the lower the total cost of financing.

There are numerous risk factors that contribute to the variance of net returns from infrastructure investment (box 2.1). Investors take into account any non-diversifiable risks associated with a project (project risk) in assessing the worthiness of an investment. In making investment decisions, governments, like any investor, compare the risk-adjusted cost of capital — that is, taking all net benefit flows into account, the rate of return that governments would otherwise be able to obtain from alternative projects with the same risk level as the project being undertaken.

Generally, the return required by investors increases with risk and uncertainty.[3] To the extent to which a financing vehicle can reduce risk and uncertainty, it can lower the total cost of financing an infrastructure project. The central question is whether a financing vehicle can reduce project risk. Modigliani and Miller (1958) demonstrated that under certain conditions (full information) the overall risk of a project is fundamentally invariant to the method of financing.[4]

The conditions required for project risk to be invariant to the allocation of risk are rarely met in practice. Consequently, a financing vehicle that can allocate project

[3] The essential difference between 'risk' and 'uncertainty' is that, in the latter case, it is practically impossible to assign a probability to every possible outcome.

[4] Although they allow that an exception could occur where the project risk alters the risk perception held by finance providers or investors (Flemming and Mayer 1997; Jenkinson 2003; Modigliani and Miller 1958).

Box 2.1 **Investment risk in infrastructure**

The sources of investment risk associated with infrastructure include:

- *Construction risk* arises from unexpected design problems, cost overruns and delays in construction works. This risk, which can be substantial for capital intensive infrastructure projects, exists during the construction and warranty phases of a project.
- *Operational risk* arises because the planned level of service availability from an asset might not eventuate. This risk is commonly associated with unexpected problems in staff management, maintenance and other elements of operating the infrastructure. It is present from the commencement of operations.
- *Demand risk* arises because the demand for infrastructure services and, hence, the project revenue might differ from expectations. This risk is present throughout the life of a project. For example, an unanticipated decline in demand could lead to a reduction in the value of the infrastructure asset.
- *Network risk* arises where the use of a particular network infrastructure depends on decisions made in relation to other elements of the network. This risk is present throughout the life of a project. For example, a relative shift in demand for different transport facilities that compete within the same network area can lead to changes in their revenue potentials and, hence, asset values.
- *Technological risk* arises because purpose-built infrastructure assets might become obsolete or stranded when users switch to a new form of service delivery. This type of risk is present throughout the life of a project.
- *Financing risk* arises because the expected availability and cost of finance might not materialise. This can occur as, for example, interest rates and exchange rates change over time. The financing risk is present throughout the life of a project.
- *Regulatory (sovereign) risk* arises in infrastructure projects, either owned or managed by private entities, because government regulations might affect project profitability. Such a risk can be related to a change in planning and environmental requirements, pricing determinations, and regulatory conditions governing the entry of new service providers. In some cases, governments might expropriate privately owned infrastructure assets. Regulatory or sovereign risk is present throughout the life of a project.

Sources: EPAC (1995); Jennings (1992); Quiggin (2002); TIAC (2004).

risks to those who have the means to better manage those risks can reduce the overall level of project risk. Evidence presented to the 1995 EPAC Private Infrastructure Task Force suggested that construction and operational risks are largely matters that a private investor can manage well. On the other hand, governments are best placed to manage regulatory risks and, to a lesser degree, network and demand risks (Hepburn et al. 1997; London Economics 1995). So, for example, a financing vehicle that can allocate construction risks to the private

investor and regulatory risks to the government will align the incentives for these parties to better manage these risks. Bundling of design, construction and operation can also reduce risk where there is asymmetric information (chapter 8).

Many infrastructure projects have features that militate against standardised approaches to identify and allocate risk. Further, some 'grey areas' exist where neither private nor public sector parties has a clear advantage in risk management. Nonetheless, there appears to be an emerging consensus on which party should bear what risk at a particular phase of the project life cycle.

In addition to the alignment of incentives, there may be scope to transfer risk to those more willing to bear such risks. This is more likely in shallow financial markets where a new financial product may offer to reduce portfolio risk through diversification. Governments are seen by some as being able to pool risk over a large number of projects as well as spread risk over a large number of taxpayers with legislative backing (Arrow and Lind 1970; Mankiw 1986; Quiggin 1996a, 2002). Government's ability to pool risk translates into low credit risk with government debt — but the public has to bear the contingent liabilities, that is, any cost consequences that arise if particular projects fail to deliver as planned. Government's ability to pool risk does not reduce project risk, only transfer it, and there is a gain only if those taking on the project risk are able to benefit from risk sharing.

Reduced risk premiums as a consequence of beneficial risk sharing or risk transfer imply a reduction in the total cost of financing. Care is needed, however, as imposing a pattern of risk bearing that is not aligned with the ability to manage this risk could increase the total cost of finance through higher contingent liabilities. For example, risks have been ameliorated for the private sector by governments in public–private partnership arrangements through the inclusion of material adverse effect clauses in project contracts. Where government has an influence over these risks, such as with regulated prices, such risk transfer may be appropriate. Alternatively, the risks involved may have been properly priced in the contract reducing the return required by the private investors and offsetting the additional cost of contingent liabilities for the government. But this is not always the case. The danger lies in government taking on risk that they are not able to influence and/or not being compensated for assuming additional project risk.

The capital market can send strong signals about exposure to risk. Relevant market signals include yield spreads (or interest rate differences), liquidity and availability of credit supplies, and the terms and conditions of loans and investments. Auxiliary credit information — such as credit ratings and project reviews by financial institutions — reinforce and support these capital market signals (box 2.2).

Box 2.2 Credit information reinforces market signals

Financial institutions help reveal project risks by gathering public or proprietary information relevant to infrastructure investment:

- *Credit ratings* are predictive opinions of a borrower's likelihood to repay debt in a timely manner. Their reliability varies from time to time as it is subject to the quality, completeness and veracity of information used in the rating process, and the skills of the agency analysts.
- *Bank lending* depends on banks' ability to retrieve credit information through their expertise in credit analysis and their close relationships with borrowers. Relationship banking facilitates screening and monitoring of borrowers' investment activities. It is also instrumental for developing flexibility and discretion in bank loans.
- *Bond issues* convey credit information through numerous bond characteristics apart from their credit ratings. For example, the total principal amount of a bond issue crucially bears on its marketability and liquidity, as do its duration and structure, and its alignment with other bond issues to add depth to that particular part of the market. The yield spread (the difference between the yields of a government bond and any other bond) is thought to reflect the relative risk associated with a project. The frequency with which a borrower issues bonds reveals the borrower's reliability and experience. Other informative bond features include issue purpose, backing (specific revenue sources or general obligation) and sale method (negotiation or auction).
- *Bond insurance* conveys credit rating opinions of specialist insurance companies (known as 'monolines') on particular bond issues. Such opinions are backed by monolines' financial obligation in the event of bond default. For insured bonds, the onus of credit assessment and monitoring is shifted from bond investors to bond insurers.
- *Underlying credit ratings* of insured bonds are sometimes revealed to convey additional credit information to bond investors. One researcher has estimated that this has the effect of reducing coupon rates by 0.04 percentage point on average (Peng 2002).
- *Performance contracts in public–private partnerships (PPPs)* convey information on the contractual capability of private-sector sponsors to exploit economies of scope in designing, building, operating and maintaining infrastructure. If fully realised, these economies have the potential to reduce total project costs. Arguably, the plausible justification for PPPs rests on the comparative strength of the private sector in productivity or technical capacity — not on its strength from ownership or financing (Engel, Fischer and Galetovic 2007; Martimort and Pouyet 2006).

Transaction costs

Transaction costs associated with organising the finance and managing the arrangements, including costs of delay due to cash flow issues, also influence financing efficiency. Flexibility also matters as there can be costs associated with the need to change financing arrangements as market conditions or project requirements change.

Transaction costs include the costs of obtaining information, including credit information, establishing appropriate project contracts and monitoring borrowers' operational and financial performance (Hepburn et al. 1997). These are far from negligible in many cases and could appreciably offset efficiency gains from an improvement in risk allocation. For example, transaction complexities have to be accounted for when governments engage private-sector entities to finance or operate selected infrastructure facilities.

Taxation complicates the conditions for financing efficiency. It affects relative capital costs between projects, depending on the capacity of individual projects to generate tax revenues for government and tax offsets for business. These tax issues can have different effects at each level of government.

The pressure to maintain fiscal prudence could reduce the capacity of governments to undertake and finance on-budget investment. This can affect the adequacy of pay-as-you-go as a financing vehicle as funds may not be available when it is needed for efficient project delivery. The construction of government budgets and accounting conventions can also result in bias in the choice of financing vehicle.

Market and other disciplines on investment decisions

One hurdle to allocative efficiency is the presence of 'asymmetric information', or the uneven distribution of information concerning the risk–return characteristics of projects to be financed (Brennan and Kraus 1987; Claus and Grimes 2003; Leland and Pyle 1977; Myers and Majluf 1984). This problem is especially prevalent for a large-scale infrastructure project where the project proponent possesses more information concerning the financial viability of a project — such as the probability and consequences of potential design changes, cost overruns and unrealised anticipated demand — than the investor. Due diligence required by market players or parliamentary scrutiny provides an incentive to invest in information. The financing mechanism may influence this incentive and can also better align the interests of the different parties to an infrastructure investment to reduce information asymmetry.

Information asymmetry is likely to be severe when funding and financing decisions involve multiple agencies or levels of government. Not all of the parties involved have an incentive to supply credible, verifiable information sufficient to identify the true benefits and costs of a project. A divergence of interest can occur in agency, intergovernmental or public-private relationships, leading to incentive issues that result in inefficient investment or costly financing (box 2.4).

The costs of supplying, absorbing and verifying project information can be high. Moreover, making project details public can result in a loss of value in the project manager's proprietary information.

Finance providers or investors facing an information disadvantage tend to rationally finance projects on terms reflecting their perception of an average risk–return profile, *plus* an additional premium for bearing the uncertainty associated with an asymmetric information risk. This additional premium increases the cost of finance.

Box 2.3 **Asymmetric information in public infrastructure investment**

Information asymmetry is a prominent issue in the provision of public infrastructure services, as shown in the following examples.

Transnational infrastructure projects

Florio (2006) examined the allocation of capital grants by the European Union to member nations for a wide range of infrastructure projects.

It was noted that information asymmetry exists in a multi-government setting where projects are selected by member nations for EU financing. Members have an incentive to propose unprofitable projects which have the least chance of securing finance from other sources. However, EU authorities do not have sufficient credible information to compare their relative worthiness.

Local public works financed by intergovernmental grants

The financing efficiency of intergovernmental grants for local public works can be beset by the asymmetry of project information between governments, as characterised in the theoretical work by Besfamille (2003).

The case examined involved a local government contracting a business to undertake a project with the aid of capital grants from a higher-level government. The approval of financing depended on the latter's assessment of the project's worthiness and the contractor's productivity.

The theoretical modelling suggested that, given the asymmetry of information favouring the local government, the local government has an incentive to exaggerate a project's merits and the contractor's performance. This leads to the possibility that projects with relatively low net benefits will be financed, unless the financing vehicle includes incentive devices such as cost sharing.

In these circumstances, an *adverse selection* problem can arise, resulting in projects with a relatively high net benefit facing greater costs of financing than their actual risk–return profiles warrant. These projects could potentially be crowded out by projects having a lesser net benefit (but greater certainty).

Particular financing vehicles can be useful for conveying information in an incentive-compatible way — that is, the parties involved can all gain by truthfully revealing private. Provision of a loan guarantee, for example, implies that the guarantor has a better knowledge of and a stronger confidence in the prospects of a project than that possessed by the lender. It can also reflect the lender's capacity to reduce and/or willingness to assume risk. The lender relies on the guarantor's financial capacity and obligation.

Financing efficiency does not preclude the financing of high-risk projects but the lender requires returns to be commensurate with risk levels. Both explicit (required rate of return) and implicit (contingent liabilities) costs have to be taken into account in order to attain financing efficiency.

2.3 Financing vehicles used by governments

The financing vehicles used by governments fall into two broad categories:

- 'pay-as-you-go' (PAYGO) — various fund sources within the public sector
- capital-market financing — borrowing or equity contribution from private sources.

Public-sector fund sources available for PAYGO financing typically include:

- current operating incomes from the collection of taxes and service charges
- special levies such as development contributions
- reserves set aside for general or specific investment purposes
- proceeds from asset sales
- intergovernmental transfers such as federal and provisional grants.

Traditionally, these funds were largely allocated through capital outlay and work program budget appropriations. Recent decades have seen an increased use of off-budget financing, reflecting the shift of some infrastructure responsibilities to government businesses.

Across the studied countries, governments allocate public-sector finances with different degrees of dependence on particular vehicles. Although it is difficult to

obtain comprehensive information on the share of total investment attributable to each of these vehicles, there is evidence that significant differences exist.

The reasons for variation in financing practices adopted by governments are likely to be numerous and intricate. Those that have been identified by EPAC (1995) and Merna and Njiru (2002) as commonly relevant include:

- infrastructure characteristics — which affect the user profiles and revenue-raising capacities of particular assets
- fiscal and macroeconomic conditions — which could restrict the use of particular financing vehicles because of their budgetary consequences
- institutional arrangements — which define the legal and regulatory framework as well as the intergovernmental relationship within which public infrastructure assets are operated and financed
- perceptions of the role of government — which underlie voters' expectations for the involvement of government in delivering specific services and managing the economy.

The pattern of use of different financing vehicles

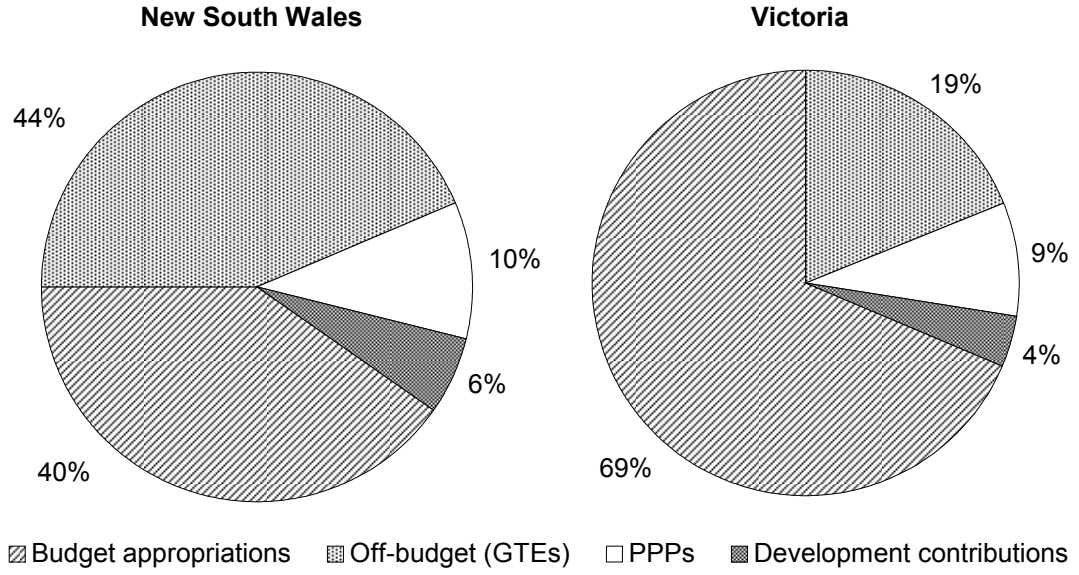
Australian State and Territory Governments rely heavily on budget appropriations and off-budget financing through government trading enterprises (GTEs) (figures 2.1 and 2.2). It should be noted that off-budget financing through GTEs is less prominent in Victoria mainly because its electricity GTEs were privatised in the 1990s.

There has been a greater reliance on PPPs in some Australian states with New South Wales and Victoria using this vehicle extensively. Nevertheless, PPPs account for a small percentage of public investment in infrastructure and their share fluctuates from year to year with the projects undertaken.

In the United Kingdom, there is also a significant reliance on budget appropriations for infrastructure financing. However, a smaller proportion of infrastructure is financed through GTEs than in Australia (figure 2.2). This reflects the extensive privatisation that took place in that country in the 1980s. More recently, a greater relative use of PPPs is also an evident outcome of the Private Finance Initiative (chapter 8).

In the United States, budget appropriations account for a small share of total public infrastructure investment because of the heavy reliance on capital-market financing through specific-purpose borrowing. In 2006, US$270 billion was raised for

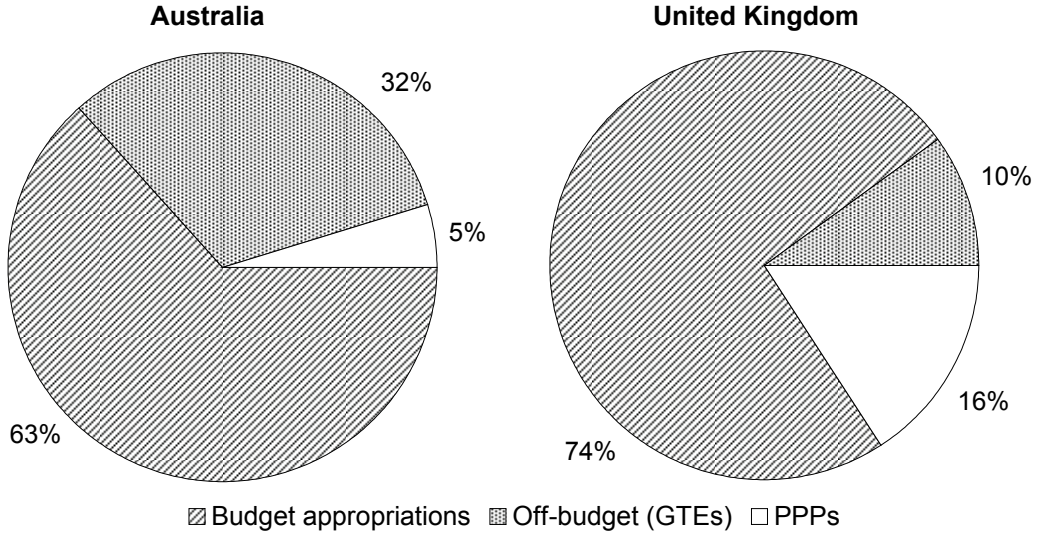
Figure 2.1 **Indicative shares of public infrastructure investment by financing vehicle in New South Wales and Victoria (2005-06)**



a Based on State and Local Government 2005-06 data from various published Budget Papers and General Purpose Financial Statements.

Source: Productivity Commission estimates.

Figure 2.2 **Indicative shares of public infrastructure investment by financing vehicle in Australia and the United Kingdom (2006-07)**



a Based on Australian Federal, State and Territory Government, and the UK Government, 2006-07 data from various published Budget Papers.

Source: Productivity Commission estimates.

projects financed by municipal revenue bonds. This alone represented approximately 70 per cent of overall infrastructure investment by all levels of government. This reliance on capital-market financing is attributable to institutional factors such as constitutional constraints on taxing and federal tax concessions for infrastructure borrowing.

Changes in the patterns and the significance of financial innovation

Australian and overseas governments alike have increasingly been making use of capital markets to finance public infrastructure. This partly reflects the contributory impact of financial innovation on financing efficiency.

Financial innovation is, in part, as a response to impediments to financing activities (Tufano 2003). New financial processes and products facilitate more efficient allocation of capital and risk if they reduce the extent of information asymmetry between borrowers and lenders, lower transaction and agency costs, or create products that are attractive to a wider range of investors.

During the past two decades or so, significant innovation has occurred in *project financing*. Project financing is based on a non-recourse or limited-recourse capital structure where project debt and equity are paid back solely from the cash flow associated with a project. Project assets, rights and interests are typically used as collateral. As such, a borrower's direct liability exposure is limited by 'ring-fencing' to the project risks (chapter 8).

Another major boost to capital market development has been the innovation of *credit enhancement* (or *credit wrapping*) instruments. These instruments provide borrowers with a potentially cost-effective means of bolstering credit standings and reducing net interest costs of security issues, particularly for lowly-rated projects with an unpredictable cash flow cycle.

Credit enhancement is a credit substitution or reallocation process. It can occur in one of two ways, by:

- a guarantee or insurance from a third party
- 'tranching' — that is, splitting the security into several classes with differing degrees of subordination in claims against the security issuer.

Governments can offer assistance in credit enhancement for desired investments through moral or policy obligation pledges, back-up guarantees, refinancing and maturity extensions, contingent lines of credit, or performance-based grants. Whether they should provide credit enhancement depends on whether they are

adequately compensated, such as through a lower required return or bringing forward an investment that has a significant net benefit to the community.

Securitisation — a process of standardising and packaging financial securities into a new fungible one — has been increasingly used to enhance credit standings and market liquidity for infrastructure projects. This form of structured finance typically involves the pooling of cash flows and the issuance of securities against specific asset portfolios.

To initiate securitisation, an infrastructure development fund or bond bank is set up as the special purpose vehicle (SPV) for issuing securities on the back of a number of specific projects. With the pooling of project assets and their transfer to an SPV, the aggregate cash flow associated with the projects is used to support interest and principal payments. The security payments depend solely on the designated projects' combined cash flows, thereby uncoupling the credit risk of the collateral asset pool from that of the borrower's balance sheet or general financial obligation.

The advent and maturing of innovative capital market vehicles, such as those discussed above, gives the private-sector and governments access to a wider range of finance sources and more options on financing strategies than previously. However, the sub-prime mortgage crisis that emerged in the United States after the mid-2000s illustrates the significance of ambiguous or untested risk exposure in some innovative financial products. As a case in point, low-risk tranches of securitised debt might not always be immune to financial losses even though they are structured to contain smaller portions of the credit risk.

Governments have to ensure that credit enhancement arrangements — particularly when offered as assistance — have a transparent financial structure with all the residual risk being controllable and correctly priced. Governments should also seek to be compensated if they are to bear any residual risk through credit enhancement.