Partnerships Victoria

Technical Note - July 2003

Use of Discount Rates in the Partnerships Victoria Process

Victoria
The Place To Be

Table of Contents

1 Summary

In June 2000, the Victorian Government launched its *Partnerships Victoria* policy on establishing partnerships with the private sector to provide public infrastructure and related ancillary services.[1] An initial set of guidance material was released in June 2001 to assist departments and agencies in undertaking *Partnerships Victoria* projects.

For specific processes during a *Partnerships Victoria* project, discounted cash flow (DCF) analysis is required to compare different cash flow streams. This Technical Note provides specific guidance on calculating and using discount rates in undertaking DCF analysis for:

(i) constructing a Public Sector Comparator (PSC)

(ii) evaluating bids.

These two processes are required to assist in determining whether government can obtain better value for money by:

- delivering the project itself through more traditional means, the whole-of-life, risk-inclusive cost of which is estimated by the PSC; or
- delivery through *Partnerships Victoria*, the cost of which is represented by the private sector bids.

As the cash flow profiles of the PSC and private sector bids will differ, DCF analysis is used to compare them on a consistent basis.

1.1 Discount rate concepts

DCF analysis recognises the concept that a dollar today is worth more than a dollar in the future. This reflects the opportunity cost of capital – revenues earned earlier can earn a return, or reduce the cost of borrowing.

Two main inputs are required for DCF analysis:

(i) forecast cash flows over the term of the project

(ii) discount rate.

The accuracy of the DCF analysis depends on the accuracy of both the forecast cash flows and the estimation of the discount rate. Consideration must be given to ensure that the level of accuracy of both elements is similar. While this Technical Note focuses on how the discount rate is calculated, the *Partnerships Victoria Public Sector Comparator* Technical Note, issued in June 2001, and the *Public Sector Comparator* Supplementary Technical Note, issued in July 2003, provide guidance on the preparation of forecast cash flows.

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[1] Department of Treasury and Finance, *Partnerships Victoria* Policy Statement, June 2000, available via www.partnerships.vic.gov.au.

The principles for determining discount rates for DCF analysis are based on the theory used to calculate the cost of capital represented by the capital asset pricing model (CAPM). While there are other frameworks, which could be used, CAPM is the most widely accepted and extensively developed theoretical approach.

In CAPM, the cost of capital reflects the return required by an investor to undertake or invest in a particular project. The required return is equal to the risk-free rate, plus a risk premium for the systematic or market risks retained by the investor.

Systematic risks are risks that affect all assets within a diversified portfolio of assets and therefore cannot be eliminated by holding such a portfolio. Examples of such risks for a *Partnerships Victoria* project include:

- demand risk relating to the level of general economic activity
- unexpected inflation
- the effect of unexpected changes in interest rates or foreign exchange rates on asset values
- unexpected obsolescence
- broad market risks such as a material rise in bankruptcies affecting supply.

CAPM is used to calculate the cost of capital and is expressed as:

$$R_a = R_f + \beta_a (R_m - R_f)$$

where:

R_a is the cost of capital of (or required return on) assets whose risk class is designated by the asset beta or systematic risk

R_f is the **risk-free rate**

β_a is the **asset beta**, which reflects the degree that asset returns (i.e. returns of a particular project) are expected to vary with returns of the market as a whole (i.e. a well-diversified portfolio of assets or projects), otherwise known as the systematic risk

$R_m - R_f$ is the **market risk premium** (MRP) that an investor would expect to receive before investing in an asset exactly correlated with the market.

1.1.1 Risk-free rate

For *Partnerships Victoria* projects, the risk-free rate is determined to be equal to the recent average of the ten-year Commonwealth Bond rate. This is currently determined by the Department of Treasury and Finance (DTF) as 5.3% per annum nominal, or around 3.0% per annum real.

The risk-free rate will be reviewed from time to time by DTF and a revised rate will be published via www.partnerships.vic.gov.au when considered necessary.

1.1.2 Asset beta

For each project, an asset beta is determined assuming that government is undertaking the project directly and therefore retains all of the systematic risks inherent in the project. Theoretically, each project has a different level of systematic risk and therefore should have a unique asset beta. However, for the majority of projects, the marginal benefits from calculating a unique asset beta are outweighed by the costs.

In order to determine the value of the asset beta, DTF has established three risk bands that cover the range in which the majority of *Partnerships Victoria* projects will fall. These risk bands are outlined in Table 1.1:

Table 1.1: Risk bands for most *Partnerships Victoria* project categories

Risk band	*Project sectors* and example projects	Asset beta	Real risk premium*	Real discount rate**
Very low	***Accommodation and related services*** Aged care housing Public housing Hospital facilities Correctional facilities	0.3	1.8	5.0% (4.8% rounded to nearest whole number)
Low	***Water, transport and energy*** Wastewater treatment plants Water infrastructure Hospital car parking Hospital energy plants Road projects (non-toll)	0.5	3.0	6.0%
Medium	***Telecommunications, media and technology*** Entertainment Telecommunications and IT Knowledge economy	0.9	5.4	8.0% (8.4% rounded to nearest whole number)

* Risk premium assumes a market risk premium of 6.0%.[2] The real risk premium is calculated as market risk premium x asset beta.

** The real rate will be updated by DTF (at www.partnerships.vic.gov.au) from time to time as required.

These betas may be lower than those observable within the general market. This reflects the nature of projects in which government is involved.

The categorisations in Table 1.1 are provided as a guide only and it is understood that there is no typical 'telecommunications, media and technology' project, for instance. Each project should be assessed on a case-by-case basis to ensure that it is placed in the appropriate band. Also, for large or higher systematic risk projects, additional consideration may be warranted as to whether the selection of a beta from these bands is appropriate. This is particularly relevant in situations where demand risk is to be transferred, such as the proposed Mitcham-Frankston Freeway.

[2] Officer, R. 'The Cost of Capital for the State of Victoria: a Synopsis'. Paper commissioned by the Department of Treasury and Finance, May 2001, p. 6, and confirmed in more recent discussions.

As a general rule, in situations where a project has multiple components, each with a different potential asset beta, the risk band that represents the majority of the project should be used. However, if the different components represent significant portions of the project, some adjustment may be required to the risk bands above. For example, in a project where a hospital and a car park are to be constructed, if the risks of the car park and its relative weighting within the project are significant, a beta value in between the very low and low risk bands may be appropriate. An alternative approach, where the differences are material, is to separate the cash flow for the multiple components using different asset betas as appropriate.

1.1.3 Market risk premium

For the purposes of *Partnerships Victoria* projects, DTF is using a market risk premium of 6%, as currently estimated by Professor R Officer. This rate will be reviewed from time to time by DTF and changed if considered necessary.

1.2 Consistency between discount rates and cash flows

DCF analysis requires the methodology to calculate discount rates and project cash flows to be consistent. In DCF analysis, common errors may occur in relation to the treatment of tax and inflation. Generally for *Partnerships Victoria* projects, DTF recommends that in DCF analysis, discount rates and cash flows are calculated:

- on a pre-tax basis[3]
- using nominal amounts, that is cash flows adjusted to include inflation.

1.3 Determining discount rates for PSC construction and bid evaluation

Private sector bids are evaluated against the PSC as part of assessing whether it is better value for government to contract with the private sector in a *Partnerships Victoria* arrangement, or to deliver the project directly as a capital works project. Therefore, the discount rate methodology used to calculate the PSC must be consistent with that used to assess private sector bids.

The PSC is based on the government reference project, which assumes that all systematic risks inherent in the project are retained by government.[4] The discount rate for PSC calculation is generally determined on this basis.

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[3] For Government Business Enterprises subject to company tax or tax-equivalent regimes, use of post-tax cash flows and discount rates may be more appropriate.

[4] Under traditional procurement (i.e. implementation of the reference project) some systematic risk may be transferred to a contractor (e.g. within a turnkey contract) but, for simplicity, all systematic risk has been assumed to be retained by government.

Under a *Partnerships Victoria* delivery mechanism, systematic risks may be transferred to the private sector. Therefore, where the project is delivered in conjunction with the private sector, government cash flows are likely to be subject to less systematic risk than the PSC. For most projects in the very low and low risk categories, this transfer of systematic risk is unlikely to be material and a common discount rate should be used by government for the PSC and for assessing bids.

However, for *Partnerships Victoria* projects where there is material systematic risk transfer to the private party, it is recommended that different discount rates be used to calculate the PSC and to assess private sector bids, based on the level of systematic risks transferred to the private sector. The calculation of these different discount rates will depend on whether government's net cash flows from the project are positive (i.e. net cash inflow) or negative (i.e. net cash outflow).

2 Introduction

2.1 Status of this technical note

The Victorian Government launched its *Partnerships Victoria* policy in June 2000.[5] This sets out the Government's policy in relation to establishing partnerships with the private sector to provide public infrastructure and related ancillary services.

After the policy was released, detailed guidance material was provided for use by departments and agencies to assist them in undertaking *Partnerships Victoria* projects. The guidance material released in June 2001 consisted of:

- an *Overview*
- a *Practitioners' Guide*
- a *Risk Allocation and Contractual Issues* guide, and
- a *Public Sector Comparator* Technical Note.

Technical notes provide detailed guidance on specific areas to departments and agencies undertaking a *Partnerships Victoria* project. They are released from time to time, as considered necessary. This Technical Note is being released with the *Public Sector Comparator* Supplementary Technical Note, issued in July 2003, that provides further detailed guidance on the construction and use of a Public Sector Comparator and includes a comprehensive worked example. Each guide and technical note should be read in conjunction with the other *Partnerships Victoria* publications.

2.2 Structure of this technical note

This Technical Note provides guidance on the calculation and use of discount rates in the following processes required in a *Partnerships Victoria* project:

- constructing a Public Sector Comparator (PSC)
- evaluating private sector bids, including evaluation against the PSC.

Chapter 3 discusses how discount rates are used in these processes.

A summary of the principles underlying discount rate calculations is provided in Chapter 4. Specific issues relating to calculating discount rates for government projects are discussed in Chapter 5.

Chapter 6 discusses how discount rates are used to calculate the PSC and in evaluating private sector bids.

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[5] Department of Treasury and Finance, *Partnerships Victoria* Policy Statement, June 2000; refer to www.partnerships.vic.gov.au.

Additional uses of discount rates during a *Partnerships Victoria* project are briefly discussed in Chapter 7.

Chapter 8 provides a list of frequently asked questions to assist readers in further understanding the use of discount rates in the *Partnerships Victoria* process.

3 Discount rates and *Partnerships Victoria* projects

The cash inflows and outflows from a project will vary over the term of the project. To assess these cash flows, they are discounted to a single point in time. This process of discounting cash flows is known as discounted cash flow (DCF) analysis. For DCF analysis in *Partnerships Victoria* projects, the method used to calculate the discount rate is based on the theory used to calculate the cost of capital.

During a *Partnerships Victoria* project, DCF analysis is required for a variety of decision-making processes. The principal processes are:

(i) **investment decision –** undertaking cost-benefit analysis to determine whether investment in a project should be undertaken. For completeness, the investment decision is briefly discussed in Chapter 7

(ii) **Public Sector Comparator (PSC) –** determining the PSC to be used as a benchmark in assessing private sector bids for the project

(iii) **bid evaluation –** assessing private sector bids to compare against the PSC.

This Technical Note focuses on the calculation and use of discount rates in determining the PSC and for bid evaluation. These processes are solely concerned with comparing alternative means of delivering a project – either directly by government or in conjunction with the private sector as a *Partnerships Victoria* project.

3.1 Public Sector Comparator (PSC)

The department or agency sponsoring a *Partnerships Victoria* project will generally need to develop a PSC.[6] The PSC is an estimate of the risk-inclusive, whole-of-life cost of providing the tendered services under public sector financing and management.[7]

For determining the PSC, the scope of the project is limited to those project components for which the private sector will be requested to bid. These components form the reference project. The reference project may be a subset of the project components reviewed in the investment decision, as shown in the following example.

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6 *Partnerships Victoria, Practitioners' Guide*, p. 27 refer to www.partnerships.vic.gov.au.
7 *Partnerships Victoria, Private Sector Comparator* Technical Note, p. 69.

Example – Project components

Consider a government project to build a new public hospital. This may require at least the following project components:

(i) construction of a new hospital facility

(ii) ongoing facility maintenance

(iii) periodic facility refurbishment

(iv) provision of medical services to patients.

All the project components would need to be considered by government during the investment decision process, although the reference project is likely to include only components (i) to (iii). Therefore, the PSC would only include the cost of these three components. The last component, the provision of medical services, is likely to be considered a core service that government would provide directly at the new hospital.

The PSC is the primary financial benchmark against which private sector bids are assessed to determine whether government will obtain better value by undertaking the project as a *Partnerships Victoria* project or as a government build project.[8]

As the PSC comprises a forecast of the project cash inflows and outflows, DCF analysis is used to determine a value at a single point in time. This value is known as the:

- net present value (NPV) where there is a net cash inflow to government
- net present cost (NPC) where there is a net cash outflow to government.[9]

This Technical Note explains how discount rates are calculated and used to determine the PSC.

3.2 Bid evaluation

Private sector bids for a project contain forecasts of the cash flows to be received and/or paid by government over the term of the project. In addition, the bids may contain details regarding cash flows to other parties where relevant. DCF analysis is used to compare the value of government cash flows arising from different bids and for comparison with the PSC cash flows. To accurately assess the bids against the PSC, the principles used in undertaking the DCF analysis must also be consistent. This Technical Note explains how the discount rate is determined and then used to assess bids.

[8] In projects where government will use the facility to provide core services, the cost impact of the bidder's design on the efficiency of government's operation of the facilities will also be considered in the government's value for money assessment.

[9] An NPC can also be thought of as a negative NPV.

4 Estimating discount rates

Discounted cash flow (DCF) analysis requires two main inputs:

(i) forecast cash flows over the term of the project

(ii) a discount rate.

The accuracy of the DCF analysis depends on the accuracy of both the forecast cash flows and the estimation of the discount rate. The level of accuracy of both elements should be similar. (While this Technical Note focuses on the determination of the discount rate, further discussion of the estimation of forecast cash flows is provided in the *Public Sector Comparator* Technical Note.)

As noted, the principles for determining discount rates for DCF analysis are based on the theory used to calculate the cost of capital. This section introduces this theory and the basic concepts underlying the cost of capital. While a detailed understanding of capital market theory is not required, it is useful to have a basic understanding of how the cost of capital is determined. In particular, an understanding of the relationship between the treatment of cash flows and determination of the discount rate is needed.

The theory discussed below is relatively generic and requires modification before applying it to the determination of the discount rate to be used to calculate the PSC and for bid evaluation. This generic theory may be readily applicable to other uses of the cost of capital, such as for the investment decision and funding allocation.

The capital asset pricing model (CAPM) can be used to determine government's cost of capital. There is considerable academic literature dealing with CAPM. This Technical Note provides a simple summary of this theory. The bibliography in Appendix D provides some sources of further reading for interested readers. The use of CAPM is not universally accepted. It has been the subject of a number of academic critiques. However, it remains the most widely accepted theory of the cost of capital.[10]

4.1 Cost of capital – principles

The cost of capital in private capital markets is determined by the interaction between competing users and competing providers of capital. This interaction results in a cost of capital for any specific asset that reflects the returns that investors could have received by investing in other assets with comparable risks. The cost of capital is therefore:

- an opportunity cost – measured by foregone investments in comparable assets
- based on expectations of future and uncertain returns

[10] For a discussion of the validity of CAPM, and some alternative theories, see Brealey, R, and Meyers, S, *Principles of Corporate Finance*, sixth edition, Irwin McGraw-Hill, Boston, 2000.

- determined by the expected returns on comparable assets, and therefore independent of the source of financing.[11]

The cost of capital is determined by:

- investors' preference for cash now over cash in the future – this is reflected in the risk-free rate

- investors' preference for low-risk investments over high-risk investments – this is reflected in the risk premium attached to any particular project.

The following sections develop these concepts further.

4.2 Types of risk

The first concepts to be considered are the types of risk inherent in all projects and their effect on the cost of capital. A rational investor will not bear risk without compensation in the form of a higher return.

The types of risks inherent in all projects are:

(i) non-systematic risk

(ii) systematic risk.

Non-systematic risks can usually be diversified away[12] by investing in a balanced portfolio of assets, but systematic risks cannot be reduced in this way. Therefore, a higher cost of capital results from the need to compensate investors for bearing systematic risks.

4.2.1 Non-systematic risk

Non-systematic or diversifiable risks are those risks that are asset-specific. An investor may reduce this risk by holding a diversified portfolio of assets, as discussed in the following example.

Example – Non-systematic risk

An example of non-systematic risk is the risk of investing in a business that only sells heaters. Sales would be higher for this business during the cold times of the year. This risk could be diversified or reduced by also investing in a business that sells air-conditioners, where sales would be higher during the warm times of the year. Investing in these two businesses provides more consistent sales throughout the year.

As non-systematic risk can be reduced through diversification, investors do not receive a premium for holding this risk. Therefore, in theory, non-systematic risks do not have any effect on the costs of capital.

[11] For government, these 'returns' may be in the form of community benefits as well as, or rather than, financial returns.

[12] To maximise the reduction of non-systematic risks requires an investment in a portfolio of at least 15 to 20 assets, each with different non-systematic risks.

Example – Non-systematic risk

For individual projects, non-systematic risks are taken into account when forecasting the expected costs and benefits (in the form of cash flows) from the project and are included as risk adjustments to the project cash flows in determining the PSC.[13]

4.2.2 Systematic risk

Systematic risks are those risks that cannot be reduced through a diversified portfolio of assets. An example of this risk follows.

Example – Systematic risk

An investment in a business that sells both heaters and air-conditioners is likely to have sales rising during economic booms and falling during recessions. This risk is defined as a systematic risk as an investor cannot avoid this risk through a diversified portfolio. Therefore the investor will seek a premium where they are required to assume systematic risks. This risk premium increases the investor's cost of capital. Specific examples of systematic risks that may affect *Partnerships Victoria* projects are:

(i) demand risk relating to the level of general economic activity – this should be contrasted with demand risk relating to the operator's (or a competitor's) performance which would be a project or non-systematic risk

(ii) unexpected inflation

(iii) unexpected changes in interest rates or foreign exchange rates

(iv) broad market risks – this is the risk that the project is affected by the secondary impacts that occur in the broad market economy. For example, a supplier becoming insolvent affects service provision for the project.

4.2.3 Summary of risks

A summary of the two types of risks is shown in Table 4.1.

[13] *Partnerships Victoria: Public Sector Comparator* Technical Note, p. 16.

Table 4.1: Systematic and non-systematic risk and implications for discount rate

Type of risk	Description	Implications for discount rate
Non-systematic risk		
Also known as: • diversifiable risk • asset-specific risk	Risks that are project-specific and can be reduced by holding a diversified portfolio of assets	(Provided that the cash flows to be brought to present value are the expected values), no impact on discount rate, as investors can reduce this risk
Systematic risk		
Also known as: • non-diversifiable risk • market risk	Risks that affect all assets within a diversified portfolio of assets	Investors are unable to reduce systematic risk and therefore require a premium for accepting this risk (i.e. increase in the discount rate)

4.3 Time preference and the risk-free rate

A dollar today is worth more than a dollar in the future. That is, investors have a preference for early revenues, and late costs. This reflects the opportunity cost of capital – revenues earned earlier can earn a return, or reduce the cost of borrowing.

This preference for money sooner rather than later is called 'time preference'. Pure time preference is measured by the returns observed in the market on risk-free assets. Note that the term risk-free relates only to a lack of systematic risk. Non-systematic or asset-specific risks are included in the forecast of the cash flows for the asset.

Using the common simplifying assumption that the Commonwealth Government debt is risk-free, we can say that an investment that is free of systematic risks needs to earn at least as much as the yield on a government bond for it to attract investors. This yield is referred to as the risk-free rate (R_f).

The cost of capital for an investment that is free of systematic risks will simply be the risk-free rate. For example, if government was assessing a project that it considered to have returns as certain as the returns on a Commonwealth Government bond, it should use the risk-free rate as the discount rate for that project. In practice, most projects involve systematic risk. Where this is the case, the cost of capital for the project needs to include a risk premium.

4.4 Market risk premium

The return on the whole market portfolio has (by definition) an average market risk. This return is known as the market return (R_m). The market risk premium (MRP) is the extra return which investors demand for holding a risky asset and whose returns mirror the movement in returns from the whole market.

The market risk premium is calculated by taking the market return and subtracting the risk-free rate.

Market risk premium = $R_m - R_f$

4.5 Systematic risk of a project

The market risk premium usefully quantifies the return required for accepting the market level of systematic risk. However, many assets will not have the same variability to market movements as the market as a whole. Some will be relatively stable and low risk. Others will be volatile, and will on average over/under shoot market movements. As a result, it is necessary to determine what exposure to market risk is associated with different assets, and what return is required to compensate investors for holding that risk.

The market riskiness of any individual asset or project is measured through the sensitivity of its returns to market movements. This measure is defined as the asset beta[14] (β_a) and calculated as follows:

$\beta_a = \delta_{am} / \delta_m^2$

where:

β_a is the beta for asset 'a'

δ_{am} is the covariance of returns of asset 'a' compared to market returns

δ_m^2 is the variance of market returns.

The asset beta provides information on the extent of systematic risks inherent in a project.

A financial asset whose price movements are exactly correlated with the market has an asset beta of one – this would be true for example of a share investment fund that included a weighted average of all shares in the market. A financial asset with an asset beta below one is less responsive to market movements, while a financial asset with an asset beta of greater than one is more responsive.

To simplify the determination of the asset beta for each project, Section 5.3.1 provides details of systematic risk bands that have been determined by the Department of Treasury and Finance, with examples of similar systematic risk projects in each band.

[14] Throughout this Technical Note we use beta to refer to an 'asset beta', not an 'equity beta'. That is, it is a measure of the market risk of all the cash flows of an asset or project, irrespective of capital structure.

4.6 Capital asset pricing model (CAPM)

The principles above are combined to form the CAPM formula:

$$R_a = R_f + \beta_a (R_m - R_f)$$

where:

R_a is the cost of capital of (or required return on) assets whose risk class is designated by the asset beta

R_f is the risk-free rate, though for the purposes of the CAPM this is the rate on an asset that is free from systematic risks only

β_a is the asset beta, which reflects the degree to which asset returns (i.e. returns of a particular project) are expected to vary with returns of the market (i.e. a well-diversified portfolio of assets or projects), otherwise known as the systematic risk

$R_m - R_f$ is the market risk premium that an investor would expect to receive before investing in an asset exactly correlated with the market.

5 Discount rate for government projects

This chapter discusses how the CAPM-based formula is applied to discounted cash flow analysis for government projects.

5.1 Risk-free rate

For *Partnerships Victoria* projects, the risk-free rate (R_f) represents the discount rate for an asset with no systematic risks. (As discussed, the non-systematic or asset specific risks are included in the forecast cash flows for a project.) The risk-free rate is determined periodically by the Department of Treasury and Finance. At the time this Technical Note was compiled, the risk-free rate was determined to be 5.3% nominal and 3.0% real. As noted, these rates may be updated as necessary. See www.partnerships.vic.gov.au for updates. (A 'real' rate does not include an inflation adjustment and needs to be converted to a nominal rate, taking into account the latest inflation forecasts, using the Fischer equation before being applied to nominal cash flows). The Fischer equation converts from real to nominal discount rates as follows:

$$N = (1 + r) \times (1 + i) - 1$$

where:

N = Nominal rate

r = Real rate

i = Inflation rate

For example, assuming a real risk-free rate of 3.0% and an inflation rate of 2.25%, the nominal discount rate is calculated as follows:

$$N = (1 + 3\%) \times (1 + 2.25\%) - 1$$

$$= 5.3\%$$

In determining the risk-free rate, the following principles are to be applied:

(i) risk-free rate to be based on the Commonwealth Government's long-term borrowing rate:

Risk-free rate = Average of the ten-year Commonwealth Bond rate for the previous six months.

(ii) DTF may review the risk-free rate from time to time and change the rate if interest rate movements are considered to have a long-term effect on the determination of the risk-free rate.

5.2 Market risk premium

There are many different ways of measuring market returns and there is a considerable debate over the calculation of the market risk premium ($R_m - R_f$).

For the purposes of *Partnerships Victoria* projects, at the date of this Technical Note, DTF will use the market risk premium of 6% determined by Professor R Officer.[15] Consistent with the calculation of the risk-free rate, the market risk premium determined by DTF is a 'real' rate and does not include an inflation adjustment. However, since the adjustment for inflation is generally made within the risk-free rate, the same MRP of 6% can be used for deriving both real and nominal discount rates.

This rate will be reviewed from time to time by DTF and changed if considered necessary.

5.3 Project risk premium

Theory suggests that a separate risk premium and overall discount rate should be developed for each *Partnerships Victoria* project. In practice, for most major projects this is likely to prove time-consuming, for little gain. An increase in the accuracy of the discount rate calculation will be of marginal benefit unless the cash flows can also be forecast to the same degree of accuracy.

The discount rate will be affected by the sector in which an investment is being made and the nature of the risks associated with the asset. Many government projects are in similar sectors, and government services may share similar risks. For this reason, the benefits from preparation of a project-specific discount rate are likely to be low. Substantial resources could go into analysing small variations in the discount rate with little improvement in the accuracy of the DCF analysis.

5.3.1 Risk bands

Given the minimal value obtained from calculating a project-specific beta, DTF recommends that the majority of projects should be categorised into one of three broad 'risk bands'. Each risk band has been assigned a beta value on the basis that government assumes all the systematic risks inherent in the project's cash flows. The beta value is known as the asset beta and the resulting discount rate is defined as the project rate. Table 5.1 outlines the broad risk bands. However, it should be noted that a detailed understanding of the systematic risks of the project needs to be undertaken in order to correctly classify the project into one of the risk bands.

In some instances a project-specific discount rate may be justified and this is discussed in Section 5.3.2.

[15] Officer, R. 'The Cost of Capital for the State of Victoria: a Synopsis'. Paper commissioned by the Department of Treasury and Finance, May 2001, p. 6 and confirmed in recent discussions.

Table 5.1: Broad risk bands for *Partnerships Victoria* projects

Risk band	*Project sectors* and example projects	Asset beta	Real risk premium*	Real discount rate**
Very low	***Accommodation and related services*** Aged care housing Public housing Hospital facilities Correctional facilities	0.3	1.8	5.0% (4.8% rounded to nearest whole number)
Low	***Water, transport and energy*** Wastewater treatment plants Water infrastructure Hospital car parking Hospital energy plants Road projects (non-toll)	0.5	3.0	6.0%
Medium	***Telecommunications, media and technology*** Entertainment Telecommunications and IT Knowledge economy	0.9	5.4	8.0% (8.4% rounded to nearest whole number)

* Risk premium assumes a market risk premium of 6.0%.[16] The real risk premium is calculated as market risk premium x asset beta.

** The real rate will be updated by DTF (at www.partnerships.vic.gov.au) from time to time as required.

These betas may be lower than those observable within the general market. This reflects the nature of projects in which government is involved.

The categorisations in Table 5.1 are provided as a guide only and it is understood that there is no typical 'telecommunications, media and technology' *Partnerships Victoria* project, for instance. Each project should be assessed on a case-by-case basis to ensure that it is placed in the appropriate band. Also, for large or high systematic risk projects, additional consideration may be warranted as to whether the band rate is the appropriate discount rate. This is particularly relevant in situations where demand risk is to be transferred, such as the proposed Mitcham-Frankston Freeway.

As a general rule, in situations where a project has multiple components, each with a different potential asset beta, the risk band that represents the majority of the project should be used. However, If the different components represent significant portions of the project, some adjustment may be required to the above risk bands. For example, in a project where a hospital and car park was to be constructed, if the risks of the car park and its relative weighting within the project are significant, a beta value in between the very low and low risk bands may be appropriate. An alternative approach, where the differences are material, is to separate the cash flow for the multiple components using different asset betas as appropriate.

Care needs to be exercised in the evaluation of asset betas to ensure a project is categorised in the correct risk band. A detailed analysis of the project is required to

[16] Officer, R. 'The Cost of Capital for the State of Victoria: a Synopsis'. Paper commissioned by the Department of Treasury and Finance, May 2001, p. 6, and confirmed in more recent discussions.

understand the systematic risks inherent in the project's cash flows. An example of how similar assets can be categorised in different risk bands is discussed below.

Example: Hospital projects

This example concerns projects of the same asset type, a hospital, but with different outputs purchased by government.

A hospital project might fit appropriately into the property category if the emphasis is on providing accommodation and facility services. On the other hand, if the project included the provision of health services, it should be considered a health sector project. The health sector may have a different, most likely higher, systematic risk than the 'Accommodation and related services' sector. (This example is for illustration only. Provision of clinical health services in a public hospital is considered to be a 'core' service and will not form part of the services provided privately in a *Partnerships Victoria* project.)

5.3.2 Calculation of a project-specific discount rate

The approach of allocating each project into risk bands will work for most *Partnerships Victoria* projects. However, there are times when a more precise, project-specific approach may be justified. To justify a project-specific discount rate, the project should meet at least one of the following conditions:

(i) the size of project is in excess of NPV/NPC of $500 million

(ii) the project has unique or unusual systematic risks that are not similar to any of the project types in the risk bands.

Where a project-specific discount rate is to be developed, the methodology should concentrate on developing an estimate of the asset beta for that project. This ideally would be determined by observing the asset betas of traded companies with similar market risk characteristics to those in the project. The risk-free rate and the market risk premium used should be the same as those discussed in this Technical Note.

5.4 Consistency between discount rates and cash flows

In using the CAPM to calculate a discount rate for DCF analysis, the approach must be consistent with that used to estimate the project cash flows. Key areas in which inconsistencies may arise are:

- the treatment of tax
- the treatment of inflation.

5.4.1 Treatment of tax

The discount rate may be developed on a pre-tax or post-tax basis. The cash flows to which that discount rate is applied must be developed on the same basis.

The PSC Technical Note recommends that, for government budget-sector agencies, cash flows are calculated on a pre-tax basis. Therefore, the discount rate should also be a pre-tax estimate. For government bodies subject to company tax or company tax equivalents, use of a post-tax basis may be more appropriate.

5.4.2 Treatment of inflation

Consistent with PSC Technical Note, Sections 3.3 and 3.4, the discount rate should be estimated in nominal terms, that is, including inflation. Therefore, cash flows should also include the effect of inflation.

5.5 Reconciliation with historical approach

This Technical Note seeks to further refine the determination of discount rates to be used in *Partnerships Victoria* projects. The use of bands rather than a common uniform discount rate for determination of the PSC is one refinement. Another is the use, in select cases, of different discount rates for bid evaluation from that used in determining the PSC for that project. The purpose of this is to capture the extent of systematic risk transfer between government and the private party. This refinement is addressed in Chapter 6.

6 Discount rate for the PSC and bids

Following the discussion in Chapter 4, it is recommended that the discount rates used to calculate the PSC and to assess private sector bids is based on the CAPM:

$$R_a = R_f + \beta_a (R_m - R_f)$$

As outlined in Chapter 5, systematic risks inherent in the project are measured by the asset beta multiplied by the market risk premium, $\beta_a (R_m - R_f)$. Non-systematic or project risks are taken into account in the expected cash flow forecasts for the project.

6.1 General approach – to apply in most projects

Bids from private parties are assessed by government to determine which offers the best value for government. Bids are also evaluated against the PSC to determine whether it is better value for government to:

- contract with the private sector and use the *Partnerships Victoria* delivery mechanism; or
- deliver the project itself as a capital works project.

The discount rate methodology used to calculate the PSC must be consistent with that used by government to assess bids. Where these methodologies are not consistent, the DCF analysis of the PSC and private sector bids cannot be compared.

The PSC is based on government's reference project, which assumes that all systematic risks inherent in the project are retained by government.

In delivering the project under *Partnerships Victoria*, it is likely that some systematic risks will be transferred from government to the private sector. Therefore, where the project is delivered in conjunction with the private sector, government's cash flow payments will retain less systematic risk than is contained in the PSC. This is of benefit to government (although it could be expected to be reflected in the cash flows sought by bidders).

If the value of this benefit to government were to be captured, the proportion of systematic risk transferred to the private sector would be estimated and a different discount rate consequently determined to apply to bidders' cash flows.

However, for most *Partnerships Victoria* projects categorised in the very low and low systematic risk categories (see Section 5.3.1), this transfer of systematic risk is unlikely to be material. In such cases, the estimation of the proportion of systematic risk transferred under a *Partnerships Victoria* contract is unlikely to be warranted and it is recommended that government applies a common discount rate to bids and the PSC for assessment purposes.

6.2 Approach to apply where material systematic risk is transferred

For projects where it is considered that material systematic risks are transferred under a *Partnerships Victoria* project, estimation of an adjusted discount rate to apply to bidders' cash flows, different from that used in the PSC, may be warranted.

In such cases, the methodology used to determine the adjusted discount rate to apply to bids will vary according to whether the project's net cash flows for government are positive (i.e. net cash inflow) or negative (i.e. net cash outflow).

6.2.1 Projects with net cash inflows

Where the net cash flows to government are positive, a conventional use of the CAPM is appropriate, i.e. the higher the systematic risk inherent in government's cash flows, the higher the discount rate applied to those specific cash flows.

Discount rate for PSC

For a project with positive cash flows, the discount rate used to calculate the PSC is based on the assumption that government retains all the project's systematic risks. The resulting beta calculated in the CAPM is based on the risk bands shown in Section 5.3.1 and, as noted in that section, is known as the asset beta. The resulting discount rate (R_a) is defined as the project rate.

Discount rate for assessing private sector bids

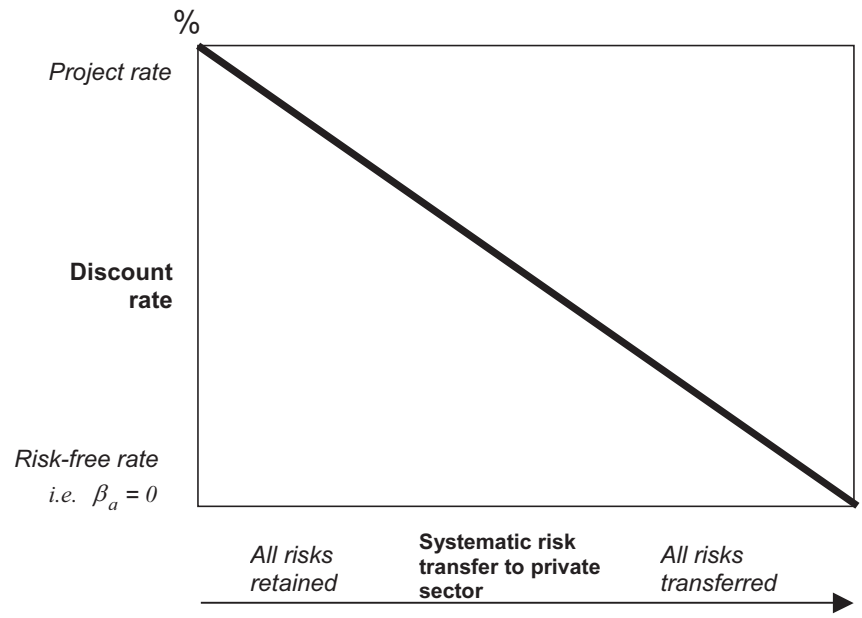
The discount rate used to assess private sector bids in such projects is calculated with reference to the allocation of systematic risks between government and the private sector. This risk allocation is set out in the proposed contract between the two parties and this will be reflected in the beta adjustment. (In theory, different betas could be estimated for different bids if the amounts of systematic risk transfer were to vary between bids. In practice, such a complication is unlikely to be warranted.)

As government's cash flows will be subject to less systematic risk than that estimated for the PSC, the beta calculated for the cash flows bid by the private sector will be less than the asset beta. Accordingly, the discount rate used to assess the private sector bids will be less than the project rate.

In Section 4.2.2, four specific examples of systematic risks that may affect *Partnerships Victoria* projects were listed. The proposed contract for any *Partnerships Victoria* project would need to be examined to estimate the systematic risk transfer.

The following graph, Figure 6.1, demonstrates the calculation of discount rates in projects where the government reference project would experience net cash inflows. In practice, once an estimate has been made of the proportion of systematic risk transferred (e.g. ¼, ½, ¾, all) a discount rate could be determined from the graph and applied to government's net cash inflows. Guidance on estimating the proportion of systematic risk transferred is provided in Appendix C (Victorian County Court case study).

Figure 6.1: Discount rate calculation – net cash inflow to government



6.2.2 Projects with net cash outflows

In most *Partnerships Victoria* projects, government cash flows will be negative. For these projects, the above approach to discounting government's cash flow profile cannot be used.

By using the standard methodology to calculate discount rates for net cash outflow projects, other things equal, a more risky net cash outflow would be assigned a higher discount rate, resulting in a lower net present cost (NPC). This would make the higher risk project appear preferable to a lower risk project, whereas, a rational party would prefer the lower risk project. Refer to Section 8.3 for an example of the incorrect use of discount rates in DCF analysis.

In order to overcome this issue, in government net cash outflow projects a modified use of CAPM is proposed. This modified approach will provide the correct rankings for different cash flow alternatives faced by government. However, the actual, absolute NPCs derived will have no direct meaning.

This approach has been chosen because of its relative simplicity, together with its ability to yield appropriate rankings of the PSC and bids.

Discount rate for PSC

In the context of the previous discussion and only for the purposes of establishing a PSC benchmark to compare private sector bids and to ensure a rational ranking of net cash outflow alternatives, the risk-free rate should be used to discount government's PSC cash flows.

The use of the risk-free rate as a discount rate in this context is valid for determining a benchmark, the PSC, for which private sector proposals can be tested to ensure government is obtaining the best value for money in delivering the project.

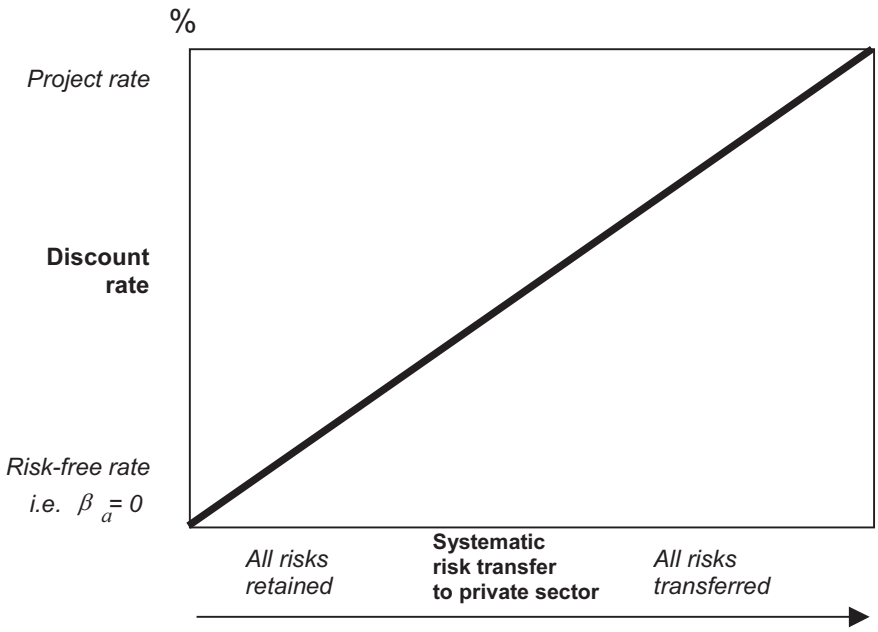
Discount rate for assessing private sector bids

In comparing the financial cost of a private sector bid with the PSC, the transfer of more systematic risk to the private sector represents a better outcome for government (other things equal). For the DCF analysis, a higher beta, and therefore a higher discount rate, should apply to government's net cash outflows (i.e. the payments to be made to a bidder) where greater systematic risk is transferred to the private sector. The higher discount rate results in a lower NPC (i.e. a higher NPV) to government.

Conversely, lower risk accepted by the private sector provider is a less preferable outcome for government (other things equal) and therefore the beta applicable to their bid will be lower, resulting in a lower discount rate. This is due to the risk being borne by the private sector, representing a lower percentage of the total systematic risk or asset beta. The lower discount rate results in a higher NPC (i.e. lower NPV) to government.

Figure 6.2 demonstrates the calculation of discount rates used to assess private sector bids for projects with net cash outflows to government. Again, the discount rate could be determined from the graph and applied to government's net cash outflows.

Figure 6.2: Discount rate calculation – net cash outflows to government



6.3 Summary of discount rates for the PSC and bids

For most projects, government will use the same discount rate, the project rate, for both the PSC and for assessing bids. This discount rate will generally be determined by which category – very low, low or medium – most suits the project.

For projects where material systematic risk would be transferred to bidders under the contract, use of a different discount rate to apply to bid cash flows may be warranted. Table 6.1 summarises the range of cases that could apply in this event.

Table 6.1: Summary of methodologies for determining discount rates for *Partnerships Victoria* projects

Criteria	General rules	Special rules
Application	General rules to be applied in the majority of projects	Projects >$500m NPV/NPC or where project has unique or unusual systematic risk profile
Cash flow profile	Applicable to positive and negative cash flow projects	Different methods for positive and negative cash flow projects
Discount rate – Net cash inflow projects:		
PSC Bid	Project rate Project rate	Project rate < Project rate
Discount rate – Net cash outflow projects:		
PSC Bid	Project rate Project rate	Risk-free rate > Risk-free rate

More detailed coverage of the material in this chapter is provided in Appendix B.

7 Additional uses for discount rates

Chapter 3 identified when DCF analysis is used to assist in decision-making for *Partnerships Victoria* projects. In summary, these processes are:

(i) **investment decision –** undertaking cost-benefit analysis to determine whether the project should proceed

(ii) **Public Sector Comparator (PSC) –** determining the PSC to be used as a benchmark in assessing private sector bids for the project

(iii) **bid evaluation –** assessing private sector bids to compare against the PSC.

This Technical Note has only focused on the calculation and use of discount rates in determining the PSC and for bid evaluation. For completeness, the investment decision process is discussed briefly below.

7.1 Investment decision

At the investment decision stage of a project, the aim is to ascertain, broadly, the excess of expected benefits over costs from investing resources in a specific project configuration. The scope of the project includes those components that may be delivered by private parties under *Partnerships Victoria* and new activities that will be delivered directly by government. Different project discount rates may be appropriate at the investment decision stage and the stage of assessing whether a *Partnerships Victoria* delivery mechanism offers better value for money for government than direct delivery.

The discount rate for the investment decision could be based directly on the asset beta as discussed previously. This approach involves similar assumptions regarding the robustness of the technique, the availability of reliable data etc. The CAPM model takes a long-term view of the pure time value of money (the risk-free rate), and adds a margin for the systematic risks inherent in the particular model of the project under examination. Strictly, the project-specific margin is derived from the multiple of the beta for the asset class(es) in which investment is proposed, multiplied by a standard market risk premium.

Alternatively, the discount rate may be based on a weighted average cost of capital (WACC). The validity of this approach depends on matters such as the assumed capital structure and the size of the increase in funds invested (and hence the applicability of average capital costs in marginal situations). The WACC approach generally requires use of the CAPM approach to estimate required returns on the equity component.

While, theoretically, each asset class has a specific discount rate, the cost of deriving these rates has to be traded-off against the size of any errors likely to result from using discount rates that are less accurate but broadly applicable and readily available. The reliability of the cash flow estimates to be discounted should also inform the level of accuracy of the discount rate for the project.

The hospital projects example (Section 5.3.1) indicates how the scope of a project and the beta may differ at the investment decision level from those in the PSC.

8 Frequently asked questions

This chapter includes common questions regarding the determination of discount rates and their use in calculating the PSC and assessing private sector bids.

8.1 Does government have a low cost of capital?

It is sometimes argued that government faces a low cost of debt, as shown by the rate of interest on government securities compared with the rate on corporate bonds. This might imply that the cost of capital for government should be lower than for the private sector.

The reason government's cost of borrowing is low is that government can use its taxing powers to repay loans. Because of these taxing powers, lenders to government consider that it is unlikely to default, leading to lower interest rates on borrowings. However, when government decides whether to invest in a project, it should look at the riskiness of that project, and demand a return commensurate with the risk it is taking. Further, as discussed, in Section 8.2 below, the discount rate should reflect the risk of the project, not government's borrowing rate.

If this was not the case, the logical consequence would be that government would finance everything, and replace commercial sources of finance. Since it is generally agreed that this would not be a desirable outcome, it is clear that it is the expected returns of the project, and the risks associated with them, rather than the costs of debt for public or private financiers, which determine the cost of capital. Further, if government was to finance all projects, the large increase in public debt would create a corresponding increase in the cost of public borrowing.

8.2 Should government use a single discount rate?

A further common argument is that government should use a single discount rate. The fact that government borrows at a single rate is sometimes used to support this view. Alternatively this view might be advanced as simpler, or somehow more efficient, because all projects are treated the same.

The flaw in this argument is the same as the flaw in the argument that government's cost of capital is always low. A project's cost of capital is not set by the cost of borrowing; it is the cost of bearing the market risk of a project. Since

individual projects vary in their riskiness, they vary in their cost of capital. This is so whether the project is undertaken by the public or the private sector.[17]

The variation of risk extends to the allocation of risk between government and each private sector bid.

It follows that government should apply different discount rates to projects with different levels of risk. If government applied an average discount rate across all projects, it would advantage risky projects (by demanding a return lower than their risk warranted) and disadvantage low risk projects, by demanding excessive returns from them. The result would be that government would tend to over-invest in risky projects, and under-invest in low risk projects.

Suppose government uses a single discount rate when considering the case for public or private finance, while the private sector uses project-specific costs of capital. Government will tend to finance projects where its discount rate appears to be lower than the private sector. The result will be that government will tend to finance high-risk projects, leaving low-risk projects to the private sector.

It is this reasoning that has resulted in DTF publishing this Technical Note to refine the use of discount rates in calculating the PSC and assessing private sector bids.

8.3 Why does the discount rate methodology change for projects with net cash outflows?

Where a project has net cash inflows, a higher discount rate results in a lower NPV to government when undertaking DCF analysis. For projects with net cash outflows this relationship is reversed, as a higher discount rate results in a lower NPC.

A change in the methodology used to calculate the discount rate for projects with net cash outflows is required to ensure an appropriate outcome from DCF analysis of the relative value of the PSC compared with the private sector bids. This can best be explained by the example below.

Example – Incorrect calculation of discount rates for project with net cash outflows for government

Consider a project with two different private sector bids (Bidders A and B). Both bids request government to make the same net cash outflows, though each bid transfers a different amount of systematic risk to the private sector.

The proposed cash flows for Bidder A have more systematic risks transferred to the private sector than for Bidder B. Therefore, government's cash flows in Project A are subject to less systematic risk being retained by government.

If the calculation of betas, and therefore discount rates, was based on the methodology used for net cash inflow projects, then the cash flows for Bidder A,

[17] For an explanation of why corporations should use project-specific costs of capital, rather than an average cost for all projects, see Brealey, R, and Meyers, S, *Principles of Corporate Finance*, op.cit., Chapter 9. The same argument applies to government.

Example – Incorrect calculation of discount rates for project with net cash outflows for government

with lower systematic risks retained by government, would be assigned a lower beta. The lower beta would result in a lower discount rate for Bidder A and therefore, a greater NPC to government.

Tables 8.1 and 8.2 demonstrate this theory.

Table 8.1: Example *Partnerships Victoria* projects cash outflows by year and risk levels

Project cash outflows, $m	Total	Year 1	Year 2	Year 3	Year 4	Year 5
Bidder A High systematic risk transferred to private sector Low systematic risk borne by government	**(50)**	(10)	(10)	(10)	(10)	(10)
Bidder B Low systematic risk transferred to private sector High systematic risk borne by government	**(50)**	(10)	(10)	(10)	(10)	(10)

Table 8.2: Example *Partnerships Victoria* projects – risk levels, discount rates and net present costs (NPC)

Please note: This is an example of the incorrect determination of discount rates for projects with net cash outflows.

Project	Beta	Discount rate*	NPC $m
Bidder A High systematic risk transferred to private sector Low systematic risk borne by government	0.3	5.0%	**(43.3)**
Bidder B Low systematic risk transferred to private sector High systematic risk borne by government	1.0	9.0%	**(38.9)**

* Note: Discount rate assumes: risk-free rate of 3.0%;[18] market risk premium of 6.0%;[19] rounded to nearest whole number.

Based on Table 8.2, Bid B has a lower net present cost to government than Bid A and so Bid B would be the preferred project provider. This conclusion is clearly incorrect (other things equal), as government is subject to greater systematic risk in Bid B than Bid A.

[18] The risk-free rate will be reviewed from time to time by DTF and a revised rate will be published via www.partnerships.vic.gov.au when considered necessary.

[19] Officer, R. 'The Cost of Capital for the State of Victoria: a Synopsis'. Paper commissioned by the Department of Treasury and Finance, May 2001, p. 6 and confirmed in recent discussions.

8.4 Should the risk-free rate always be used to calculate the PSC for material systematic risk transfer projects with net cash outflows?

Projects with net cash outflows may have different systematic risks and therefore it might be argued that different discount rates should be used to calculate the PSC, rather than the risk-free rate.

While it is true that projects with net cash outflows may have different systematic risks, the calculation of the PSC for a particular project is used to compare private sector bids for that project. The PSC is always based on the benchmark project that assumes that government is retaining all the systematic risk inherent in the project.

The betas assigned to each private sector bid are based on the systematic risks transferred to the private sector relative to those risks included in the PSC.

The PSC calculated for a particular project is not used to compare with other projects or to determine the actual funding costs for government. Therefore, the systematic risks relative to other projects are not required to be assessed, or included, in the discount rate at the PSC stage of the analysis.

Appendix A: Glossary

The following are explanations of terms used in the Use of Discount Rates in the *Partnerships Victoria* Process Technical Note.[20]

Asset beta	A measure of the systematic risk of an asset, which reflects the degree to which asset returns are expected to vary with returns of the market as a whole.
Asset residual value risk	The risk that events such as loss events, technological change, construction of competing facilities or premature obsolescence will occur, with the result that the economic value of the asset may vary, either during or at the end of the contract term, from the value upon which the financial structure of the project is based.
Asset-specific risk	Risk that is specifically attributable to the asset.
Availability payments	A payment made to the service provider, based on the availability of the asset. This is irrespective of any demand for, or usage of, the asset.
Beta	A measure of the variability of returns against the market as a whole which can be used for equity, firms or groups of assets. However, for the purposes of this Technical Note, beta is used interchangeably with asset beta.
Bid evaluation	A process by which proposals by private sector parties are evaluated, including evaluation against the Public Sector Comparator.
Borrowings	*See Debt*
Capital asset pricing model (CAPM)	An economic model for valuing stocks by relating systematic risk and expected return. Based on the idea that investors demand additional expected return (called the risk premium) if asked to accept additional risk.
Commonwealth Bond rate	*See Long-term bond rate*
Core service	A service that is integral to the operation of the asset or project and which government chooses to provide direct.

[20] These explanations are not necessarily the same as definitions adopted in authoritative documents, such as accounting standards. However, at the time of publication, they are not inconsistent with such definitions.

Correlation	A measure of how closely two variables move together through time.
Cost of capital	The opportunity cost of an investment, i.e. the rate of return that an investor would otherwise be able to earn at the same risk level as the investment that has been selected.
County Court	The Victorian County Court, Melbourne, Victoria, opened May 2002, is referred to as the County Court in this publication.
Covariance	The correlation between two variables times the standard deviation of each.
Debt	A liability or obligation owed to another person, or persons, and required to be paid on demand or by a specified date.
Default risk	The risk of the failure of a party to perform a contractual requirement or obligation, including failures to meet deadlines, to perform to a specified standard, to meet a loan repayment or to meet its obligations in relation to a materialised risk.
Demand risk	*See Market risk*
Design/Construction risk	The risk that the design, construction or commissioning of the facility or certain elements of each of these processes, are carried out or not carried out in a way which results in adverse cost, time and/or service delivery consequences. The consequences if the risk materialises may include delays and/or cost increases in the design, construction and commissioning phases, or design or construction flaws which may render the infrastructure inadequate for effective service delivery, either immediately or over time.
Discount rate	The rate used to calculate the present value of future cash flows.
Discounted cash flow (DCF) analysis	A general term for analysis which discounts a stream of future cash flows in order to calculate a net present value.
Diversifiable risk	Risk that is specific to an asset that may be reduced or even eliminated by the use of diversification.
Diversification	Investment in a range of assets with the aim of reducing the risk of the total portfolio, i.e. gains from some investments offset the losses from other investments.
Diversified portfolio	A portfolio that has achieved a reduction in diversifiable risk by investing in a range of assets.
Equity	Shareholders' funds or total assets less total liabilities

Equity beta	The asset beta adjusted to reflect the capital structure of the entity.
Evaluation discount rate	The discount rate used to assess the Public Sector Comparator and/or private sector bids.
Financial asset	A non-physical asset, such as a security, certificate, or bank balance.
Financial benchmark	A standard, used for comparison.
Financial risk	The risk that the financial return on an investment will vary from that expected.
Inflation risk	The risk that inflation will vary from forecast, which may impact on the expected costs and revenues of the project.
Infrastructure	Fixed capital assets, such as schools and hospitals, which support the provision of services. Infrastructure can also refer to a network of reticulated services such as roads, energy services, rail, airports, etc.
Long-term bond rate	The prevailing market rate for ten-year Commonwealth Government bonds.
Market return	The return achieved by investment in the market as a whole or in a portfolio representing the whole market.
Market risk	The risk that the demand or price for a service will vary from that initially projected, so that the total revenue derived from the project over the project term varies from initial expectations.
Market risk premium	The additional return required by investors to be exposed to the systematic risk of the project.
Material impact	An impact of significant proportions.
Material systematic risk transfer	The transfer of a material level of the systematic risks of a project.
Mean	A statistical average, calculated by dividing the sum of a set of values by the number of values.
Net cash inflow	Projects where the total cash flows to government in the reference project are positive.
Net cash outflow	Projects where the total cash flows to government in the reference project are negative.

Net present cost (NPC)	The equivalent cost at a given time of a stream of future net cash outlays (calculated by discounting the actual values at the appropriate discount rate).
Net present value (NPV)	The equivalent value at a given time of a stream of future net cash inflows (calculated by discounting the actual values at the appropriate discount rate).
Nominal cash flows	Cash flows which are adjusted to include the impact of inflation. Differ from real cash flows.
Nominal discount rate	A discount rate used to discount nominal cash flows, i.e. a rate that includes inflation.
Non-diversifiable risk	*See Systematic risk*
Non-systematic risk	*See Diversifiable risk*
Opportunity cost	The cost of passing up one investment in favour of another.
Present value	The value of a series of future cash flows discounted to today's dollars.
Pre-tax cash flows	Cash flows before income taxes have been deducted.
Price risk	The risk of volatility in the price of services over the life of the project.
Private party	The private sector entity with which government directly contracts. Traditionally the private party has been a special purpose vehicle created specifically for the purposes of the project. The private party is not limited to this form and can be set up under a number of structures, including a joint venture and a trust structure. Behind the contracting party, however, there may be a number of private sector interests at play, seeking to be represented through the contracting party.
Probability distribution	A curve that shows all the values that a random variable can take and the likelihood that each will occur.
Project payment mechanism	The mechanism for the calculation of service payments. This includes the key service levels and abatement criteria.
Project rate	The discount rate used to assess the project cash flows.

Public Sector Comparator (PSC)	The Public Sector Comparator (PSC) represents the most efficient likely public procurement cost (including all capital and operating costs and share of overheads) – after adjustments for Competitive Neutrality, Retained Risk and Transferable Risk – to achieve the required service delivery outcomes. This is used as a financial benchmark for assessing the potential value for money of private party bids in *Partnerships Victoria* projects.
Raw PSC	The base costing under a public procurement where the underlying asset or service is provided directly by the public sector on the same terms and defined performance standard required under the output specification. It does not include any allocation of value for risks and contingencies retained by government, which may affect cash flows.
Real cash flows	Cash flows represented in current day terms, i.e. no adjustment for inflation is made for future cash flows.
Real discount rate	A discount rate used to discount real cash flows, i.e. a rate that does not include inflation.
Real risk premium	The risk premium adjusted for the effects of inflation.
Reference project	The most likely and efficient form of public sector delivery that could be used to satisfy all elements of the output specification.
Retained risk	The value of those risks or parts of a risk that government proposes to bear itself under a *Partnerships Victoria* arrangement.
Risk	The chance of an event occurring, which would cause actual project circumstances to differ from those assumed when forecasting project benefits and costs.
Risk allocation	The allocation of responsibility for dealing with the consequences of each risk to one of the parties to the contract, or agreeing to deal with the risk through a specified mechanism which may involve sharing the risk.
Risk band	A classification of the level of systematic risk that is generally evident within certain projects/sectors.
Risk-free	An asset/liability whose future return/payments are known with certainty.
Risk-free rate	A theoretical interest rate that would be returned on an investment which was completely free of risk. The long-term bond rate is used as a proxy for the risk-free rate.

Risk matrix	A method of presenting all possible significant risks likely to be encountered in a project, the magnitude and likelihood of the risks occurring, their areas of impact, the allocation of risks between parties and the risk mitigation techniques to be employed.
Risk premium	The amount required to compensate an investor for assuming a particular risk attached to an investment proposal.
Standard deviation	A statistical measure of historical volatility.
Systematic risk	Market-wide risks that affect all asset classes and cannot be reduced by diversification.
Tax (Income)	Involuntary payment to Commonwealth Government based on a defined income level.
Time preference	A reflection of the time value of money, which results in a preference by investors to receive funds sooner rather than later.
Transferable risk	The value of those risks (from government's perspective) that would be retained by government in the reference project but which are likely to be allocated to the private party under a *Partnerships Victoria* delivery method.
Value for money (VFM)	A quantitative and qualitative assessment of the costs and benefits of public versus private provision of services.
Variance	A measure of the spread of returns when compared to an average or 'mean'. Calculated as the square of the standard deviation of returns.
Weighted average cost of capital (WACC)	A measure of the cost of capital calculated by weighting the marginal cost of each type of capital (i.e. debt, equity, etc.) by the proportion of that type of capital in the firm's capital structure.
Whole market portfolio	A fully diversified portfolio of assets that moves in line with, or is comprised of, a weighted average of all assets within the market.
Whole-of-life risk-inclusive cost	The total cost of a project, which takes into account all costs and risks across the entire time period of the project.

Appendix B: Discount rates for the PSC and bids – material systematic risk transfer

As outlined in Chapter 6, for most *Partnerships Victoria* projects it is recommended that the same discount rate, the project rate, is used by government for the PSC and to assess bids. This process is straightforward and is not addressed further in this appendix.

However, for those *Partnerships Victoria* projects where it is considered that material systematic risk is transferred, estimation of an adjusted discount rate to evaluate bidders' cash flows may be warranted.

B.1 Projects with net cash inflows

Where the net cash flows to government are positive, then a conventional use of the CAPM is appropriate, i.e. the higher the systematic risk inherent in government's net cash inflows, the higher the discount rate applied to those specific cash flows. Examples of projects where government would receive a net cash inflow if delivered by government (i.e. the PSC scenario), include the Melbourne Casino and the City Link toll road.

An example of the effect of different betas and therefore different discount rates, in DCF analysis is shown below.

Example – Net cash inflow to government

Consider two projects with the same net cash inflows to government, but with different systematic risks inherent in each set of cash flows. Government's cash flows for Project A have higher systematic risks, and therefore will have a higher discount rate. This results in a lower NPV[21] than for Project B whose cash flows to government have lower systematic risks. The difference in NPVs reflects the different systematic risks inherent in government's cash flows to be received from each project. Tables B1 and B2 demonstrate this theory.

Table B1: ***Partnerships Victoria* example bids – projected cash inflows and risk to government**

Project cash inflows, $m	Total	Year 1	Year 2	Year 3	Year 4	Year 5
Bidder A High systematic risk borne by government	**50**	10	10	10	10	10
Bidder B Low systematic risk borne by government	**50**	10	10	10	10	10

[21] A positive NPV represents a net cash inflow.

Table B2: *Partnerships Victoria* example bids – risk level, discount rate and net present value (NPV) to government

Project	Beta	Discount rate*	NPV $m
Bidder A High systematic risk borne by government	1.0	9.0%	**38.9**
Bidder B Low systematic risk borne by government	0.3	5.0%	**43.3**

* Note: Discount rate assumes: risk-free rate of 3.0%;[22] market risk premium of 6.0%;[23] rounded to nearest whole number.

Project B provides a greater risk-adjusted NPV to government and so would be preferred over Project A.

B.1.1 Discount rate for PSC

Where the net cash flows to government are positive, the discount rate used to calculate the PSC is based on the assumption that government retains all the project's systematic risks. The resulting beta calculated in the CAPM is known as the asset beta and the discount rate (R_a) is defined as the project rate. This should be calculated as in Chapter 6.

B.1.2 Discount rate for assessing bids

For a *Partnerships Victoria* project which is to be delivered in conjunction with the private sector, government's net cash flows will be bid by each private sector provider.

The discount rate used to assess government's net cash inflows reflects the proposed transfer of systematic risk from government to the private sector provider. This transfer or allocation of systematic risks will be set out in the proposed contract between the two parties, and therefore the beta for each bid may vary depending on the level of risks accepted by each provider.

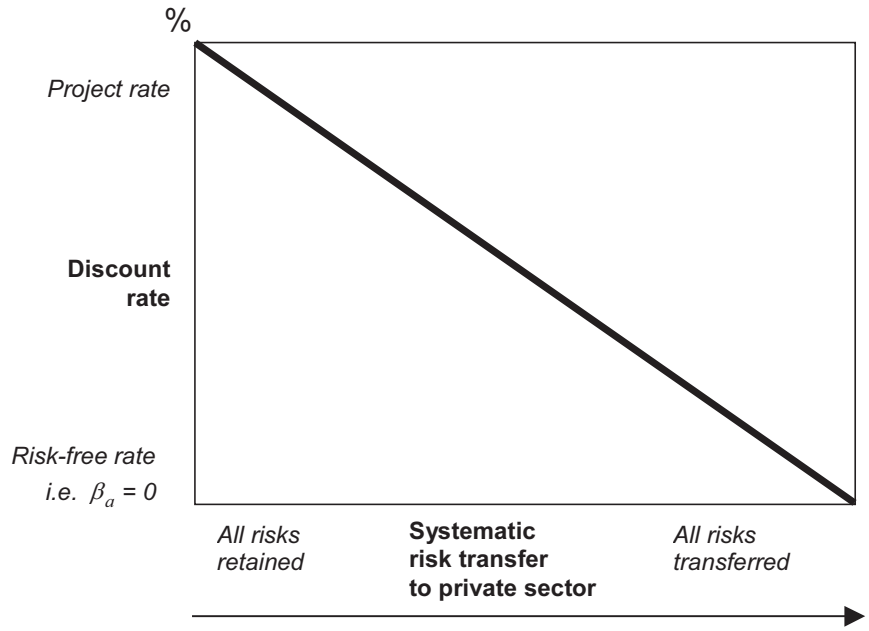
As government's cash flows will be subject to less systematic risk than those cash flows estimated for the PSC, the discount rate used to assess the private sector bids will be less than the project rate.

The following graph demonstrates the calculation of discount rates used to assess government's net cash inflows from a project delivered in conjunction with the private sector. In practice, a discount rate could be determined from the graph and applied to government's net cash inflows.

[22] The risk-free rate will be reviewed from time to time by DTF and a revised rate will be published via www.partnerships.vic.gov.au when considered necessary.

[23] Officer, R. 'The Cost of Capital for the State of Victoria: a Synopsis'. Paper commissioned by the Department of Treasury and Finance, May 2001, p. 6 and confirmed in recent discussions

Figure B1: Discount rate calculation – net cash inflow to government



B.2 Projects with net cash outflows

Projects with negative cash flows, i.e. net cash outflows or net payments, are typical of government projects in the social infrastructure field. Examples include prisons, hospitals and transport interchange projects. For these projects, the approach used above to discount government's cash flow profile cannot be used in the value for money test.

By using the standard methodology to calculate discount rates for net cash outflow projects, other things equal, a more risky net cash outflow would be assigned a higher discount rate, resulting in a lower NPC. Other things being equal, this would make the higher risk project appear preferable to a lower risk project, whereas, a rational party would prefer the lower risk project.[24] This principle is outlined in Table B3.

Table B3: *Partnerships Victoria* projects with net cash outflows – risk level and net present cost (NPC)

Please note: This is an example of the incorrect determination of discount rates for projects with net cash outflows.

Project/Option	Year end cash cost			NPC
	Year 1	Year 2	Year 3	
Project A – Low risk	10	10	10	At 3.0%, $28.3m
Project B – High risk	10	10	10	At 7.0%, $26.2m

[24] Refer to Section 8.3 for an example of this incorrect use of discount rates in discounted cash flow (DCF) analysis.

B.2.1 Discount rate for PSC

For the purposes of establishing a PSC to compare private sector bids and to ensure a rational outcome for projects with net cash outflows, the risk-free rate should be used to discount government's PSC cash flows.

The use of the risk-free rate as a discount rate is valid in this context for determining a benchmark, the PSC, for which private sector proposals can be tested. The purpose is to ensure that government is obtaining the best value for money in delivering the project.

The NPC value of the PSC calculated using the risk-free rate will not give an estimate of the true cost to government of delivering the project, as the risk-free rate does not represent government's actual cost of capital.

In addition, government's use of the risk-free rate in determining the PSC is:

- **not** stating that the government investment is riskless
- **not** stating that the asset beta of the underlying assets is zero
- **not** stating that government intends to borrow to fund the project and the borrowing rate represents the cost to government of undertaking the project.

For net cash outflow projects, the use of the risk-free rate as a discount rate for the PSC:

- recognises that the standard methodology used to calculate discount rates provides an irrational outcome when used for projects with net cash outflows
- allows the discount rate used to assess private sector bids to be adjusted, depending on the allocation of systematic risk between government and the private sector.

This approach has been chosen because of its relative simplicity, together with its ability to yield appropriate rankings of the PSC and bids.

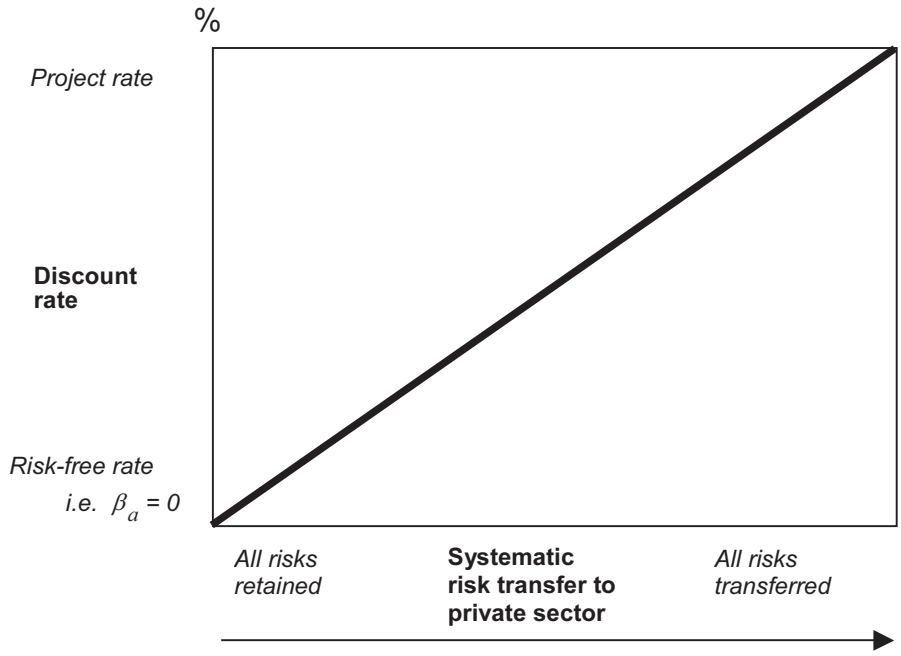
B.2.2 Discount rate for assessing bids

In comparing the financial cost of a private sector bid with the PSC, the transfer of more systematic risk to the private sector is preferable (other things equal) for government. For the DCF analysis in net cash outflow projects, a higher beta, and therefore a higher discount rate, should apply to government's net cash outflows where greater systematic risk is transferred to the private sector. The higher discount rate results in a lower NPC to government.

Conversely, lower risk accepted by the private sector provider is an adverse result (other things equal) and therefore the beta will be lower, resulting in a lower discount rate. The lower discount rate results in a higher NPC to government.

Figure B2 demonstrates the calculation of discount rates used to assess private sector bids for projects with net cash outflows. Again, the discount rate could be determined from the graph and applied to government's net cash outflows.

Figure B2: Discount rate calculation – net cash outflows to government



An example of the effect on projects with net cash outflows of different betas is shown below.

Example – Net cash outflow to government

Consider a project with two different private sector bids (Bidder A and B). Both bids request government to make the same net cash outflows, though each bid transfers a different amount of systematic risk to the private sector.

The proposed cash flows for Bidder A have more systematic risks transferred to the private sector than for Bidder B. Therefore, government's cash flows in Project A are subject to less systematic risk being retained by government and for comparative purposes, will be assigned a higher beta than Project B.

The higher beta results in a higher discount rate for Bidder A and therefore a lower NPC[25] to government for Bidder A. Tables B4 and B5 demonstrate this.

[25] Net present cost (NPC) represents a net cash outflow or may also be considered as a negative net present value (NPV).

Table B4: Example *Partnerships Victoria* projects – cash outflows by year and risk levels

Project cash outflows, $m	Total	Year 1	Year 2	Year 3	Year 4	Year 5
Bidder A High systematic risk transferred to private sector Low systematic risk borne by government	**(50)**	(10)	(10)	(10)	(10)	(10)
Bidder B Low systematic risk transferred to private sector High systematic risk borne by government	**(50)**	(10)	(10)	(10)	(10)	(10)

Table B5: Example *Partnerships Victoria* projects – risk levels, discount rates and net present costs (NPC)

Project	Beta	Discount rate*	NPC $m
Bidder A High systematic risk transferred to private sector Low systematic risk borne by government	1.0	9.0%	**(38.9)**
Bidder B Low systematic risk transferred to private sector High systematic risk borne by government	0.3	5.0%	**(43.3)**

* Note: Discount rate assumes: risk-free rate of 3.0%;[26] market risk premium of 6.0%;[27] rounded to nearest whole number.

As shown in the example above, Bid A has a lower NPC to government and therefore would be preferred over Bid B. This corresponds with the systematic risk transferred, as Bidder A transfers more risk to the private sector than Bidder B.

[26] The risk-free rate will be reviewed from time to time by DTF and a revised rate will be published via www.partnerships.vic.gov.au when considered necessary.

[27] Officer, R. 'The Cost of Capital for the State of Victoria: a Synopsis'. Paper commissioned by the Department of Treasury and Finance, May 2001, p. 6 and confirmed in recent discussions.

Appendix C: Case study – Victorian County Court

The market riskiness (or systematic risk) of a project is measured through the sensitivity of its returns to market movements. This measure is defined as the asset beta (β_a) and forms part of the capital asset pricing model (CAPM) formula:

$$R_a = R_f + \beta_a (R_m - R_f)$$

This appendix provides assistance with calculating the asset beta to apply to private sector bids in cases where a *Partnerships Victoria* project transfers material systematic risk to the private party (see Section 6.2).

The following material was originally prepared by the Melbourne office of Deloitte Touche Tohmatsu, with support from the Allen Consulting Group. The methodology outlined was part of a larger report considered by a Heads of Treasuries forum in mid-2002.[28] It has been reproduced, largely unaltered, with permission.

Case study – Victorian County Court

This appendix is designed to provide practitioners with an example of the practical workings of the methodology, based on a real-life project. Please note that this example is for illustrative purposes only and should not be taken to reflect the actual decision-making, or actual results of the project team's deliberations. Nor should it be taken to be a critique of the project team's work or the outcomes achieved.

The following project summary, which is based on publicly available information, aims to take practitioners through each step of the methodology to demonstrate how it should be applied in practice and also discusses the critical issue(s) that should be considered.

C.1 Victorian County Court project – background

The Victorian County Court project was initiated in the late 1990s by the government of the time. The service requirements, however, were changed in 1999-2000 to comply with the incoming government's new *Partnerships Victoria* policy.

Consistent with *Partnerships Victoria* principles, government will continue to provide all services relating to the administration of justice, notably case list management, registry court reporting and recording. This is dealt with in more detail below.

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[28] Submission to the Heads of Treasuries Working Group on the Cost of Capital, Melbourne, 19 July 2002

The previous Victorian County Court comprised a central court facility spread over five CBD locations, and a number of circuit courts in suburban and regional Victoria. The Victorian Government recognised that the central County Court facility had a number of inadequacies requiring high priority improvements. In particular, the facility had become outdated and its overall capacity needed to be increased to meet a projected increase in demand for court services in the Melbourne CBD over the next 20 years. Given the difficulties experienced by government in providing best practice judicial administration in the existing outdated County Court, it sought to involve the private sector in delivering non-core services on a value for money basis. The aim was to help reduce waiting times for court appearances, provide better security for the judiciary and all other court users, and reduce court costs through the use of new technology.

On 8 June 2000, the Liberty Group Consortium Pty Ltd (TLG) was contracted to provide accommodation and other support services to the Department of Justice (DoJ) at Melbourne's new $140 million County Court building over a 20-year term. The assumed economic life of the building was 80 years. TLG will provide DoJ with essential services related to the effective functioning of the building, such as building security, maintenance and information technology.

C.2 Overview of the main features of the project

It is the State's responsibility to ensure that the court services continue seamlessly during transition from one facility to another.

Broadly the core objectives of government for the County Court project have been defined as follows:

- fix the backlog in the existing outdated Court
- improve service quality and access to justice
- ensure court services continuity
- ensure consistency with government requirements
- improve court productivity
- provide a cost-effective solution – value for money (VFM).

Government required the private sector to take the long-term ownership risk of the new Court facility. The private sector was required to undertake the financing, design, construction and specified ancillary service delivery for the new facility. The government indicated that it was prepared to enter into a 20-year contract with the private sector to provide accommodation and specified ancillary services. Beyond providing support for planning and other approval processes, it was not the intention of government to provide guarantees to the project, other than those provided as part of the ordinary commercial arrangements. Overall, the government objective was to minimise the extent of its risk exposure. The underlying commercial arrangements for the new facility reflect government's view that it is in the business of providing core court services, not providing the underlying asset.

C.3 Applying the methodology

Step 1: What are the systematic risks in the project?

The important questions that need to be considered by the practitioner in relation to systematic risks are:

(i) What are they?

(ii) How important is the risk?

(iii) Who is bearing the risk?

The factors likely to contribute to the systematic risk inherent in a project are covered in Section 4.2.2. There are a number of sources of information available to practitioners to assist in identifying the nature and extent of systematic risks inherent in the project and identifying who is bearing the risk. Useful sources of information for identifying systematic risks are the project agreements, the project risk allocation matrix and the project payment mechanism. In the context of the County Court project, the following information is relevant.

Commercial terms reflected in the project agreements

The project agreements provide useful information to assist in identifying systematic risks and on how risk is to be shared between the parties.

In the context of the County Court, the principal contract is the Court Services Agreement (CSA). It governs the relationship between the State and TLG in respect of:

- the design, construction, and maintenance of the new County Court
- the availability of the courts
- the ongoing provision of ancillary court services over the contract term.

In addition to the CSA, the other principal agreement which is an indicator of ongoing risk sharing is the crown lease. Under a ground lease, the State will make the land available to the private sector operator on a 99-year lease. This is considered to be equivalent to 'ownership' and was to be an essential 'selling point' to allow equity investors to take a long-term view of the asset.

TLG in turn will build, own and operate the project to provide accommodation services to the State to enable it to carry out proceedings in relation to the County Court of Victoria. The complex includes 46 courtrooms, judges' chambers and other non-courtroom areas such as jury accommodation and witness facilities. The contract also provides some flexibility to construct an additional eight courtrooms (by fitting out levels 8 and 9 of the Court tower).

The buildings are effectively leased to the State for 20 years from the completion of their construction under the CSA. Following termination of the CSA (but while the site lease is still in operation), the site need not be used for the provision of a County Court. It can be used for any purpose by law except uses prohibited under the relevant planning schemes. It is not until the 99-year ground lease expires that the building and land revert to the State.

Risk allocation matrix

The risk allocation matrix for the project (as generally found in the final business case or project contract documentation) provides a high-level overview of key project risks, including systematic risks, and how they are allocated.

In the context of the County Court project, the following summary of the generic project risks identified the possible systematic risks:

(i) Design/Construction risk – rests with TLG. Government makes no payment during the development period. Government does not accept capex cost over-runs except in some discrete circumstances.

There may be an element of systematic risks, such as unexpected inflation, or increased risk of downturn caused by broader economic factors, but these risks lie with the private sector.

(ii) Operating costs – Accommodation charges to DoJ are fixed based on usage over the term of the CSA, with the actual costs of delivering the outputs borne by TLG. Full payment by DoJ is based on availability of courtrooms to agreed performance standards, and an abatement regime applies where these standards are not met. From a government perspective, it has been provided with a total fixed cost for the facility over the term of the CSA. Maintenance and IT funding allocations have been included in the total cost.

There may be an element of systematic risks, such as unexpected inflation, unexpected broader economic factors which may impact on costs for TLG, or impact on the demand for services and the payments to be made by DoJ.

(iii) Demand risk – The new facility will have 46 courtrooms. Average demand was 37 courtrooms with a peak of 42 rooms. The major driver for additional courtroom usage is the appointment of additional judges, each requiring a courtroom to conduct hearings. Based on historical data, it is expected that new judges will be appointed to fill the capacity of the facility over the term. An element of demand risk sits with TLG, as the base fee is based on minimum agreed reservation of courtrooms, established on current average demand. In addition, two extra floors have been added to the facility to provide for further growth. This is at TLG risk – government has first option on this space at five-year intervals.

There is an element of sharing of the systematic risk. How important this is can be determined from an analysis of the payment mechanism and the potential variability of the payment streams.

(iv) Financial risk – borne by TLG. To maximise returns to equity, TLG is looking to non-government income for returns. The financial structure is aimed at the isolation of quality cash flow stream to allow debt at low margins.

There may be an element of systematic risks, such as unexpected inflation and unexpected broader economic factors, which may impact on costs or revenues for TLG, or demand risk caused by changes to general economic activity. (How this is allocated will be discussed later.)

(v) Asset residual value (asset ownership) risk – The new facility is purpose-built for the County Court with an additional two floors for growth if required. There are no automatic extensions/options to renew the contract beyond the existing term. Government has the flexibility to renegotiate a new term and the facility could be redundant in 20 years if court services become ‘virtual’ or more

regionalised in delivery. Furthermore, there is no transfer back to government at the end of the CSA and therefore TLG is taking significant residual value risk. Government has purchased outputs so that the risks of depreciation, technical obsolescence, maintenance and refurbishment of the assets rest with TLG.

There is an element of systematic risk in that the facility may not have the residual value at termination of the contract that was originally estimated by TLG in the financial structure to support the project. (In practice most of the asset residual value risk is likely to be of a non-systematic nature.)

Project payment mechanism

TLG will receive the court service payment from DoJ (see Table C1) in the form of a fixed-use payment, court reservation fees (subject to a minimum court reservation amount) and court usage fees (subject to the number of court days booked).

Table C1: Components of fees payable by government under the Court Services Agreement

Services		Basis of charge
Accommodation services		
Accommodation services charge	Court usage fee	Usage fees (dependent on days reserved or booked)
	Court reservation fee	Fees (dependent on court days reserved, but must be a minimum of 8400 court days per annum)
CPI-adjusted	Fixed-use payment: Non-courtroom area fee	Fixed accommodation charge
	Building services payment	According to building services schedule
Court services		
Court services fee	Fixed service payment	According to service contracts
CPI-adjusted		

Following a review of the project payment mechanism in light of the overall contractual arrangements and indicative risk allocation, the following additional comments are made:

Accommodation services charge (ASC)

- Court reservation fee (CRF) – Government has guaranteed an annual reservation of courtrooms based on current usage levels, i.e. 8400 courtroom days. This fee primarily covers TLG's debt and maintenance commitments. As a result of this guarantee, the potential impact on the variability of TLG's revenue stream caused by broader economic factors has been mitigated, i.e. the risk that demand/usage will not reach guaranteed levels remains with government.

- Court usage fee (CUF) – This represents approximately 15% of government payments to TLG. Daily usage fees are agreed for the term. The risk to TLG is that government will not use courtrooms at the level the provider has assumed. From a government perspective, this element of the fee structure will assist to drive cultural change within judiciary, as a greater understanding of the commercial implications of their hearing schedules and judicial supervision emerges. As a result of this arrangement, government has transferred an element of demand/usage risk to the private sector operator and this should be reflected in the discount rate used to evaluate private sector bids.

- Other payments – a fixed monthly amount allocated on a zoned basis for non-courtroom areas, plus a fee to cover accommodation costs such as maintenance and refurbishment. CPI adjustment protects the provider from systematic risks inherent in unexpected general price movements.

Court services fee (CSF)

- This indexed payment stream covers various IT and security services and also provides for IT refurbishment and replacement over the term (initially five years). The contracts for IT and security services provide for CPI indexation. Therefore, the service contractors are protected from systematic price risk, (but are exposed to specific price risk, i.e. the risk that the movement in their costs does not track general inflationary price changes).

In summary, the identified systematic risks for the County Court project and their indicative allocations are:

Table C2: Allocation of systematic risks – Victorian County Court project

Type of systematic risk	Private	Public	Explanation
Demand	√	√	The base fee is based on minimum agreed reservation. The revenue risk, driven by demand/usage of courtrooms, is shared between the parties.
Inflation		√	Both the accommodation service charge and the Court services fee are subject to indexation. Therefore, government is taking inflation risk.
Asset residual value (asset ownership)	√		The facility is purpose-built and TLG has assumed significant residual value at the end of the contract term. This has enabled TLG to price services favourably to government over the term of the contract but allocates significant risk to TLG, requiring the provider to either renegotiate extensions post year 20 or find alternative use for the facility. In addition, the nature of delivery of justice services may change over the next 20-30 years which may result in the County Court becoming obsolete in its designed structure, and this forms part of the overall asset residual value risk taken by TLG.

Type of systematic risk	Private	Public	Explanation
Downturn in broader market	√		As a result of the base payment arrangements, government is effectively providing a floor to the operator and guaranteeing the revenue provided to TLG to cover debt and operating costs, provided that the operator makes courtrooms available. The operator (TLG) is taking the risk that demand/usage will meet growth expectations so as to generate normal equity returns. Therefore, the provider is assumed to be predominantly taking default risk.

The analysis above identifies the systematic risks in the project and provides sufficient information with which to move to the next step in the methodology.

Proceed to Step 2.

Step 2: Are predominantly all the systematic risks in the project borne by the public sector?

Where there are systematic risks in a project, the methodology requires an assessment of the systematic risks and consideration of who will bear them.

In the context of the County Court project, there are clearly a number of systematic risks and various forms of sharing between the parties, as shown in the summary table (Table C2).

The methodology requires an assessment of whether 'predominantly all' systematic risks are borne by the public sector. The County Court project is for a 20-year term. Over that period the parties may be exposed to unexpected economic events, which may impact upon the project costs, revenues and underlying asset values. The primary systematic factor, which may cause significant variability in the cash flows of the project, is the level of demand risk caused by factors in the broader economy. The private sector operator is sharing usage/demand risk sufficiently to suggest that the public sector is not bearing predominantly all systematic risks.

Exactly what proportion of systematic risks is being borne by the public and private sectors will be discussed later. At this stage it is evident that the public sector is not bearing predominantly all systematic risks and we should move forward to Step 3 of the methodology.

Proceed to Step 3.

Step 3: Identify project rate

Where a material level of systematic risk will be transferred to the private sector, then the methodology requires that a project rate needs to be determined that reflects the systematic risk of the project itself (irrespective of who undertakes it).

Determining the project rate

To assist the implementation of the methodology, a number of broad 'risk bands' with associated risk premiums are included in Section 5.3.1.

To initially calculate a project rate it is necessary to consider the type of project being undertaken and identify the appropriate risk banding. The County Court project essentially involves the provision of justice facilities, as distinct from administration. The responsibility for the delivery of core judicial services is to remain with the government.

Using the table on risk bands, the indicative asset risk level for a project like the County Court would be low, based on the emphasis on property/facility management in the project. This assessment assumes that the County Court has sufficient alternative uses for broader commercial usage. If it were assessed that the facility was so purpose-built that its alternative uses were limited, then a higher classification may be appropriate. Expert property guidance may be appropriate in order to enable practitioners to have a fully informed view.

Calculation of the project rate

Applying the broad bands indicated in the table, the appropriate project rate would be calculated as follows:

- R_f is the risk-free rate = 5.3% nominal or 3.0% real
- β_a is the asset beta = 0.3 (based on low risk profile rating of project)
- Market risk premium ($R_m - R_f$) = 6% (based on accepted market practice)

Therefore the project rate (R_a) for the purpose of establishing a cost of capital encapsulating all systematic risks is:

$$R_a = R_f + \beta_a (R_m - R_f)$$

Project rate = 3.0% + 0.3 x 6%

= 4.8% real

or 7.2% nominal (i.e. – the required return on assets)

On this basis, the systematic risk premium for this particular project is 1.9% nominal – the difference between the project rate (7.2%) and the risk-free rate (5.3%).

Please note that the need for a more precise project-specific discount rate has not been considered for the purpose of this illustrative case study.

Proceed to Step 4.

Step 4: Are predominantly all the systematic risks in the project borne by the private sector?

Where predominantly all the systematic risks identified in Step 1 are transferred by the public sector to the private sector, then the appropriate discount rate, is the project rate and the remaining steps in the methodology are not required. This rate applies to the evaluation of any private sector proposals (for that project) where the public sector has transferred out predominantly all the systematic risks.

In the context of the County Court project, there are clearly a number of systematic risks evident in the project with various forms of sharing between the parties, as shown in Table C2.

The methodology requires an assessment of whether 'predominantly all' systematic risks are borne by the private sector. The County Court project is for a 20-year term. Over that period the parties may be exposed to unexpected economic events, which may impact on the project costs, revenues and underlying asset values. The primary systematic factor, which may cause significant variability in the cash flows of the project, is the level of demand risk caused by factors in the broader economy. The public sector is providing certainty for a minimum level of demand but the private sector operator is sharing usage/demand risk sufficiently to suggest that the private sector is not bearing predominantly all systematic risks.

Exactly what proportion of systematic risks is being borne by the public and private sectors will be discussed in the next step. Where there is sharing of systematic risk between the parties, the methodology requires an apportionment of the systematic risk premium.

At this stage, it is evident that the private sector is not bearing predominantly all systematic risks and we should move forward to Step 5 of the methodology.

Proceed to Step 5.

Step 5: Evaluate the proportion of systematic risk transferred by the public sector

By their very nature *Partnerships Victoria* projects will involve some form of risk sharing between the public and private sector. Efficient contracting requires that risk is allocated to the party which can manage the risk at the lowest cost.

The key task is to apportion the systematic risk premium between the parties to the project based on the levels of systematic risk sharing.

Identifying the proportion of systematic risk

If the *Partnerships Victoria* contract does not transfer predominantly all systematic risk to either the public or private sector then the appropriate discount rate to use in evaluating bids will lie somewhere between the PSC (risk-free) rate and the project rate.

Based on analysis and discussion, there is clearly some systematic risk transfer from the government to the private sector. How systematic risk is allocated between the public and private sectors is fundamental to determining the appropriate discount rate to adopt for the evaluation of private sector bids. The critical question is how much overall risk has been transferred and what proportion of the systematic risk premium should the private sector be allocated to compensate them for taking on this risk?

The key test is to establish which party will bear any variation in cash flow and return as a result of the systematic risk allocation. As the methodology indicates, to identify the proportion of systematic risk borne by the parties and allocate the systematic risk premium, a simple two-stage process is required:

(i) Assess the relative importance of each of the systematic risks.

(ii) Assess how the risk is allocated between the parties.

To assist practitioners to estimate the amount of systematic risk transferred to the private sector and therefore the systematic risk premium to add to the risk-free rate so as to arrive at the evaluation discount rate, a table (Table C3) has been assembled at the end of this appendix.

Based on the approach in the methodology, the following comments on the systematic risks identified in the County Court project are provided to assist in completing the table. For the purposes of the illustration, assume that forecast operating revenue for the facility is $10 million per annum (excluding any minor potential third-party revenue) and forecast operating costs are $7 million per annum (including debt service costs).

(i) Demand risk

- **Assessing relative importance.** The length of the service agreement is 20 years. A contract term that long may present difficulties in forecasting demand/usage requirements.

  The proportion of fixed costs to forecast revenue is 70% ($7m/$10m), which potentially exposes the private operator to significant variability of cash flow from changes in the broader economy. Therefore it is reasonable to conclude that the importance of demand to cover these fixed costs is high.

- **Assessing allocation.** Government is providing one floor under demand risk, via the court reservation fees. Hence, TLG has a degree of revenue certainty, and therefore DoJ is retaining a proportion of demand risk, as it will have to pay a fee regardless of actual usage.

  On the other hand, TLG has at risk up to 15% of its revenue stream if actual usage is less than planned, assumed or projected. On the basis that government is providing a guaranteed floor and that equity return is at significant risk depending on growth assumptions, the risk of demand is assessed as shared between the parties.

(ii) Inflation risk

- **Assessing relative importance.** For a contract arrangement with a term of 20 years, the potential cash flow impacts of inflation could be significant. The importance of inflation risk is assessed as medium on the basis that at least 20-30% of the fixed operating costs would relate to debt service costs and it is assumed that the private operator would enter into long-term hedging arrangements to mitigate the impact of variability on debt service obligations.

- **Assessing allocation.** The government has predominantly retained the systematic risks of unexpected inflationary impacts by agreeing to have payment obligations to TLG indexed at CPI. Government has however transferred the initial potential systematic factors associated with planning, design, and construction of the facility, caused by unexpected economic events impacting upon time and cost overruns, to the private sector and any costs (e.g. insurance, hedging etc.) associated with the potential likelihood of such events would have been incorporated in the private sector cash flows (the charge to government).

(iii) Asset residual value risk

- **Assessing relative importance.** The contract term of 20 years represents approximately 25% of the estimated useful life of the County Court facility. The importance of asset residual value is assessed as medium based on the present value of the facility in year 20 (i.e. capital costs of $140 million depreciated on a straight line basis over an 80 year useful economic life would have a constant dollars value in year 20 of $105 million. The present value of this amount (at the project rate) would be approximately $23 million or 16% of the original capital cost. Therefore the potential importance of broader economic factors impacting on asset values may be significant to the private operator (depending on which factors were incorporated into service pricing, alternative use options etc.).

- **Assessing allocation.** The residual value risk of the facility has been transferred to the private sector owner (TLG) on the basis that there is no transfer to government at the end of the contract term. The asset may not readily have alternative usage if DoJ does not wish to enter a new contract, and the overall site lease is for a term of 99 years. On this basis the asset residual value risk is with the private sector operator.

(iv) Risk of downturn in the broader economy

- **Assessing relative importance.** Events that may occur in the broader economy could increase the risk of insolvency and adversely affect suppliers and/or customers of the private sector operator, potentially impacting on the private sector's ability to continue to provide the service for which it has been contracted. However, given the commercial arrangements in the County Court project, the importance of such events to the private operator is not likely to be major.

  The operator is not dependent on a particular customer base (outside DoJ), mitigating the variability of the cash flows. Furthermore, alternative suppliers are available in the market should the current suppliers to TLG be affected by broader economic events. Therefore, the overall level of importance of a general economic downturn is assessed as low.

- **Assessing allocation.** Government is guaranteeing a certain level of demand for courtrooms. The revenue from this will cover debt and operating cost commitments. TLG equity returns are based on the provider's growth expectations, which are a function of broader economic events, and therefore the risk of economic downturns is assessed as predominantly with the private sector operator (TLG).

  Based on the analysis in Step 1 and the commentary above, Table C3 summarises the proportion of systematic risk borne by government and the proportion of the systematic risk premium to be transferred to the private sector as compensation for taking some of the systematic risks.

Table C3: Victorian County Court example project – Proportions of systematic risk transferred to the private sector

Systematic risk type	Weighting (Scale 1 – 3)*	Estimated portion of project risk premium**	Allocation of risk based on Step 1 analysis		Project risk premium transferred to private sector %
	Based on relative importance	Project risk premium 1.9% (per Step 3)	Public	Private	
Demand	3	0.7	0.5	0.5	0.4
Inflation	2	0.5	1		0
Asset residual value	2	0.5		1	0.5
Default/insolvency	1	0.2		1	0.2
TOTAL	**8**	**1.9**			**1.1**

* Scale 3 – High importance based on significance/impact on project cash flow or returns; Scale 2 – Medium importance based on significance/impact on project cash flow or returns; Scale 1 – Low importance based on significance/impact on project cash flow or returns.

** Estimated portion of project risk premium is calculated as in the following example:

Systematic risk type:	**Demand**
Weighting:	3
Total of weights:	8
Per cent allocation of demand risk:	38%
Total project risk premium:	1.9%
Demand risk per cent x Total project risk premium:	0.7

Calculation of evaluation discount rate

On the basis of this analysis, in aggregate, the public sector has transferred the majority of the systematic risk factors to the private sector. The systematic risk premium for a project like the County Court was estimated at 1.9 percentage points, and of this, 1.1 percentage points are carried by the operator. Therefore, the appropriate discount rate for the purpose of evaluating private sector bids with the contractual obligations specified as above would be 6.4% (i.e. risk-free rate of 5.3% plus the proportionate share of the systematic risk premium of 1.1 percentage points).

Appendix D: Bibliography

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