Australian Government

Department of Infrastructure and Regional Development

National Public Private Partnership Guidelines
Volume 5: Discount Rate Methodology Guidance

August 2013

National Public Private Partnership Guidelines
Volume 5: Discount Rate Methodology Guidance

August 2013

Components of the Guidelines

National PPP Policy Framework

National PPP Guidelines Overview

National PPP Detailed Guidance Material

    Volume 1: Procurement Options Analysis
    Volume 2: Practitioners' Guide
    Volume 3: Commercial Principles for Social Infrastructure
    Volume 4: Public Sector Comparator Guidance
    Volume 5: Discount Rate Methodology Guidance
    Volume 6: Jurisdictional Requirements
    Volume 7: Commercial Principles for Economic Infrastructure
    Roadmap for applying the Commercial Principles

Document Updates

This Policy will be updated from time to time to reflect evolving best practices and lessons learned.

Version control	Last updated	Updated sections
1	December 2008	Original publication
2	August 2013	Changes to section 3.3 following a review of asset beta factors. Revised Table 2 to incorporate a range. Other consequential changes in the guideline.

Ownership of intellectual property rights in this publication

Disclaimer

Creative Commons licence

Use of the Coat of Arms

Contact us

Note: This Guidance focuses upon the development of the discount rate for Social Infrastructure projects, i.e. projects with net cash outflows for government. Appendix D sets out the required approach for Economic Infrastructure projects, i.e. user pays.

Note: This Guidance focuses upon the development of the discount rate for Social Infrastructure projects, i.e. projects with net cash outflows for government. Appendix D sets out the required approach for Economic Infrastructure projects, i.e. user pays.

Table of Contents

Glossary

Term	Definition
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.
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.
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.
CPI Bonds	A form of debt instrument in which the coupon is comprised of a real payment and an adjustment for CPI. This type of debt instrument protects investor's real returns.
Design and Construction Contract	A relatively common form of construction contract in which a contractor provides a fixed price, in response to a project brief, for a construction project. The contractor normally bears most risks, including price and timing, related to the delivery of assets.
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, ie, 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 Beta	The Asset Beta adjusted to reflect the capital structure of the entity.
Expected Value	The Expected Value for a cash flow item is the probability weighted average of all potential outcomes for that item.
Financing Decision	Having made the decision that an investment is a worthwhile investment, the decision as to the best VFM procurement route. In the context of this Guidance the decision is between a traditional public sector delivery and a PPP.
Investment Decision	An economic decision based on society's preferences as to which projects should proceed. The Investment Decision decides if an investment is worth making and takes into account alternative uses of government spending.
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).
Net Revenue Project	A project where the Public Sector receives net revenue from the delivery of services to the community. E.g. construction of road or bridge by the public sector where users will be charged a toll for use of the asset. This toll covers all capital and operating costs of the public sector in delivering the infrastructure related services and

Term	Definition
	results in no net cash outlay by the Public Sector over the life of the project.
Non-Systematic Risk	See Diversifiable risk
Payment Mechanism	The schedule to the Project Agreement that sets out the payment arrangements under a PPP contract between public and private sector. This schedule normally includes, detailed proposals about the timing of payments and the methodology for varying payments over time, such as in line with inflation.
Project Agreement	The principal agreement in a PPP contract governing the contractual arrangements between government and the private sector operator of the infrastructure and provider of services. The Project Agreement establishes the risk transfer for the project.
Project Rate	The Project Rate represents the required return from any project in which all Systematic Risk lies with the private sector. The Project Rate serves as the basis for the determination of the appropriate Discount Rate for specific projects (irrespective of any risk sharing).
PPP Project Documents	All of the documents governing a PPP arrangement including the Project Agreement and associated schedules (such as the Payment Mechanism), services specification and output specification.
Public Private Partnership (PPP)	Public Private Partnership – arrangement where the Public Sector enters into a contract with the private sector to deliver public infrastructure based services where significant upfront capital investment in assets is required.
PPP Discount Rate	The PPP Discount Rate is the Risk-free Rate plus that portion of the Systematic Risk Premium transferred to the private sector as compensation for the Systematic Risk borne by them.
Public Sector Comparator (PSC)	A benchmark against which VFM of private sector bids is assessed. It is typically a cost estimate based on the assumption that assets are acquired by the Public Sector through conventional funding and that the procurer retains significant managerial responsibility and exposure to risk.
PSC Discount Rate	The PSC Discount Rate is normally the Risk Free Rate.
Project Specific Risk	See Diversifiable Risk.
Risk Free Rate	The Risk Free Rate is the return on capital that investors demand on riskless investments (that is, those that yield a constant return regardless of what is happening in the economy), and the accepted estimate for this is the long term Public Sector bond rate. For the purposes of this guidance a nominal Risk Free Rate is used to determine the PSC Discount Rate and the PPP Discount Rate. This rate should be developed at the state level as described in Section 4.
Reference Project	The assumed structure under which the PSC will be delivered. This includes the method of delivering the design and construction phase and of delivering the whole of life services. This might be 'unbundled' such as separate design and construction, or bundled, such as through the use of a Design & Construction contract. The Reference Project makes key assumptions about the quality of the deliverables and outputs under the PSC. The PSC represents the 'costed' Reference Project.
Service Fee	The amount payable by government to the private sector under a PPP arrangement. This is governed by the Project Agreement and the Payment Mechanism. This is normally a periodic payment

Term	Definition
	(typically monthly or quarterly) payable following commercial acceptance (when the asset is in a condition that is acceptable for the services phase to commence).
Soft Services	Services associated with the facilities management of a project, normally including items such as cleaning, catering and pest control, normally including a high labour component and not intrinsically associated with the capital assets. These services, where transferred to the private sector under a PPP arrangement, will normally be subject to market testing and/or benchmarking arrangements under the PPP contract.
Systematic Risk	Market-wide risks that affect all asset classes and cannot be reduced by Diversification.
Systematic Risk Premium	The Systematic Risk Premium represents the difference between the Risk Free Rate and the Project Rate. Represents the amount required to compensate an investor for assuming particular Systematic Risk attached to a project.
Value for Money (VFM)	A quantitative and qualitative assessment of the costs and benefits of public versus private provision of services.

1 Executive Summary

1.1 Overview

For specific processes during a PPP project, Discounted Cash Flow (DCF) Analysis is required to compare different cash flow streams. This guidance provides specific recommendations on calculating and using Discount Rates when undertaking DCF analysis for the purposes of:

- Evaluating the Public Sector Comparator (PSC)
- Evaluating Public Private Partnership (PPP) bids.

These two processes are required to assist in determining whether government can obtain better Value for Money (VFM) by:

- Delivering the project itself through more traditional means, the whole-of-life, risk-inclusive cost of which is estimated by the PSC; or
- Delivering the project through a PPP, 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.

This Discount Rate Guidance for Public Private Partnerships Projects ('Guidance') provides a methodology ('Methodology') for the development of the Discount Rate used to assess the relative VFM of the PSC compared to the PPP – this is the Financing Decision. The underlying principle is that the Investment Decision has already been made, ie the investment has merit and should proceed, and the only decision under consideration is whether to procure the project through traditional means or PPP.

This Guidance focuses upon the development of the discount rate for Social Infrastructure projects, ie, projects with net cash outflows for government. Appendix D sets out the required approach for Economic Infrastructure projects, ie, user pays.

1.2 Evaluation Fundamentals

In the evaluation of the cash flows of the PSC and the PPP all key factors relevant to the decision need to be considered for a practitioner to be able to make a rational decision. The practitioner will be concerned with the following:

- If the PSC and the PPP cash flow provide the same level of service, quality, project scope, risk etc. then the lowest cost option will be preferred; and

- If the PSC and the PPP cash flow have the same level of costs and benefits, then the lowest risk option will be preferred.

In simple terms evaluation needs to take into account matters including, scope, quality, service, cost and risk. Consider the following:

- The PSC cash flow has a cost of $100. In developing this cost no allowance has been made for the impact of demand risk
- A PPP cash flow has a cost of $105. Under the Project Agreement some demand risk has been transferred to the PPP provider and, as a result, is reflected in the Service Fee payable to the private sector.

In this evaluation the practitioner will need to consider the value the government places on demand risk and whether the additional cost of the PPP is a price worth paying for the transfer of this risk. The concept of creating a like-for-like comparison in the evaluation of the PSC and the PPP cash flows is the central principal on which this Guidance is based.

1.3 Summary of Recommended Approach

The Methodology is based upon the following core principles:

- All (or nearly all) projects have Systematic Risk
- That Systematic Risk will be borne by either the Public Sector, the Private Sector or shared
- Only Systematic Risk is reflected in the Discount Rate (ie, not Project Specific Risk which may be reduced, or eliminated through diversification)
- Where Systematic Risk is transferred under the PPP, the Discount Rate used for the PSC and the Discount Rate used to evaluate competing bids under a PPP will differ according to the Systematic Risk borne by each party.

This approach requires the use of the Capital Asset Pricing Model (CAPM) to determine the amount of Systematic Risk in the project. It then uses a modification in the application of CAPM to determine an appropriate Discount Rate to reflect the value to the Public Sector of the Systematic Risk transferred under each of the PSC and the PPP.

In simple terms, an adjustment is made to the Risk Free Rate to reflect the extent to which Systematic Risk is transferred under the PPP option. If the PPP Project Agreement leads to Systematic Risk being transferred from the Public to Private Sector, the Discount Rate needs to be adjusted to reflect the additional risk transferred under the PPP option. This will normally result in the PPP discount rate being higher than the PSC Discount Rate and this Discount Rate is termed the PPP Discount Rate.

1.4 Overview of Methodology

The following summarises the Methodology:

- Projects with no Systematic Risk in the cash flows, ie, equivalent to the PSC, should be discounted at the PSC Discount Rate, typically the Risk Free Rate

- For projects with Systematic Risk in the cash flows:
    - The CAPM is then used to assess the level of Systematic Risk associated with the project
    - An assessment is made of the level of Systematic Risk transferred to the Private Sector under the PPP project
    - The modified form of CAPM is used to quantify the adjustment required to the Risk Free Rate to compensate for Systematic Risk transferred
    - PPP cash flows should be discounted at the PPP Discount Rate.

This approach requires a project specific Discount Rate to be developed for each project. The appropriate PPP Discount Rate is a function of the scope of the project, the Systematic Risk it faces and the level of risk transfer required under the project documentation (subject to the private sector's acceptance of those risks). Therefore it is conceivable that:

- The PPP Discount Rate for each bidder will be different, depending on the relative level of risk transfer in its submission (some bidders may accept the government's Systematic Risk transfer proposals in full while others may not)

- More than one PPP Discount Rate may be required for a single bidder. For example, if a bidder submits two proposals, one using a CPI indexed bond with a fully indexed Service Fee and one with Nominal Debt and a partially indexed Service Fee, the level of CPI risk (which is a Systematic Risk) transferred under the two proposals will be different and a different PPP Discount Rate should be applied to each bid.

The use of CAPM requires data to quantify the Project Rate. The CAPM data is provided on a similar basis to guidance material that this Guidance supersedes.

1.5 The use of CAPM

The methodology provides a framework for determining Discount Rates based on the Capital Asset Pricing Model (CAPM).

The Methodology focuses on capturing differential allocation of Systematic Risk as the driver of different Discount Rates between project options. To apply the Methodology, each Systematic Risk is identified and analysed and a conclusion must be reached as to who is taking that risk, the Public Sector, or the Private Sector, or a combination of the two (i.e. shared risk). It is this differential allocation of Systematic Risk to the Public Sector and the Private Sector between procurement options and the correlation with the rate of return that is reasonably sought by the Private Sector that is the genesis of the VFM comparison and the determination of the appropriate Discount Rate.

In negotiating a PPP arrangement, the Public Sector will transfer some, or predominantly all of the Systematic Risk it holds under the PSC to the Private Sector[1]. This reduction in risk is to the benefit of the Public Sector and will come at a cost to the Public Sector, through a higher price in Private Sector bids. As more Systematic Risk is transferred to the Private Sector, a higher Rate of Return is justified. Hence the PPP Discount Rate will exceed the PSC Discount rate where Systematic Risk is transferred.

For context, four Discount Rates are referred to in this Guidance:

- The Risk Free Rate: This is the theoretical rate of return of an investment with no risk and the estimate for this within this guidance is the long term Public Sector bond rate.

- The Project Rate: This is the Discount Rate which represents the required return from any project in which all Systematic Risk lies with the Private Sector.

- The PPP Discount Rate: This is the Discount Rate including Systematic Risk transferred to the Private Sector.

- The PSC Discount Rate: This is the Risk Free Rate where all the Systematic Risk resides with the Public Sector.

---

[1] It should be noted that a core principle of the Value for Money assessment is that risks are allocated to the party best able to manage them. The principle is for optimal not maximum risk transfer.

It is this relationship that underpins the Methodology:

- Where no Systematic Risk is transferred to the Private Sector, the Discount Rate to be used to calculate the NPC should be the Risk Free Rate.

- If all the Systematic Risk is transferred to the Private Sector then the Discount Rate to be used to calculate the NPC of the Private Sector alternative should be the rate determined based on the CAPM approach outlined in the Methodology. This rate is referred to in the Methodology as the Project Rate.

- Where the Systematic Risk is shared between the Public Sector and the Private Sector, then the amount by which the Project Rate exceeds the Risk Free Rate, referred to as the Systematic Risk Premium, and must be allocated between the parties. The more Systematic Risk transferred to the Private Sector, the higher the Discount Rate should be to evaluate that option.

This relationship between the transfer of Systematic Risk and the Discount Rate is applicable to the evaluation of procurement options in PPP projects and differs to the relationship in traditional project "investment evaluation" where, in deciding whether to proceed with a project at all (irrespective of delivery method), the Discount Rate used reflects the social time preference rate and opportunity cost of capital. The Methodology is not concerned with whether or not to undertake the project, it is concerned with determining whether Private Sector procurement alternatives provide a measure of the relative VFM for the amount of Systematic Risk transferred to the Private Sector.

This allocation of the Systematic Risk Premium requires the application of judgement on behalf of the practitioner based on an analysis of the proposed contractual arrangements. The Methodology contains tools that can be used by practitioners to identify the Systematic Risks present in a project, determine their relative importance and correctly apportion these between the parties. In applying the various tools of the Methodology, the focus is on determining the appropriate Discount Rate for use in the assessment of the PPP option, that is, the PPP Discount Rate.

1.6 Cash Flows and the Variance in Returns

Under the methodology the more Systematic Risk transferred, the higher the discount rate. This is an important point. The PSC cash flows are normally developed including the Expected Value of risk, regardless of source, be it systematic or non-systematic (although they exclude uncertainty). However, under PPP arrangements the private sector may share in the Systematic Risk of the project. This risk exposes the PPP cash flows to variability in returns. This variability is priced into the required returns of PPP contractors and is built into the Service Fee. Under the modified form of CAPM this variability in return is compensated through a higher Discount Rate (reflective of the level of systemic risk borne).

1.7 The Decision Tree

The table below provides an overview of the decision process for developing the PPP Discount Rate for the purposes of comparing Private Sector bids:

Figure 1 – Methodology Decision Tree

```
┌────────────────────────────────────────────────────────┐
│ Step 1 – What are the Systematic Risks in the project?  │
└────────────────────────────────────────────────────────┘
                        │
┌────────────────────────────────────────────────────┐      Yes
│ Step 2 - Are predominantly all the Systematic Risks │────────────┐
│                  borne by Government?                │            │
└────────────────────────────────────────────────────┘            │
                        │ No                                        │
┌────────────────────────────────────────────────────┐            │
│              Step 3 - Identify Project               │            │
└────────────────────────────────────────────────────┘            │
                        │                                           │
┌────────────────────────────────────────────────────┐            │
│ Step 4 - Are predominantly all the systematic Risks │            │
│             borne by Private Sector?                 │            │
└────────────────────────────────────────────────────┘            │
            Yes  │         │  No                                    │
    ┌────────────┘         └──────────┐                            │
┌──────────────┐    ┌──────────────────────────────┐    ┌──────────────────────┐
│ Use Project  │    │ Step 5 - Evaluate proportion  │    │ Use Risk- Free Rate (r_f) │
│    Rate      │    │ of Risk transferred by the    │    └──────────────────────┘
└──────────────┘    │         Government            │
                    └──────────────────────────────┘
                               │
                    ┌──────────────────────┐
                    │     Use (r_f) plus   │
                    │      proportion      │
                    │      Systematic      │
                    │       premium        │
                    └──────────────────────┘
```

The Methodology is not entirely formulaic and a number of judgements are required. A structured and robust process, including the use of objective information, is provided to guide practitioners in the exercise of judgement. The process should be transparent and a rational justification should be provided to support decisions made. The experience gained in the application of the NSW Discount Rate Guidance and the Draft Commonwealth Guidance, on which the NSW guidance was based, has provided a detailed insight into the nature of Systematic Risk as it applies to Australian PPP projects and has been used in the development of this guidance, in both:

- supporting an assessment of Systematic Risk transferred for each project; and
- providing practitioners with an evidence base to support assessment of Systematic Risk transferred

Focusing attention on the allocation of Systematic Risks should enable more productive negotiations between the Public Sector and the Private Sector and allow shared understanding of the price of risk.

Applying the Methodology will ensure that:

- the choice of preferred procurement option is made with an appropriate Discount Rate(s);

- decision-makers understand how the Discount Rate was arrived at; and

- the appropriate Discount Rate is used for a given set of cash flows and risk profile.

The suite of publications comprising the Guidelines is as follows*:*

- National PPP Policy Framework

- National PPP Guidelines Overview

- National PPP Detailed Guidance Material

  ➢ Volume 1: Procurement Options Analysis

  ➢ Volume 2 : Practitioners' Guide

  ➢ Volume 3 : Commercial Principles for Social Infrastructure

  ➢ Volume 4 : Public Sector Comparator Guidance

  ➢ Volume 5 : Discount Rate Methodology Guidance

  ➢ Volume 6 : Jurisdictional Requirements

  ➢ Volume 7 : Commercial Principles for Economic Infrastructure

Jurisdictional Requirements Documents will provide details of individual jurisdictional requirements and will need to be read in conjunction with the Guidelines*.*

In addition, there is a *National PPP Policy Framework* that details the scope and application of the Guidelines across jurisdictions.

1.8 Structure of Document

Section 2 covers the supporting theory necessary for practitioners to understand some of the complex background concepts that underpin the Methodology. Material covered in this section includes an introduction to Discount Rates and risk, the treatment of risk in cash flows, the concept of sharing Systematic Risk and the use of CAPM.

Section 3 provides detailed guidance on the Methodology to determine the appropriate Discount Rates for PPP evaluation. In this Section the Methodology is presented on a step-by-step basis. More experienced practitioners, or those that are familiar with the Methodology are likely to rely more on Section 3 in the first instance, referring to Section 2 where necessary.

Section 4 provides details of some specific issues associated with the development of the Discount Rate. In this section the approach to developing the Risk Free Rate and the inflation assumption is set out.

Section 5 provides details on the use of sensitivity analysis. The Guidance requires a sensitivity analysis to be performed to test the sensitivity of the VFM assessment to the Discount Rate selected. The approach to dealing with uncertainty is also established.

Appendices are included as follows:

Appendix A deals with the treatment of Inflation Risk in PPP projects and how different payment structures may give rise to different levels of Systematic Risk;

Appendix B considers the factors giving rise to Systematic Risk in PPP projects and considers how risk is allocated;

Appendix C sets out a detailed Case Study illustrating how the Guidance should be applied;

Appendix D sets out the approach to determining the discount rate for net revenue projects;

Appendix E provides references to useful further reading; and

Appendix F sets out some frequently asked questions.

2 Supporting Theory

There is a considerable body of literature regarding Discounted Cash Flow (DCF) Analysis. Most of this literature deals with the use of Discount Rates in the context of commercial business, or investment evaluation, or for public policy in the cost-benefit analysis of policy proposals. It is not necessary for practitioners to have specialist knowledge of the available techniques and theoretical background to apply the Methodology. While it is assumed that practitioners are familiar with the basic tools and concepts of financial analysis and DCF methodology, Section 2.1 restates some simple DCF concepts, to ensure all readers have a common grounding.

This Section is designed as a reference source to ensure that the theoretical platform of the Methodology is clearly understood and to assist practitioners that do not have a background in this type of financial analysis in applying the Methodology. Once practitioners are familiar with its contents, it is likely that this Section would only be used as a specific reference as required.

For practitioners seeking to undertake further background reading, a list of suggested reference texts and additional guidance material is included as Appendix F.

2.1 Introduction to Discount Rate

What is a Discount Rate and what is it used for?

A Discount Rate is used to convert projected cash flows into a present value to enable comparison of competing options for which the cash flows reflect differences in both timing and amounts. The Discount Rate reflects the Rate of Return expected by an investor to compensate the investor for placing capital at risk in a project.

The DCF methodology follows a process whereby all future cash flows are projected over a given period and then adjusted to a common reference date using the Discount Rate. The Discount Rate reflects the time value of money and the premium that is required by investors in the project to compensate them for the Systematic Risk inherent in the project. Thereby, converting future cash flows into equivalent present cash flows and allowing VFM to be measured between options on a consistent basis. The concept of Systematic Risk is further explained below.

In the context of potential PPP procurement decisions, the Public Sector is choosing between assembling the components of service delivery (often requiring significant upfront capital costs, as well as ongoing operational costs) versus procuring service outputs (often involving regular periodic payments for delivery of a service to agreed service specifications).

> ### Example – Time Value of Money
>
> The following demonstrates the application of Discount Rates in comparing two highly simplified cash flows and why it reflects the time value of money.
>
> In this example we have two cash outflows each totalling $1 500 over five years. Option A incorporates an initial investment of $1 000 in year 0 with anticipated operating cash outflow of $100 in years one to five. In comparison, Option B assumes higher operating cash outflow of $300 in years one to five but without any need for an initial investment in year 0.

Table 1 – Comparison of Alternate Cash Flow Streams

Option A							
	Year 0	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Cash Outflow	1,000	100	100	100	100	100	1,500
NPC @ 10%	1,000	91	83	75	68	62	1,379

Option B						
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Cash Outflow	300	300	300	300	300	1,500
NPC @ 10%	273	248	225	205	186	1,137

The NPC represents the summation of each year's discounted cash flow. Each year's cash flow is discounted by the Discount Rate of 10 per cent per annum for the relevant number of years.

As the above table shows, on a pure cash flow basis, each option has equal merit, as they both require a cash outflow of $1 500. However, on the basis that a dollar today, is worth more than a dollar tomorrow, Option B is more attractive in today's cash terms as the NPC to the Public Sector in today's dollar terms is $1 137, which is lower than the NPC for Option A of $1 379.

Are Discount Rates the same for the Public and Private Sector?

When carrying out initial investment appraisals, to ensure efficient use of resources, Public Sector projects should use the same Discount Rate as the Private Sector for assets of the same risk characteristics.

In the context of procurement decisions within a PPP framework, as the Methodology will show, a different Discount Rate may be used for the PSC and to evaluate competing Private Sector bids to reflect differences in Systematic Risk allocations between the Public and Private Sectors.

2.2 Why risk is an issue in determining Discount Rates

Discussion of risk in project evaluation is mostly about the risk that actual financial outcomes are different from those projected in advance. As outlined above, if two investments are identical, but one contains more risk, the rational investor will take this into account in their evaluation of options.

Practitioners use a variety of approaches to address risk within a financial analysis. These include:

- sensitivity analysis of major variables including Discount Rates and cash flow drivers;

- adjustments to cash flows and/or Discount Rates to reflect perceived risks; and

- utilising categories of Discount Rates such as different rates for expansion of existing projects versus entry into new projects.

Whatever approach is adopted, where DCF is used, a Discount Rate will be required. It is important that its basis is understood and the relationship between the treatment of risk in the cash flows and the Discount Rate is consistent.

In developing the Methodology it was considered desirable that a sound framework be used for objective derivation of Discount Rates. This required consideration of the theory behind the relationship between risk and Discount Rates.

There are a number of established theoretical approaches that can be used to measure this relationship. However, the CAPM was selected as the most appropriate for the purposes of this Guidance. It has a greater level of practical usage, it is simpler to apply and has the greater availability of required reference data. Overall, its attributes were considered to be reflective of current better practice. More detail on the operation of CAPM is provided below.

The premise that underpins CAPM, in the finance theory, is that the Rate of Return from an asset, or investment should compensate owners for risk that cannot be eliminated by Diversification through investing in other assets. This type of risk is called Systematic Risk and is sometimes referred to as market, or non Diversifiable Risk.

Systematic Risk is a measure of the extent to which a particular project's (or asset's) returns are likely to vary relatively more (or less) than a portfolio of projects (or assets) across the market. The measure of Systematic Risk is known as Beta, and will vary from project to project. The Beta determines the additional return that an investor, including a Public Sector investor, would require to compensate them for investing in that project and thereby taking on the Systematic Risk of that project. Beta is discussed further in section 2.5 below.

On the other hand, non-systematic (also known as project-specific or diversifiable) risk can be diversified away by investors and accordingly is not recognised in the Discount Rate. However, such risk, as described in Volume 4: Public Sector Comparator Guidance, should be reflected in the risk adjusted project cash flows.

> **Example – Difference between Systematic and Non-Systematic Risk**
>
> To see the difference between Systematic and Non-Systematic Risks, consider the following:
>
> An ice cream producer sells ice creams on sunny days but not rainy days; an umbrella producer sells umbrellas on rainy days but not sunny days. Thus, an investor in each of these businesses (individually) faces risk from the weather. However, this risk can be diversified (ie, reduced or eliminated) by investing in both businesses because then sales from the portfolio of businesses will be made, regardless of the weather.
>
> On the other hand, it could be that sales of both ice creams and umbrellas are higher in economic booms and lower in recessions. This kind of risk cannot be diversified by investment in other assets, and so is non-diversifiable, or systematic. Practitioners should note that under a PPP arrangement, Systematic Risk could be divested to another party for a price to compensate the party for taking on that risk.

2.3 Treatment of risk in cash flow

The Methodology assumes that the cash flows prepared for the PSC have been adjusted for all project risks. Risk is quantified in the PSC based upon Expected Values, which are inclusive of all risks (systematic and non-systematic). When we refer to cash flows being adjusted for risk we refer to the cash flows being adjusted to Expected Values. This applies regardless of whether the source of the variability is Systematic or Non-Systematic Risk.

Some practitioners consider that including risks in both the cash flows and the Discount Rate is double counting. This is not the case. The cash flows account for risk in the sense of considering all possibilities and deriving a mean, or Expected Value, but do not account for risk in the sense of providing specific compensation for the potential for returns to depart from those Expected Values due to Systematic Risk. For example, a project with a certain cash flow return of $50 per annum would have the same expected cash flow as a project with a 50 per cent probability of $0 return and 50 per cent probability of a $100 return per annum. Therefore, the Expected Value of the cash flows does not reflect the variance of the cash flows due to Systematic Risk, or the co-variance of those cash flows with the cash flows of a portfolio of projects. To the extent that the potential variance is sensitive to Systematic Risk this is taken account of through the Discount Rate.

In estimating cash flows, analysts often incorporate into projected cash flows estimates based on substantial realisation of expectations with little, or no allowance for the potential for the unexpected or unlikely. For example, cash flow projections may be based on a target or budget reflecting what 'should' happen, rather than a realistic balance of probable and improbable outcomes. This approach not only creates problems in terms of potentially biasing financial analysis, but may also suggest insufficient risk analysis to support project development and assessment more generally.

CAPM, upon which the Methodology for deriving the Systematic Risk transferred is based, requires that cash flow projections be adjusted to represent the Expected Value for each component. Ideally, the calculated Expected Value for each cash flow item is the probability weighted average of all potential outcomes for that item. However, in practice, analysts usually find it sufficient to identify a reasonable range of possible outcomes for each item, weight each possible outcome by an assessed likelihood of it occurring and then calculate a mean value to determine the Expected Value for each item. This process is best done as part of, or in close association with, risk analysis of procurement options. It is the Expected Value of cash flows that should be included in a DCF analysis.

Example – Simple Calculation of Expected Value

Suppose that building costs are $500 if the weather is sunny but $1 000 if the weather is rainy. Suppose that three days out of four are sunny and one day out of four is rainy. Sunny days are more likely than rainy days, so the most likely building costs are $500. However, the Expected Value of building costs, which is the correct measure, are calculated as follows: 3/4*500+1/4*1000 = $625. ((the probability of a sunny day is ¾ times the building cost on a sunny day of $500) plus (the probability of a rainy day of ¼ times the building cost on a rainy day of $1 000). Note that all probabilities must add to 100 per cent or 1.)

For more detailed discussion on this issue practitioners should refer to Volume 4: Public Sector Comparator Guidance.

2.4 The concept of sharing Systematic Risk between Private and Public Sectors

One of the prime motivations for Private Sector involvement in public infrastructure, is to instigate risk-sharing arrangements between public and private parties to increase the efficiency of projects and improve VFM. In a PPP framework risks are allocated via contract to the party who is perceived to have the best potential to manage risks of particular types. The party that bears the particular risk should receive the rewards and losses that result from holding that risk.

Generally, a PPP project results in Systematic Risks being shared between the Private Sector and Public Sector, although it is possible that a project could involve all the Systematic Risks being borne by the Private Sector or the Public Sector.

Example – Contrast of Procurement Options

The following example looks at three examples of projects with different levels of Systematic Risk.

Example 1 – the Public Sector pays an inflation indexed fee to the Private Sector for a PPP schools facility. The Service Fee will be adjusted for any over, or under utilisation of capacity. Underlying costs are indexed against specific cost indices. Where the fee adjustment only partly reflects fluctuating utilisation, demand risk is likely to be predominantly borne by the government.

Example 2 – for a Pathology Service the Public Sector pays the Private Sector operator 60 per cent of the required annual fee and pays the operator on a per pathology service basis. In this situation, the Private Sector operator is exposed to a degree of demand risk (for example, if demand for pathology services is much less than forecast due to factors related to the economy as a whole) and therefore demand risk are shared between the parties.

Example 3 – again for a Pathology Service the Private Sector operator obtains 100 per cent of its income on a per pathology service basis and is therefore fully exposed to demand risk and cost fluctuations from inflation. Given the likely Systematic Risks in this situation, demand risk and inflation risk would represent the vast majority of Systematic Risks and these have been transferred to the Private Sector.

Risk sharing may take any number of forms, including explicit guarantees, take-or-pay contracts or cost-plus contracts. They may also take the form of capacity payments formulated to fund the capital costs of the business and to provide an equity return to investors in the Private Sector operator.

It is important that the Discount Rate used to evaluate a Private Sector bid in a PPP project takes account of both the Systematic Risk of the project and the amount of Systematic Risk that is to be borne by the Private Sector, or shared between the parties. If the Private Sector Discount Rate is applied to Public Sector projects without taking into account the reduction in risk due to the risk sharing activities, then the risk of the project to Private Sector investors will be overestimated. If this happens the Private Sector parties will receive a return above and beyond what is due to them having regard to the Systematic Risk they will bear and the Public Sector will pay too much for services received. On the other hand, if the private sector bears systematic risk under the PPP contract and its bid is compared to the PSC which does not include any allowance for Systematic Risk, its submission will be unfairly disadvantaged if the differential in risk between the two options is not specifically addressed.

The PSC represents the cost of the project at its expected outcome. It should not incorporate any cost premium for the Systematic Risk borne by the Public Sector under Public Sector delivery, even where the Reference Project would transfer such risks. Under the modified form of the CAPM the PPP Discount Rate is adjusted to reflect a premium for Systematic Risk transferred from Public to the Private Sector under the PPP arrangement. This 'compensates' the PPP for taking additional risk (over and above the PSC). Accordingly, the Private Sector cash flows under the PPP include Systematic Risk Transferred, this is of benefit to the Public Sector, and the additional risk in those cash flows, ie, higher variability in returns, leads to a premium being calculated under the modified form of CAPM, which is used to identify the risk premium related to the risk Systematic Risk Transferred. This premium compensates the Private Sector for bearing Systematic Risk.

2.5 Systematic Risk and the PSC

In developing this Guidance the treatment of Systematic Risk and the PSC was considered. The PSC Guidance requires that project risks are identified and quantified, regardless of whether they arise as a result of the occurrence of systematic or Project Specific Risk. Clearly where Systematic Risk is transferred to the PPP contractor it bears the risk of the variability in returns and at the very least, in theory, the risk that the returns will vary from expectation will be priced into the PPP Service Fee.

It might be argued that under the PSC Reference Project a similar level of risk transfer is achieved as under the PPP structure. While this is likely to be the case, though perhaps less so than under the PPP structure, the PSC cash flows take no account of the potential variability in outcomes. This variability is normally addressed through the return requirements of private sector investors in PPP projects. This is not normally priced into PPP cash flows through additional return requirements and overall project fees and margins.

In theory if the PSC was developed under a pure cost plus contract structure, and the PPP was a 'hybrid' which was in all respects the same as the PSC except that the construction phase was delivered under a fixed price Design & Construction Contract, then the prices received from the market for the PPP hybrid would need to take into account the Systematic Risk Transferred under the PPP hybrid structure – ie, the PPP Discount Rate would need to include a premium over the Risk Free Rate. For the purposes of example, assume the overall construction risk premium is 0.5 per cent. Under the modified form of the CAPM, if the hybrid PPP transferred 20 per cent of this risk to the hybrid PPP contractor, the risk premium for this element would be 0.1 per cent. If there was another bidder that put forward a full PPP solution and this transferred all of the construction Systematic Risk, then it would have a risk premium of 0.5 per cent. Clearly in this case the difference between the two PPP structures is that the hybrid contains less risk transfer than the full PPP, though it does contain some systematic.

By extending the logic of this example, if the hybrid PPP was the Reference Project for Public Sector delivery, then the additional risk transferred under the expected structure would need to be accounted for in the PSC Discount Rate. It should be emphasised, that this approach relies on the modified form of CAPM. However, it is highly unlikely that the PSC pricing for the D&C component will have taken into account any allowance for the variability in outcomes as a result of the transfer of Systematic Risk. This pricing is normally a business decision and is not reliably captured in the expected cash flows of a hypothetical Reference Project. As a result, no adjustment is normally required to adjust the PSC Discount Rate using the modified form of CAPM.

2.6 PPP created Systematic Risk

It is possible that Systematic Risk may be created through the use of a PPP structure. Intuitively any such risk should not be reflected in the adjustment to the Discount Rate, this will need to be a pricing disadvantage that the private sector needs to address in other components of its bid, such as better risk management.

However, it is unlikely that any created risks will be material. In fact the presence of private sector finance may act to mitigate the impact of Systematic Risk. The additional due diligence and structuring under a PPP project may create structures less rather than more susceptible to Systematic Risks. For example, the use of construction bonds, liquidated damages, retentions, close monitoring and detailed scrutiny of the construction price, mitigates against the potentially negative consequences of a down-turn in the market leading to contractor failure.

Certain financial structures do create additional Systematic Risks. For example, CPI Bonds normally require a Payment Mechanism that transfers less inflation risk than Payment Mechanisms structured around nominal debt. This issue is addressed in Appendix A which sets out the approach for adjusting the PPP Discount Rate for different payment structures.

2.7 Use of CAPM to calculate project Discount Rates

It is important to note that CAPM is applied in its modified form for the derivation of the Discount Rates for the assessment of the PSC versus the PPP. As with other theoretical frameworks, CAPM is a means by which observable market based data can be translated into surrogates for determining future rate of return requirements.

Introduction to CAPM

The following provides an introduction to the theory of CAPM.

An investor expects to receive a return that is equivalent to the Risk-free Rate plus the proportion of systematic (or market) risk that is being taken on by a project. In its simplest form, the CAPM provides a direct estimate of the required return for a project (asset). That is:

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

- R_a is the required return on assets whose risk class is designated by the Beta or Systematic Risk (in the Methodology this is called the Project Rate)

- R_f is the Risk-free Rate

- β_a is the Asset Beta, which reflects the degree that asset returns (ie, returns of a particular project) are expected to vary with returns of the market (ie, a well Diversified Portfolio of assets or projects)

- $(R_m - R_f)$ is the return over the Risk-free Rate (the market risk premium or equity risk premium) that investors would need or expect in order to invest in an asset

It is important to have a sound understanding of the components that make up the Discount Rate and other key project specific issues that may impact on the rate used in certain circumstances.

Risk Free Rate (R_f **)**

The RiskFree Rate is the return on capital that investors demand on riskless investments (that is, those that produce a constant return regardless of what is happening in the economy), and the accepted estimate for this is the long term Public Sector Bond rate.

In developing the discount rate under this guidance the Commonwealth Bond rate should not be used to calculate the discount rate for either the PSC, or the PPP. A nominal risk free cost of debt should be used, referenced to the marginal cost of debt in the particular jurisdiction. This rate should then be adjusted for any Systematic Risk transferred (See Section 5).

Beta Factor (β_a **)**

Beta is a measure of relative risk. A project with a Beta of more than 1 is more risky than the market as a whole and a project with a Beta of less than 1 is less risky. The Beta factor is the expected covariance of returns from a project with the returns of the market as a whole, divided by the variance of returns of the market. (Covariance measures how much the project return and the market return move together).

The risk associated with a project is reflected in the variability or, uncertainty of the cash flows. Therefore, because assets determine the nature of the cash flows and their associated risks, it is the assets that ultimately determine the Discount Rate.

There are two types of Betas used in financial applications, Asset Beta and Equity Beta. Which of these is appropriate depends on the context. The Methodology uses 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 the capital structure or gearing.

Practitioners should be aware that the observable Beta of a company available on common databases is usually an Equity Beta. These Betas are not suitable for use in the Methodology as they reflect a company's financial leverage, or gearing which will cause the Equity Beta to differ from its Asset Beta. For the Methodology it will be necessary to remove the financial leverage (risk) so as to isolate the specific asset risk and identify the required premium for the type of asset being considered.

The Asset Beta reflects the degree that returns or cash flows derived from a particular use of the project are expected to vary with returns of the market (ie, a well diversified portfolio of assets or projects).

In considering PPP projects the Public Sector is not paying a premium to the Private Sector for the risks associated with the financial gearing of the structure. The process of degearing (or deleveraging) an Equity Beta to arrive at an Asset (ungeared) Beta is outside the scope of this document, but for an outline of the process and a discussion on the differences between Asset and Equity Betas practitioners should refer to Brealey and Myers Chapter 9 or Lonergan Chapter 6.

Practitioners should seek professional advice to assist in the identification of appropriate Asset Betas to inform the calculation of specific Project Rates where this is deemed necessary.

Market Risk Premium

The market risk premium (Rm – Rf) represents the "extra" return over the RiskFree Rate that investors require to invest in the market as a whole. For the purpose of examples, the rate used in the Methodology for market risk premium is 6 per cent[2].

Asset Beta

An indicative Beta range is provided in Section 3 which is representative of the risk characteristics of typical PPP availability based social infrastructure contracts. Practitioners should use sensitivity analysis to determine whether the results of their evaluation could be altered by small to medium shifts in the Discount Rate (say +/- 0.5% and 1.0% on the Discount Rate). Jurisdictions/practitioners may determine a more project specific Discount Rate from first principles based on current market data and taking into account the risk profile of a particular project.

2.8 Projects falling into more than one Systematic Risk Category

Another factor to be considered is whether some projects could include two, or more distinctly different sub-components. For instance, a hospital PPP may require a private operator to construct the hospital facility and operate a car park. In these circumstances, it may be appropriate to use more than one Discount Rate. These two projects are quite different with potentially different levels of Systematic Risk.

Where the components are material either a separate Discount Rate should be developed for each sub-component, or an appropriately blended rate should be developed.

Where the sub-components of a project comprise of more than 10 per cent of the overall value of the project, by capital value and/or the NPC of the operating costs and/or by the split of the Service Fee payable to the private sector, the Discount Rate should be adjusted to reflect a blended rate.

For projects in which the cash flows can be separated into individual profiles, with distinct cash flows and risks, the use of a separate rate, applicable to each set of cash flows, should be adopted. This will only be practical in cases where the bidder's cash flows are capable of being separated into distinct streams. In cases where this is possible the Discount Rate should be developed and Systematic Risk assessed for each individual cash flow.

In practice it may be more difficult separating cash flows and individually considering risks. Where this is the case a blended rate will be required. A weighted average of the Discount Rate should be developed based upon the overall contribution of each sub-component to overall Systematic Risks. A range of measures should be used to assess the contribution of each sub-component, including the level of capital and operating costs, management arrangements, etc.

---

[2] MRP is based on generally accepted market practice. The more recent regulatory reviews conducted by the ACCC and government based regulators have adopted a MRP in the range of 6-7%

2.9 Modified Form of CAPM

Whereas CAPM provides a technique for the calculation of the required return for a given investment, the modified form of CAPM is a refinement to the approach for the specific circumstances of assessing the Discount Rate applicable to PSC and PPP cash flows. Starting with the assumption that the PSC cash flows contain no Systematic Risk and the PPP cash flows contain 50 per cent of the overall Systematic Risk for the project, then, if the Risk Free Rate is 5 per cent and the overall Systematic Risk of the project is 2 per cent then the following Discount Rates will apply:

- PSC: Risk Free Rate applies, i.e. 5 per cent
- PPP: Risk Free Rate plus Systematic Risk transferred, i.e. 6% (5% + (50% x 2%))

The modified form of CAPM looks to equate the risks reflected in the cash flows, in this case the PPP cash flows which contain a price inclusive of Systematic Risk, with the Discount Rate.

2.10 The use of precedent information

After the calculation of a Discount Rate with CAPM it will be useful to apply a "sanity" check to the rate. The Relevant PPP Authority should have access to the rates applied on other projects and this should be used to test the reasonableness of the results. However, it should be noted that each project should be expected to have a different level of Systematic Risk depending on its scope, nature and the risk transfer proposals reflected in the project documentation.

2.11 A more detailed approach

The approach outlined above should be followed in most circumstances. However, for particularly large projects, or projects with unique, or unusual Systematic Risks that are not similar to any of the project types in the risk bands, a 'bottom up' assessment of Systematic Risk should be performed.

3 Discount Rate Methodology for PPP projects – Social Infrastructure

This Guidance has been developed specifically for social infrastructure PPP projects. The methodology for establishing a Discount Rate for Economic Infrastructure projects is included in Appendix D.

The specific allocation of Systematic Risk within the PPP arrangement will impact on the appropriate Discount Rate for evaluation and comparison of Private Sector bids. The Methodology is applied by evaluating the proportion of Systematic Risk held by the Public and Private Sectors and using this information to adjust the Project Rate and accordingly to arrive at appropriate PPP Discount Rates to evaluate competing Private Sector bids. Practitioners should note that, where competing bids demonstrate materially different Systematic Risk allocations, this process would need to be repeated on a bid-by-bid basis.

The Methodology requires procuring agencies to focus on what is the best VFM procurement decision for the Public Sector (note – this is not just a Financing Decision). The key issue is how much risk transfer the Public Sector desires to undertake, as part of the proposed procurement and how much of a premium ("compensation") the Public Sector is prepared to pay for that risk transfer in the VFM context. Using the decision tree below, this premium is represented by the difference between the Project Rate and the Risk-free Rate. There is a positive relationship between the amount of risk transferred from the Public Sector and the Discount Rate to be applied to the PSC and Private Sector bids.

The important questions that need to be considered by the practitioner in relation to Systematic Risks are; What are they? How important is the risk? Who is bearing the risk? These questions are addressed in applying the Methodology to arrive at the appropriate PPP Discount Rate for a PPP project. The Methodology is illustrated as a decision tree below.
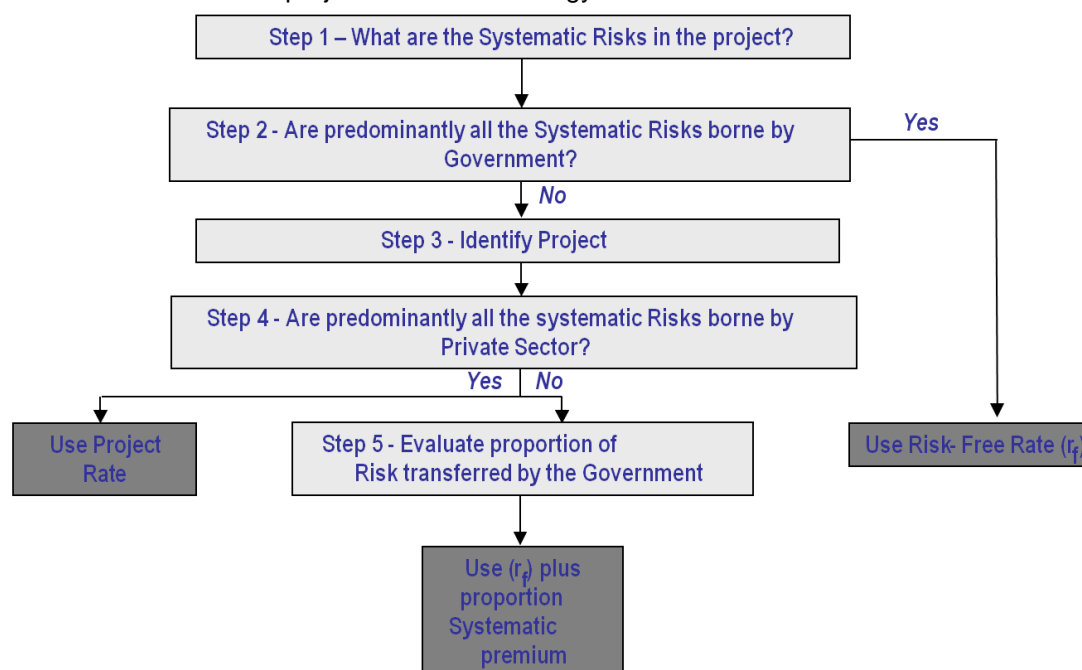
The following pages take practitioners through each step of the Methodology to demonstrate how it should be applied in practice and will also discuss the critical issue(s) that will need to be considered before proceeding to the next step. While the question of the specific allocation of Systematic Risk within the PPP arrangement is not dealt with until Step 5, it is possible to expedite the process where it is clear that predominantly all Systematic Risk is with the Public Sector. This is considered in Step 2.

It is expected that in the majority of cases an adjustment for Systematic Risk transferred will be required.

3.1 Step 1- What are the Systematic Risks in the project?

Practitioners first need to identify the nature and extent of Systematic Risks inherent in the project. The Systematic Risks identified in this step are used throughout the Methodology and provide a link to data obtained from the financial markets for use in CAPM in later steps.

While not an exhaustive list, it is likely that in a PPP project Systematic Risks will mainly be of the following nature:

- **Demand Risk:** That element of demand risk that is related to the level of general economic activity (but not that element of demand risk related to performance of services by an operator). That is, the risk of volatility in general economic activity affecting the demand for the contracted service resulting in the projected returns of the project being below expectations.

- **Unexpected Inflation**: This could be represented by unusually high or low CPI or Average Weekly Earnings that is not funded by the Public Sector. That is, the risk that the real value of payments made, or received during the term of the arrangements is eroded (or increased) by inflation with a diminution (or increase) in returns. This includes both during the construction and operational phase.

- **Residual Value:** This is the impact on the residual value of the assets caused by the unexpected effect of interest rates, currency changes (not the direct impact on the cost of finance or the cost of procurement), or the unexpected effect of changes to market demand/use of assets, or services specific to the project assets. This is the overall risk that either on termination of the services contract, or during the course of delivery of the contractual arrangements, the asset does not have the value originally forecast when the arrangements were established and the cost of services were priced.

- **The increased risk of downturn:** Caused by factors in the broader market. That is, the risk of loss of the ability to provide a service caused by secondary effects arising in the broader economy, which result in the private sector operator no longer having the ability to provide the services as anticipated. For example, this may result in a key supplier / contractor going into administration requiring a replacement contractor to be found. Where the services are specialised this may result in significant disruption to service and additional costs, e.g. as an appropriate alternative supplier is identified.

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. Likely useful sources of information include:

- a review of key commercial terms within the PPP contract agreement will provide the practitioner with a basis for a more detailed analysis of the allocation of Systematic Risks inherent in the project. The key commercial terms may already be documented in a set of project specific commercial principles and will also be reflected in the Project Agreement and Payment Mechanism. Appendix B provides examples of commercial terms that may give rise to Systematic Risk;

- the project risk matrix will identify relevant project risks. Practitioners will need to consider those that are likely to demonstrate the attributes of Systematic Risk. The risk matrix will also indicate how project risks are allocated between the parties. For example who is bearing demand risk, inflation risk and residual value (asset ownership) risk etc; and

- how Systematic Risks manifest themselves in a Project Agreement will also be through the Payment Mechanism that is reflected in the Project Agreement. The Payment Mechanism specified in the Project Agreements will indicate how the actual cash flows of the project are to be formulated, the key variables subject to variability and which party will be impacted. Practitioners will be able to assess what factors are likely to cause variability and the potential for variability in the payments made, or received. Practitioners will then be able to assess how the variability in cash flow resulting from the Payment Mechanism is a result of systematic factors. For example, in relation to the risk of the inflation rate being different from that allowed for in the Payment Mechanism, some of the important questions for the practitioner will be: who will bear this risk?; what is the potential impact on the payments made, or received as a result of this unexpected inflation?; and is this variability significant in terms of the overall cash flow?

Appendix B considers how the Payment Mechanism can give rise to different levels of Systematic Risk and Appendix A considerers, in particular, the impact of different indexation proposals, including the particular issues associated with fully indexed payment profiles.

3.2 Step 2 - Are predominantly all the Systematic Risks in the project borne by Public Sector?

Where predominantly all the Systematic Risks identified in Step 1 are borne by the Public Sector under PPP delivery, the Risk Free Rate applies to private sector bids and the remaining steps of the Methodology are not required. The reason for this is that from the perspective of the Private Sector operator (and its investors) the project has no inherent Systematic Risk (as the Public Sector retains all Systematic Risks). Therefore, no risk premium is required to compensate the Private Sector as no Systematic Risk has been assumed by them in the project.

The circumstances where "predominantly all" the Systematic Risks are borne by the Public Sector will be present where the primary factors that are likely to cause significant variability in the cash flows of a PPP project, such as that level of demand risk, or unexpected inflation risk caused by factors in the broader economy, are clearly borne by the Public Sector and are not transferred under the PPP contract. The necessary information for the assessment will be evident from the matters considered as part of Step 1. This also recognises the fact that practitioners will not have undertaken the complete analysis required in Step 5. It is considered unlikely that this will apply, i.e. there is typically an element of risk sharing and in most PPP projects experience has demonstrated that some Systematic Risk is transferred to the private sector and priced into the PPP bids.

3.3 Step 3 - Identify Project Rate

In circumstances where the Public Sector is seeking to transfer some, or all of the Systematic Risk of a project, it is necessary to first calculate the Project Rate.

3.3.1 What is the Project Rate and what is it used for?

The Project Rate is required to identify the expected return required by the market for undertaking the project and to enable the estimation of the Systematic Risk Premium (i.e. difference between the Project Rate and the Risk Free Rate) which will be apportioned between the parties to determine the appropriate Discount Rate to evaluate competing Private Sector bids. As noted earlier, this premium reflects Systematic Risk only and is important in the application of the modified form of the CAPM.

3.3.2 Determining an appropriate Asset Beta

Selection of an appropriate Asset Beta is an important step in determining the Project Rate. This determination is essentially a matter of judgement. In this context it is worth noting that Asset Betas are not reflective of, or characterised by, physical (or intangible) assets. Rather, they reflect the variability of returns associated with the use to which those assets are put.

Correspondingly, to assist practitioners in identifying an appropriate Asset Beta, Table 2 provides an Asset Beta range representative of the risk characteristics of typical PPP availability based social infrastructure contracts ie projects with net cash outflows for government. This table may be updated from time to time.

The Asset Beta range has not been derived from an examination of private sector companies operating in the relevant industry. Instead the range has been derived from companies that operate in the PPP space and therefore exposed to risks as similar as possible to the PPP cashflows being evaluated, noting that such companies have diverse businesses which also include non PPP activities. This range has also been inferred from relevant and recently concluded PPP contracts. It is recognised that the nature of the PPP contract may alter the Systematic Risk of a private provider relative to purely Private Sector activity. Table 2 is relevant to procurement analysis, which is the main focus of this Volume 5.

Table 2: Procurement Decision - Asset Beta range

Category	Description and risk characteristics	Examples of project category	Asset Beta range	Risk Premium range
Availability-based social infrastructure projects	Key Systematic Risks borne by the PPP relate to inflation risks, market downturn risks and demand risk where it has a material impact e.g. variable demand impacting upon FM and replacement lifecycle costs	• Affordable & student housing • Retirement & nursing homes • Healthcare • Education • Prison facilities • Renewable energy • Technology • Utilities • Telecomms • Roads • Public Transport	0.3 - 0.8	1.8 – 4.8

While the range in Table 2 is a guide, each Project should be assessed on a case by case basis to ensure that an appropriate Asset Beta is selected. It is noted that the level of Asset Beta is relative to the level of Systematic Risk for each project. Care needs to be exercised in the selection of an Asset Beta to ensure that a project's risks are correctly assessed. A detailed analysis of the project and its particular characteristics (eg size, complexity, the range and mix of services provided etc) may be required to understand the Systematic Risks inherent in the procurement's cash flows. An example of how similar assets can be categorised differently 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 'very low' Asset Beta range (0.3) if the emphasis is in providing accommodation and facility services. On the other hand, if the project included the provision of health services, it may not fall into that category and an assessment will need to be made of which end of the Asset Beta range the project falls within.

As an alternative to using the range provided in Table 2 bespoke asset betas can be calculated for specific projects based on market data. This may be appropriate for projects with unique systematic risk profiles.

3.3.3 Identifying a Project Rate

Table 2 also presents the Nominal Risk Premium range which is intended to assist practitioners to select an appropriate Project Rate.

For example, drawing on Table 2, the Project Rate would be derived by adding a premium of between 1.8% pa and 4.8% pa to the Nominal Risk Free Rate, depending on the level of systematic risk transferred under a PPP availability-based social infrastructure contract.

The Nominal Risk Premium is calculated as Market Risk Premium x Asset Beta, where the Market Risk Premium is assumed to be 6.0 per cent.[3]   Jurisdictions may allow for practitioners to determine a specific Market Risk Premium based upon current market data.

3.4   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 to the Private Sector by the Public Sector, the Project Rate applies to the evaluation of any Private Sector proposals and the remaining steps of the Methodology are not required. The reason for this is that from the perspective of the Private Sector operator (and its investors) they have assumed the full Systematic Risk of the project and would require the risk premium to compensate them for bearing the risks.

Where it is evident from the identification of Systematic Risks undertaken in Step 1 that any Systematic Risks likely to be retained by the Public Sector are clearly insignificant to the overall Systematic Risks that have been transferred to the Private Sector, then it is reasonable to proceed as if all Systematic Risk is with the Private Sector. In this case, the Project Rate applies to the evaluation of any Private Sector proposals and the remaining steps of the Methodology are not required.

For most projects there is likely to be risk sharing between the Public and Private Sectors. This will generally result in a lower risk to the Private Sector than if there were no Public Sector involvement. This usually occurs because the Public Sector, in practice, is not able to avoid bearing some Systematic Risk in the project. For example, most Payment Mechanisms include adjustments for CPI risk and for most social infrastructure projects based upon an availability payment structure that the government will normally bear the majority of the demand risk.   As a result, the appropriate Discount Rate to evaluate options will lie somewhere between the Project Rate and the Risk Free Rate, reflecting the fact that some, but not all Systematic Risk have been transferred.

---

[3]   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 subsequent discussions.

3.5   Step 5 - Evaluate proportion of Systematic Risk transferred by the Public Sector

3.5.1 Overview

In the situation where the Public Sector retains some Systematic Risk then the appropriate Discount Rate for evaluating bids will differ from the Discount Rate applied to the cash flows of the PSC (assuming the PSC rate is based on the Public Sector retaining all, or predominantly all Systematic Risks). In addition, the PPP Discount Rate will differ from the Project Rate, which assumes all Systematic Risk lies with the Private Sector.

On this basis, the <u>more</u> Systematic Risk that is transferred to the Private Sector, the higher the Discount Rate should be to evaluate Private Sector bids. Therefore, if little, or no Systematic Risk is transferred (i.e. risk remaining with the Public Sector) then the appropriate Discount Rate is correspondingly lower.

Figure 1 indicates how different levels of risk transfer may be categorised and the PPP Discount Rate derived for PPP decisions. Practitioners will need to review all available information to determine the extent of risk transfer (low, medium, or high). By necessity this will involve the use of judgement and an understanding of the commercial dynamics of the project. Practitioners should ensure that the reasoning behind all judgments is clearly documented.

Figure 1 – Estimating Systematic Risk Transfer Using Categories
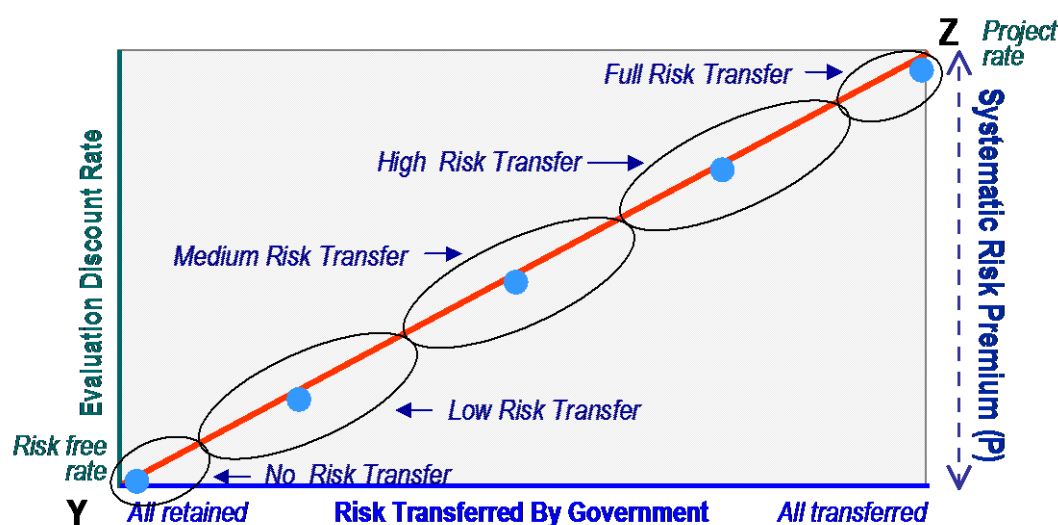
The following sections provide guidance as to the type of factors practitioners should consider, when exercising judgement as to the extent of risk transfer and the importance of various risks. In some areas, both qualitative and quantitative approaches are provided. It should be noted that the quantitative approaches are intended to provide an indication of how practitioners should analyse the relative importance of particular elements. It is not possible in general guidance such as this to pre-determine a set of "rules" that can be applied from project to project. Therefore, practitioners should ensure that quantitative approaches are adapted, as appropriate for the circumstances and that they be considered along with relevant qualitative factors. These factors should be used in conjunction with the analysis of Systematic Risk contained in Appendix B.

3.5.2 Identifying the proportion of Systematic Risk

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. If the PPP arrangement does not transfer all Systematic Risk to the Private Sector, then the appropriate Discount Rate to use in evaluating bids will be less than the Project Rate.

It must be noted that the allocation of Systematic Risk is not an exact science. The basic question for each Systematic Risk is whether, it represents a potentially large proportion of the premium to be allocated and who is bearing the predominant portion of the risk, or is it reasonably shared.

The key test is to establish who will bear any variation in cash flow and return as a result of the Systematic Risk allocation. Depending on the particular project arrangements and the nature of Systematic Risks inherent in a project of its type, there will be a range of factors to consider in order assessing the variability of cash flow and returns.

To enable the identification of the proportion of Systematic Risk borne by the parties, and allocate the Systematic Risk Premium, a two stage process is required:

1. Assess the relative importance (weighting) of each of the Systematic Risks

2. Assess how the risk is allocated between the parties

Completing Table 4 will 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 PPP Discount Rate. The Systematic Risk Premium allocation table will provide a reasonable approximation of the Systematic Risk Premium for each Systematic Risk. The next section provides further guidance to completing the table.

The information required to populate this table will be provided from undertaking the analysis in the earlier steps. A worked example using the table is provided in Appendix C.

Table 4 – Systematic Risk Premium Allocation Table

Systematic Risk type	Weighting (Scale 1 – 5) Column 1	Estimated Portion of Systematic Risk Premium % Column 2	Allocation of risk based on Step 1 analysis Column 3	Systematic Risk Premium Transferred to Private Sector % Column 4
	Based on relative importance			
Demand				
Inflation				
Asset Residual value				
Downturn in broader market				
TOTAL				

Weighting (column 1)

Scale 5 – High importance based on significance/impact upon project cash flow, or returns

Scale 2.5 – Medium importance based on significance/impact upon project cash flow, or returns

Scale 1 – Low importance based on significance/impact upon project cash flow, or returns

---

Allocation (column 3)

Risk is with Public Sector - 0

Risk is with Private Sector - 1

Risk is Shared - 0.5

The Estimated Portion of the Systematic Risk Premium (Column 2) is calculated as the portion of the weighting for each Systematic Risk (Column 1), divided by the sum of all weightings (Column 1), multiplied by the Systematic Risk Premium (as calculated in Step 3). This step cannot be undertaken until all Systematic Risks have been assessed. An illustration of the calculation is provided in Appendix C.

A five-point scale has been adopted for weighting the relative importance of Systematic Risks to ensure that sufficient differentiation is possible between risks, without introducing an unwarranted level of sophistication that a larger scale would imply. For example, it could be that the Systematic element of Demand Risk warrants a weighting of five, where all other Systematic Risks only warrant a relative weighting of one. The principal reasoning for this could be that unexpected levels of demand, that will potentially cause the most significant variability and impact on the cash flow streams of the parties and who is bearing this risk of variability will be extremely important in the context of the overall assessment when compared to the potential impact of other factors.

To enable these assessments to take place, there are a number of questions that need to be answered with respect to each of the identified Systematic Risks. The following pages provide practitioners with guidance to enable them to undertake the required assessments to complete the table and arrive at the portion of Systematic Risk Premium to be transferred.

In undertaking the analysis, where quantitative factors are used, practitioners should use the present value of the relevant cash flow streams (for the purpose of allocation of the premium the cash flow streams should be discounted at the Project Rate).

3.5.3 Demand risk

(a) Assessing Relative Importance

Demand risk is the risk that the demand for the use of an asset will be greater, or less than predicted, or expected as a result of broader economic activity causing unexpected fluctuations in the demand for a good or service provided by that asset. This may be the most important systematic factor in a project and the extent of the potential variability in demand and its impact on the cash flows of the project may be a primary factor influencing the assessment of the overall viability of the project i.e. whether the project is a good investment.

For most social infrastructure PPP projects, while the public sector is normally considered to bear the bulk of Systematic Risk, it is important to recognise that the private sector is normally exposed to an element of demand risk. Even though the public sector is typically required to make payments over time - to the extent that the private sector's performance is satisfactory - changes in demand for the infrastructure can often expose the private sector to material risk. That is, although the private sector usually builds for a fixed capacity, which is nominated by the public sector, they will prepare their bids (and their pricing) in a competitive process on a view of the profile of demand over time. During the contract term, this profile can change significantly, usually due to broader economic, or social factors. The most common example here is that ultimate capacity is reached at an earlier point than expected and maintained for a longer than expected period (or anticipated lulls in demand do not eventuate). For the private sector, this can mean increased maintenance costs and refurbishment costs, or more intensive service delivery such as additional help-desk, cleaning, or waste management services. Often these increases are not reimbursed by the public sector. The public sector would otherwise bear this risk, which would manifest in the same cost pressures.

Similarly, for a schools project, a lower level of utilisation over time might reduce the level of life-cycle investment; lower demand meaning that there is less utilisation of, say, air conditioning systems. Under most PPP contracts this type of under-utilisation would result in a higher return for the PPP contractor.

To assist practitioners to evaluate the potential effects of demand risk in order to assess its importance (significance) and its impact on the cash flow of the project, the following comments on possible factors are provided:

- If the fixed costs of the private operator to supply the service outputs to the Public Sector are high, then the importance of demand to cover these fixed costs is high. This results in higher fluctuations in returns if economic demand fluctuates. The level of revenue certainty will be impact by this assessment.

- Where the private sector bears the cost of increased, or decreased costs associated with changes in demand, such as increased life-cycle maintenance costs where demand increases, but receives no corresponding adjustment in the fee it receives from the government, then demand risk for this factor lies with the private sector.

- There may be instances where there is uncertainty about the level of future demand for the services provided by the Private Sector operator. For example, there may be uncertainty over the extent to which an asset will be used, such as the development of a new school ahead of demand in a growth area. In this case, demand risk will be more significant and who bears it will be highly relevant to determining the appropriate allocation of premium to determine the appropriate Discount Rate. According to CAPM, it is only the Systematic Risk of the school that should generate a return. That is how much the estimate could vary from its Expected Value due to economy wide factors and not the variability that can be caused purely from a lack of information for reliably estimating future use of the facility.

- The length of the contract may influence the significance of demand risk. In general, demand risk will be greater the longer the term of the contract, since it is usually more difficult to forecast for later periods. For example, in a short-term IT contract there may be very little likelihood of demand varying greatly from the levels predicted under the contract. In such a case, demand risk is not significant and little weight should be given to this test.

- A possible quantitative measure of relative importance of demand risk is provided in the following table (the decision criteria and percentages in the table are indicative only and practitioners will need to apply a degree of judgement to adapt these to the specific project):

-

If total fixed costs > 70% as a proportion of revenue	Demand risk is HIGH
If total fixed costs > 30% and < 70% as a proportion of revenue	Demand risk is MEDIUM
If total fixed costs < 30% as a proportion of revenue	Demand risk is LOW

Based on an assessment of the above factors, practitioners can complete Table 3 where:

- Risk is HIGH then place a 5 in the Weighting column (Column 1)
- Risk is MEDIUM then place a 2.5 in the Weighting column (Column 1)
- Risk is LOW then place a 1 in the Weighting Column (Column 1)

(b) Assessing Allocation

Having determined the potential dependence of the project on demand, the next stage is to consider how demand risk is allocated.

Ultimately to identify the party who is bearing demand risk, will depend on the answers to the following interrelated questions:

1. Will the payments to the Private Sector reflect the usage of the asset, or does the Public Sector have to pay regardless of the level of usage?

2. Who will gain if demand is greater than expected, or agreed?

If the Public Sector is obliged to pay for the output, or capacity of the facility (e.g. available places) whether or not it is needed, it will have retained demand risk. Conversely, where PPP payments vary proportionately over all reasonably likely levels of demand, the Private Sector operator will bear demand risk. However, in many cases the PPP provider will be exposed to the impact of under, or over utilisation.

To assist practitioners to evaluate the potential effects of allocation of demand risk to assess its impact on the cash flow of the project and on the party bearing the risk, the following comments are provided:

- The key issue with the allocation of demand risk, is to ascertain what level of Private Sector revenue is at genuine risk due to unknown/unpredictable levels of demand for the use of the asset or service

- It is also important to distinguish where demand risk is significant from a situation where the terms of the contract are such that it is passed to one, or other party. For example, while there may be much uncertainty over the demand for a certain type of asset in the long term, the terms of a long term PPP contract for such an asset may be that the Public Sector will provide a guarantee (or a floor/base level of demand use) to the private operator (provided the service is available for use). In such a case, the Public Sector may have retained the majority of demand risk. Factors to be considered could include the level of the floor/base level of demand in relation to total demand and the cost profile of the Private Sector operator.

- A possible quantitative measure to guide consideration of the allocation of demand risk is provided in the following table (the decision criteria and percentages in the table are indicative only and practitioners will need to apply a degree of judgement to adapt these to the specific project):

If > 70% of project revenues are supported by a level of demand certainty provided by Public Sector	Demand risk is predominantly with Public Sector
If > 30% and < 70% of project revenues are supported by a level of demand certainty provided by Public Sector	Demand risk is Shared
If < 30% of project revenues are supported by a level of demand certainty provided by Public Sector	Demand risk is predominantly with Private Sector

To complete Table 3, where:

- Risk is with Public Sector then place a 0 in Column 3
- Risk is with Private Sector then place a 1 in Column 3
- Risk is Shared then place a 0.5 in Column 3

3.5.4 Inflation risk

Inflation risk is the risk that inflation will be greater, or less than expected with a resultant impact on the real value of the relevant costs/revenues of the Private Sector party. Whilst in the context of the Australian economy the Reserve Bank usually forecasts to maintain inflation within a 2-3 per cent range inflation forecasts can sometimes indicate a higher rate is expected and in terms of the specific inflationary pressures affecting construction and engineering projects, there is often a considerable divergence between CPI and other cost indexes such as LPI and BPI.

Most PPP contracts are based on payment structures linked to an index, typically CPI, though other indices, or combinations may be utilised. At face value increases or decreases in that index are funded by the public sector. However, where the underlying costs within the private sector cost structure move out of line with the index used to adjust the payments then the private sector is exposed to risk. For example, if the payment is indexed at CPI, which is say 4 per cent, but the underlying costs of labour and/or life-cycle maintenance is subject to inflation of 6 per cent, then real returns for the private sector will be eroded.

One could argue that the private sector is protected through benchmarking, or market testing provisions, whereby, typically, Soft Services are tested at intervals of five to seven years, at which point the underlying price of delivering a service is adjusted to align to prevailing market rates. However, even where services are benchmarked, a degree of risk remains with the private sector. That is, services are typically not benchmarked more frequently than at five to seven year intervals, and costs are typically only adjusted when they move beyond a threshold rate of increase above CPI – for example 10 per cent. For this reason, a material degree of cost exposure often remains with the private sector. In addition, there are normally material levels of costs not subject to benchmarking arrangements, in particular life-cycle costs.

Financing also has a significant impact on the degree of inflation risk transfer in a PPP. For example, many PPP projects have been financed with CPI linked bonds. Other PPP projects have been financed using fixed rate bank debt. Fixed rate bank debt includes the market's expectations on long-term inflation and also, importantly, a pricing premium for taking this Systematic Risk. Therefore, a fixed rate bank debt funded PPP involves a greater transfer of Systematic Risk than a CPI linked bond financed PPP. This is addressed in Appendix A.

(a) Assessing Relative Importance

To assist practitioners to evaluate the potential effects of inflation risk to assess the relative importance (significance) and its impact on the cash flow of the project, it may be necessary to consider what is the percentage of total costs that may be impacted by inflation, excluding depreciation and amortisation (i.e. cash costs). It is essential in assessing these factors that all costs subject to inflationary pressure are considered, including:

- construction and engineering costs;
- wages and salaries costs; and
- life-cycle maintenance and building management costs.

A possible quantitative measure of relative importance of inflation risk is provided in the following table (the decision criteria and percentages in the table are indicative only and practitioners will need to apply a degree of judgement to adapt these to the specific project):

If > 70% of total operating costs are operating cash costs	Inflation risk is HIGH

If > 30% and < 70% of total operating costs are operating cash costs	Inflation risk is MEDIUM
If < 30% of total operating costs are operating cash costs	Inflation risk is LOW

(Note – Operating cash costs include wages, overheads, maintenance etc but excludes depreciation & amortisation, or debt service payments)

To complete Table 3 where:

- Risk is HIGH then place a 5 in the Weighting column (Column 1)
- Risk is MEDIUM then place a 2.5 in the Weighting column (Column 1)
- Risk is LOW then place a 1 in the Weighting Column (Column 1)

It would be unlikely to expect that inflation risk would ever be assessed as High.

(b) Assessing Allocation

Having determined the potential importance of inflation on the project, the next stage is to consider how inflation risk is allocated.

Ultimately who bears inflation risk will depend upon whether or not the price variations can be passed onto the Public Sector (or users).

To assist practitioners to evaluate the potential effects of allocation of inflation risk, in order to assess its impact on the cash flow of the project and the party bearing the risk, the following comments are provided:

- If the PPP payment is fixed the risk is borne by the operator.
- If the PPP payment varies with a general inflation or specific indices to reflect likely costs of the operator then the pricing risk is likely to be shared.

Under most PPP arrangements the construction price is a fixed element and any unanticipated inflationary pressure is borne by the private sector. While this risk essentially resides in the short-term of the overall PPP arrangement it is, nevertheless, a potentially significant risk.

In long-term projects, a certain base level of inflation is likely to be assumed. An alternative way to think of inflation risk is to consider who bears the risk of inflation above or below the assumed base amount.

In assessing this risk it is necessary to consider which party bears the risk and the extent to which a party will be exposed if the actual inflation applied to the underlying cash flows differs to that at which the Service Fee varies.

3.5.5 Residual value risk

(a) Assessing Relative Importance

Residual value risk is the risk that at the end of the contract the asset will be worth more or less than expected at the outset and upon which the financial structure of the project is based. In a project involving high upfront capital costs in comparison to the whole of life operating costs, residual value will have a greater level of importance than in the situation where the project involves low upfront capital costs in comparison to the whole of life operating costs although a number of other factors are imported in considering the importance of this risk. These are considered below.

To assist practitioners to evaluate the potential effects of residual value risk to assess its importance (significance) and its impact on the cash flow of the project, it may be necessary to consider what is the proportion of the present value of the residual value in comparison to the upfront capital costs. In addition, other factors to consider will include:

- how specific is the asset?
- what is the potential for obsolescence of the assets?
- what potential is there for technological change?
- what is the period of the contract arrangement compared to the economic life of the asset?

Furthermore, what happens to the asset at the end of the contract term will also influence who is ultimately bearing residual value risk.

In determining the importance of residual value, it is recommended that the assessment is based upon the present value of the nominal written down value of the assets at the end of the project's life under the PPP arrangements. The present value would be calculated using the Project Rate determined in Step 3.

A possible quantitative measure of relative importance of residual value risk is provided in following table (the decision criteria and percentages in the table are indicative only and practitioners will need to apply a degree of judgement to adapt these to the specific project):

If residual value is > 30% of total capital costs	Residual value risk is HIGH
If residual value is > 5% and < 30% of total capital costs	Residual value risk is MEDIUM
If residual value is < 5% of total capital costs	Residual value risk is LOW

To complete Table 3 where:

- Risk is HIGH then place a 5 in the Weighting column (Column 1)
- Risk is MEDIUM then place a 2.5 in the Weighting column (Column 1)
- Risk is LOW then place a 1 in the Weighting Column (Column 1)

The other factor that may be considered in assessing the overall importance of residual value risk is who determines the nature of the asset. The specification of the service requirements by the Public Sector may be such that it provides the Private Sector with little flexibility to design the asset in a way that the asset could be used for alternative purposes, without incurring significant costs. In such circumstances, the party who is bearing the residual value (asset ownership) risk will be bearing significant Systematic Risk depending upon the location of the asset, the length of the contract etc. Furthermore, how the asset is designed and constructed can impact significantly on the operating and life cycle costs of the asset and may also impact upon the actual performance of the asset.

(b) Assessing Allocation

Having decided on the relative importance of residual value risk the next question to answer is who is bearing the risk.

Which party bears residual value risk will depend on the arrangements at the end of the contract.

To assist practitioners to evaluate the potential effects of allocation of residual value risk to its impact on the cash flow of the project and its impact on the party bearing the risk, the following range of different options are provided to assist practitioners in classifying residual value risk:

Option At the end or termination of the Contract	Residual Value risk with Public Sector	Residual Value risk with Private Sector	Residual Value risk is Shared
Asset transfers to Public Sector for fixed, or nominal sum	√		
Asset transfers to a new operator, selected by Public Sector, for a fixed or nominal sum	√		
Asset transfers to the Public Sector, or another operator, at the prevailing market price		√	
Asset is retained by the Private Sector operator		√	
Asset transfers to Public Sector, or another operator, at a sum to be agreed at transfer time but with a floor/ceiling price			√

To complete Table 3 where:

- Risk is with Public Sector then place a 0 in Column 3
- Risk is with Private Sector then place a 1 in Column 3
- Risk is Shared then place a 0.5 in Column 3

3.5.6 Risk of downturn in broader market

(a) Assessing Relative Importance

There is a risk that events may occur in the broader market economy, which increases the potential risk of insolvency and impacts upon suppliers or customers of the Private Sector operator. This is the risk of secondary factors, which ultimately adversely impact on the Private Sector operator and its ability to continue to provide a service. This could manifest itself through a reduction in the level of provision, or increased costs through the procurement of a replacement supplier.

For social infrastructure PPP projects, such as a public hospital, public sector backed fixed (or indexed linked) payment streams tends to insulate the private sector from economic down-turn. Should the public sector decide that for economic reasons, it did not want to continue with the PPP, the private sector is well protected from any cancellation of the PPP contract through the standard compensation set out in the termination clauses.

For example, under a PPP contract if the lead construction contractor is declared insolvent, the PPP provider would be required to replace the construction contractor. Failure to do this would lead to a default style termination event and the project lenders would be at high risk of losing the capital invested in the project. The replacement of the construction contractor is likely to involve significant expense – both in terms of the costs of procuring a replacement contractor and the high likelihood that the replacement contractor will require a higher cost to complete the project, than is allowed in the PPP provider's budget. Under PPP contracts, the responsibility for this risk lies with the private sector; this is applied through the Payment Mechanism, which allows for no increased costs, despite any increased costs faced by the project sponsors and through the termination regime, which are likely to make it uneconomic for project sponsors to abandon the project. In this example, equity returns (and potentially debt) will be eroded by the cost of procuring a replacement, to the extent that the cost of the replacement contract exceeds that originally forecast.

The condition of the economy, both at large and in key sub-groups, has an impact on PPP projects. For example, a down-turn in economic activity may lead to an increase in insolvency risk. Key PPP contractors, such as construction and facilities management companies could be affected.

It is not possible to assess and classify the importance of the risk of insolvency in the broader market in the same manner as the other Systematic Risks. To assist practitioners to evaluate the potential effects of the secondary insolvency risk and to assess the relative importance (significance) and its impact on the variability of the cash flow of the project, it may be necessary to consider the following factors:

- Reliance of the Private Sector on a concentrated customer base.

If the revenue stream of the Private Sector operator is dependent on a limited number of customers (excluding the Public Sector) for a significant proportion of its revenue, then broader economic events may significantly impact upon its business and its ability to earn the desired return then the importance of insolvency events risk is HIGH. A contributing factor may be that the specification of the contracted services is such that the private operator is unable to scale down costs in times of reduced economic activity.

- Reliance on suppliers to provide service

If the Private Sector operator is dependent upon a limited number of critical suppliers who may be significantly exposed to broader economic events which impact upon their costs, or ability to supply, then changes in the broader economy may significantly impact the business of the Private Sector operator and its ability to earn the desired return, therefore, the importance of insolvency events is HIGH.

On the other hand, if the Private Sector operator has a range of alternate suppliers available in the market which provides it with a degree of flexibility in sourcing inputs to provide services and earn its desired return, then the importance of insolvency events risk is LOW.

If events in the economy impact upon suppliers, or customers which have a moderate impact on the Private Sector operator but it is still able to provide a service, albeit with a lower return than desired, then the importance of insolvency events risk is MEDIUM.

To complete Table 3 where:

- Risk is HIGH then place a 5 in the Weighting column (Column 1)
- Risk is MEDIUM then place a 2.5 in the Weighting column (Column 1)
- Risk is LOW then place a 1 in the Weighting Column (Column 1)

Only in extraordinary circumstances would it be likely to expect that this risk would be assessed as High. It would more normally be regarded as a secondary factor in comparison to the other Systematic Risks.

(b) Assessing Allocation

Having decided on the relative importance of insolvency risk in the broader market the next question to answer is who is bearing the risk?

To assist practitioners to evaluate the potential effects of allocation of the risk of insolvency in the broader market to assess its impact on the cash flow of the project and the its impact on the party bearing the risk the following comments are provided:

- In the context of PPP arrangements the risk to the Private Sector operator caused by potential insolvency events in the broader market will generally lie with the Private Sector.
- Only in circumstances where the PPP arrangements with the Public Sector allow for the Private Sector operator to pass through cost increases (a cost plus type arrangement), or where the Public Sector is providing a Private Sector operator with a guaranteed minimum return from providing a service will the impact of risk of insolvency events be shared.

To complete Table 3 where:

- Risk is with Public Sector then place a 0 in Column 3
- Risk is with Private Sector then place a 1 in Column 3
- Risk is Shared then place a 0.5 in Column 3

The risk of the Private Sector operator failing as a result of events in the economy, resulting in its inability to continue to provide a service and the potential cost to the Public Sector of having to step-in and maintain the delivery of services, is not a Systematic Risk and therefore should not be reflected as a proportion of the premium transferred to the Private Sector for the purpose of calculating the PPP Discount Rate. This risk is retained by the Public Sector and should be dealt with in the construction of the PSC cash flows and probabilities as to the likelihood of events occurring and potential cost impacts properly assigned in the cash outflows.

3.5.7 Calculation of PPP Discount Rate

To calculate the PPP Discount Rate the following steps need to be undertaken:

1. To Calculate the Estimated Portion of Systematic Risk Premium related to each Systematic Risk, multiply the portion of the weighting per the Weighting column (Column 1) (i.e. weighting for individual Systematic Risk divided by Total Sum of all weightings) by the amount of the Systematic Risk Premium (as calculated in Step 3) and place the amount in the Estimated Portion of Systematic Risk Premium column (Column 2).

2. To Calculate the Systematic Risk Premium transferred for each Systematic Risk multiply the amount in (Column 3) by the Estimated Portion of Project Premium (Column 2) and place the amount in the Systematic Risk Premium transferred column (Column 4).

3. The Total estimated Systematic Risk Premium transferred, is then calculated by adding the amounts for each Systematic Risk in the Systematic Risk Premium column.

Following the process described above will provide practitioners with the allocated risk premium transferred to the Private Sector.

As a result, practitioners will be able to calculate the appropriate PPP Discount Rate for the purposes of comparing Private Sector bids. The PPP Discount Rate can therefore be calculated as the Risk-free Rate plus the total estimated Systematic Risk transferred (per total of Column 4).

3.5.8 Example

A detailed example is provided in Appendix C.

4 Specific issues associated with use and determination of Discount Rates

4.1 Real vs. Nominal Discount Rates

An important distinction is between nominal and real Discount Rates. Nominal Discount Rates include an allowance for expected future inflation while real Discount Rates do not.   In adopting the Methodology outlined in this Guidance material the recommended preference is for a nominal Discount Rate. However, the choice between nominal and real Discount Rates is optional to practitioners but the key point to keep in mind is to be consistent in whatever approach is adopted. For example, if real Discount Rates are used then the numerator cash flows should be set out in real terms in the Discounted Cash Flow calculation.

4.2 The Risk Free Discount Rate

The Guidance requires the use of a nominal Discount Rate.   There are two common approaches to the development of a nominal Discount Rate:

- Use of a real Risk free rate and convert it to a nominal rate
- Use a nominal Risk Free Rate.

This Guidance requires the use of a nominal Risk Free Rate.

4.3 Nominal Risk Free Rate

A nominal Risk Free Rate should be adopted as the Risk Free Rate. The nominal Risk Free Rate reflects the current cost of debt for both government and private sector and its use avoids any requirement to convert between real and nominal rates. It avoids the private sector suffering any pricing premium or benefit arising from any difference between a derived rate (based upon a Risk Free Rate plus an inflation adjustment) and the rate in the market (the nominal rate).

Under conditions such as those prevalent currently it is appropriate to build the Discount Rate from the observed nominal rate and a balanced view of long term inflation and to place lower reliance on the observed real rates. This allows use of consistent inflation assumptions for the bid cash flows and Discount Rate.

The Nominal Risk Free Rate should be based upon a long-term government debt instrument. Unless the Commonwealth 10-Year Bond rate is equivalent to the cost of debt in the government concerned the Commonwealth Rate should not be used.

4.4 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.

For the purposes of these guidelines, a Market Risk Premium of 6% will usually be employed consistent with current regulatory practice in Australia. Typically the Market Risk Premium 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 Market Risk Premium of 6% can be used for deriving both real and nominal discount rates.

As a nominal Risk Free Rate is used for the purposes of this guidance, the Market Risk Premium will also be applied on a nominal basis.

The Market Risk Premium will be reviewed from time to time and changed if considered necessary.

4.5 Pre-tax vs. Post-tax Discount Rates

As with real or nominal Discount Rates, there also needs to be consistency in the treatment of tax between the cash flows and the Discount Rate.

It is recommended that all cash flows in the PSC be on a nominal pre-tax basis, which is consistent with the approach adopted by the Private Sector and has been adopted in the Public Sector Comparator guidance material.

5 The Use of Sensitivity Analysis

The Guidance recognises that a single Discount Rate cannot be used to evaluate every bid, or capture every risk in an exact and precise manner. As a result, the Discount Rate should be considered as a range, as opposed to a single point estimate.

For every assessment it is recommended that two types of sensitivity tests are performed:

- Uncertainty: Uncertainty is distinct from risk and the costs of uncertainty are normally shared between the private and public sector. The PPP Project Agreement will normally transfer some of the risk of uncertainty to the private sector. An approach to dealing with this uncertainty is set out below.

- Break Even Analysis: In the assessment of bids the break-even Discount Rate should be calculated to consider the overall sensitivity of the VFM proposition to changes in the Discount Rate. A narrow VFM assessment sensitive to small movements in the Discount Rate should lead the evaluator to take additional steps – both quantitative and qualitative to provide a robust VFM assessment.   This is also considered below.

5.1 Uncertainty

Uncertainty is distinct from Systematic Risk. Despite the fact that both risk and uncertainty describe events in which the actual future outcome is not predictable with certainty, uncertainty cannot reasonably be assigned a probability, or allowance within a rate of return because the circumstances of the events are so unique. For example, the list of Force Majeure events in a standard Project Agreement includes risks such as earthquakes, natural disasters, rebellions and revolutions.

When evaluating a project, moderate deviations from estimated cash flows, in either direction, are bound to occur, and these can be and should be, handled by adjusting cash flows and/or Discount Rates. However, uncertainty is not incorporated into the procedures for deriving NPC cash flows and is not included in the estimate of Systematic Risk. As a result, uncertainty should be addressed through a sensitivity analysis.

Under PPP contracts the private sector will normally face uncertainty (this includes and goes beyond Force Majeure). This risk transfer is largely implicit within the Project Agreements for PPP projects. Most Project Agreements include specific circumstances in which the risks of certain 'uncertain' events are shared, normally described with the Force Majeure clause of the contract. Any uncertainty not covered by Force Majeure is likely to be a project company risk.

The extremely pervasive nature of the events subject to uncertainty mean its impact on project returns is likely to be high, though the chances of an event happening are low.   Because of the difficulty in measuring uncertainty, it is recommended that a sensitivity analysis be conducted on the PPP Evaluation Discount Rate specifically in recognition of the transfer to the private sector of the uncertainty. This sensitivity will result in a range of values with respect to each Proponent's bid for evaluation against the PSC. It is recommended that an appropriate sensitivity analysis on the PPP Discount Rate would likely be in the range of an additional 0.5 per cent to 1 per cent.

5.2 Break Even Analysis

The breakeven Discount Rate is the Discount Rate at which the NPC of the PPP and the PSC are equal. This rate should be calculated to test the sensitivity of the VFM assessment to movements in the Discount Rate. In cases in which the VFM assessment is affected by small variations in the Discount Rate, it is recommended that more reliance is placed on qualitative VFM measures in assessing overall VFM.

Appendices
Appendix A: Treatment of Inflation Risk

Overview

This guidance requires that the Discount Rate is adjusted to reflect the level of inflation risk in private sector tenders. Section 3 sets out the methodology for identifying the level of inflation risk transferred to the private sector under the draft contract documentation, in particular the Payment Mechanism. However, on receipt of bid submissions, bidders may offer alternative proposals for the treatment of inflation risk. Where this is the case, the initial assessment of the Discount Rate will need to be reconsidered in the light of the private sector proposals.

Rationale for Adjustment

The Discount Rate will need to be reconsidered where the bidders' inflation proposals indicate either a higher, or lower level of risk transfer. This will normally be evident through the bidders' response to the Payment Mechanism. It is common for the Payment Mechanism to be amended in either or both of the following ways:

- The proportion of the Annual Service Fee (ASF) subject to inflation may be adjusted
- The index used to adjust the ASF may be by reference to different, and sometimes multiple, indices, for example, components linked to the Labour Prices Index.

Impact on Discount Rate

The initial assessment of the inflation risk transfer will need to be reconsidered in the light of bids received. Where bidders fully accept the Payment Mechanism, there will be no requirement to adjust the PPP Discount Rate. However, where the Payment Mechanism has been amended the evaluator will need to consider whether:

- Bidders are taking more risk than the initial assessment of inflation risk transferred – in this case, the Systematic Risk adjustment reflected in the PPP Discount Rate will need to be increased
- Bidders are taking less risk than the initial assessment of inflation risk transferred – in this case, the Systematic Risk adjustment reflected in the PPP Discount Rate will need to be decreased

Evidence of Changes in Risk Allocation

The table below provides an overview of the types of amendment to the Payment Mechanism, which may give rise to an adjustment to the Discount Rate. The adjustment will be by reference to the risk transfer proposals in the draft Payment Mechanism, which for the sake of this analysis is assumed to require 50 per cent of the charge to be indexed at CPI and 50 per cent to be fixed.

Evidence	Impact	Adjustment
Greater proportion of the ASF indexed at CPI. For example, 100% of the ASF to be indexed at CPI.	Government bears a higher proportion of inflation risk – more of the charge subject to CPI risk, all other things being equal, will result in more inflation risk for government.	Reduction in the bid PPP Discount Rate.
Floor on CPI. For example, the ASF will only be subject to upward increases in CPI.	The government will bear higher risk through exposure only to one side of the risk.	Reduction in the bid PPP Discount Rate.
Different components of the ASF to be indexed, in accordance with different indices.	The government will bear a higher level of inflation risk through the matching of its payments to the underlying cost movements in the bidders price structure.	Reduction in the bid PPP Discount Rate.

Bidders may take more, or less risk than is initially anticipated under the Payment Mechanism. The impact that each separate component has on the assessment of inflation risk transferred needs to be considered.

Approach to Quantification

To quantify the level of inflation risk associated with each bidder's response, the table below should be populated.

ASF Component	Indexation Proposal	Assumed Rate	Initial Assumption		Bidder A	
			% of ASF	Weighted Indexation	% of ASF	Weighted Indexation
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7

Column 1: Each separately indexed and non-indexed component of the ASF must be identified.

Column 2: The indexation proposal for each component should be described with reference provided to the relevant indexation rate, such as Consumer Prices Index.

Column 3: Should describe the rate at which the component will index. This should be the latest published rate for the applicable index.

Column 4: This is the proportion of the ASF indexed by the component described in the same row, but in column 1.

Column 5: This is the product of Column 4 x Column 3.

Column 6 and Column 7: This is the relevant information for each bidder (separate columns should be used for each bidder) and corresponds to that in Column 4 and Column 5.

Each indexing and non-indexing component of the Annual Service Fee should be described in the table for each bidder's proposal.

Worked Example

The assessment of Systematic Risk transferred for a project has been conducted. Systematic risk transferred is described in the following table:

Systematic Risk type	Weighting (Scale 1 – 5)	Estimated Portion of Project Risk Premium	Allocation of risk based on Step 1 analysis	Project Risk Premium Transferred to Private Sector %
Demand	4	1.08%	0.2	0.22%
Inflation	3	0.81%	0.5	0.40%
Asset Residual value	1	0.27%	0.0	0.00%
Financial distress / insolvency	2	0.54%	0.5	0.27%
Total Premium	**10**	**2.7%**	**NA**	**0.89%**

In determining the Systematic Risk transferred it was assumed that bidders would index 50 per cent of the ASF with CPI.

Bidder A has responded with an amended Payment Mechanism. This is described in the table below:

ASF Component	Indexation Proposal	Assumed Rate	Initial Assumption		Bidder A	
			% of ASP	Weighted Indexation	% of ASP	Weighted Indexation
ASF – Component 1	Indexed at CPI	2.5%	50%	1.25%	100%	2.5%
ASF – Component 2	Not indexed	0.0%	50%	0.0%	0.0%	0.0%
			100%	**1.25%**	**100%**	**2.5%**

In this example Bidder A is taking only ½ of the inflation risk that the government had anticipated in its draft Payment Mechanism. More of the government's fee will vary with inflation which means it is exposed to greater risk.

In this example, the level of inflation risk transferred might be considered to be ½ that on which the initial assessment of Systematic Risk was based. This would generate a revised Systematic Risk premium as follows:

Systematic Risk type	Weighting (Scale 1 – 5)	Estimated Portion of Project Risk Premium	Allocation of risk based on Step 1 analysis	Project Risk Premium Transferred to Private Sector %
Demand	4	1.08%	0.2	0.22%
Inflation	3	0.81%	0.5	0.20% (from 0.40%)
Asset Residual value	1	0.27%	0.0	0.00%
Financial distress / insolvency	2	0.54%	0.5	0.27%
Total Premium	**10**	**2.7%**	**NA**	**0.69%**

Other Considerations

The assessment of inflation risk will need to take into account a range of adjustments which could be proposed by bidders. Each of these should be reflected in the table and an assessment made of the individual impact of each on the overall level of risk transfer for inflation risk.

The table below considers some common bidder proposals and the considerations that will be made:

Bidder Proposal	Impact	Treatment
Use of a CPI floor	Means price can only increase and government loses the benefit of any downward movements in prices.	Reduces CPI risk transferred. The level of the floor will determine the extent of the reduction in risk transfer.
Use of a specific inflation index	Government will make payments in accordance with specific cost related indices.	Consider the impact of the difference between CPI and the specific index.
More frequent reviewable services	Costs will be benchmarked and adjusted more frequently, reducing the private sector's exposure to unanticipated price movements.	Reduce the level of risk transfer. For example, if there were five review points and the private sector proposes six, then the level of risk transfer in relation to items subject to review would have reduced by 20%.

Example:

The table below illustrates how the table might be populated for a range of bidder proposals:

ASF Component	Indexation Proposal	Assumed Rate	Initial Assumption		Bidder A		Bidder B		Bidder C	
			% of ASP	Wtd Ind	% of ASP	Wtd Ind	% of ASP	Wtd Ind	% of ASP	Wtd Ind
ASF 1	Indexed at CPI	2.5%	50%	1.25%	100%	2.5%	75%	1.88%	50%	1.25%
ASF 2	Not indexed	0.0%	50%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
ASF 3	Indexed at LPI	3.5%	0.0%	0.0%	0.0%	0.0%	25%	0.88%	30%	1.05%
ASF 4	Indexed at BPI	5.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20%	1.1%
Total				**1.25%**		**2.50%**		**2.76%**		**3.40%**

In simple terms each bidder is taking the following inflation risk, relative to the rate on which the initial assessment of risk was performed:

- Bidder A: 50 per cent
- Bidder B: 45 per cent
- Bidder C: 37 per cent

Appendix B: Factors giving rise to Systematic Risk

This appendix provides examples of Systematic Risk drivers in infrastructure projects and the contractual structures which have an impact on allocation.

Demand Risk

Assessing Relative Importance

Factor	Indicates
A significant change in demand for the facility will directly affect the amount the government pay the Project Company.	Higher level of importance
Projects with longer concession periods mean that there is a high probability that actual demand may be materially different to forecast demand.	Higher level of importance
Projects with a user pays structure will be subject to higher demand risk than those projects which are free at the point of use.	Higher level of importance for user pays projects
Projects with alternative public, private and voluntary sector provision are likely to have a higher demand risk than those with no alternative provision. For example, a prisons project has fewer competing options than a school or hospital which may compete with private providers.	Higher level of importance where there are competing demands
Projects subject to rapid technological change will have a higher level of demand risk, than projects which will not change over time. For example, a fibre optic broadband project is likely to be more subject to demand risk than a schools project.	Higher level of importance for projects where pace of technological change is higher

Assessing Allocation

Factor	Risk Allocation
Payments to the Project Company are fixed irrespective of the level of demand.	More likely to be government risk
Payments to the Project Company increase, or decrease relative to the level of demand.	More likely to be Project Company risk
Where demand and use have a significant impact on the wear and tear and condition of facilities and the Project Company is not compensated for such use. For example, where additional use might incur increased, or earlier than forecast maintenance costs, additional security, cleaning and waste removal costs to comply with the performance regime and greater help desk resource requirements, due to higher numbers of users. If such costs are borne by the Project Company, through the Payment Mechanism, this will have an impact on its profits.	More likely to be Project Company risk
Where government requires the provision of a fixed capacity and any under-estimation in capacity requires government modifications, or alternate provision.	More likely to be government risk

Inflation Risk

Assessing Importance

Factor	Indicates
Long-term contracts mean the risk that underlying prices change in manner not anticipated is higher.	Higher level of importance
Complex / diverse range of services subject to a range of different inflation drivers means inflation risk is higher.	Higher level of importance
Long-term construction contracts include a likelihood of price variation during the construction period.	Higher level of importance
High level of operating costs and life cycle costs relative to construction costs exposes the project to more long-term inflation risk.	Higher level of importance
Overheated local economy / volatility and/or high construction inflation index means construction costs more likely to change.	Higher level of importance
Project taking place at similar time to other major construction projects, those projects expected to compete for resources.	Higher level of importance
Specialist components or labour is required indicates a higher level of construction risk.	Higher level of importance
No compensation for additional costs during the construction phase.	Higher level of importance

Assessing Allocation

Factor	Risk Allocation
A Payment Mechanism with a single inflation index, such as CPI, increases the risk for the Project Company that individual underlying costs will be materially different to the cost indexation allowed in the Payment Mechanism. The greater the mismatch between the basket of goods on which CPI is based and the underlying indexing cost base, the greater the risk that CPI will inadequately compensate the Project Company for specific inflationary pressure.	More likely to be Project Company risk
Reviewable services regimes which restrict increases in costs transfer more inflation risk than those that allow full cost recovery. For example, if the Project Company must bear the first, say, 10 per cent of any cost increase, transfer more risk than those which all additional costs to be recovered.	More likely to be Project Company risk
Non-benchmarked services will be reliant only on the inflation adjustment in the overall Service Fee to compensate for any movements in underlying costs. Payment Mechanisms with fewer categories of benchmarked, or reviewable services transfer more risk than those with more categories of costs subject to future adjustment. For non benchmarked services – the Project Company bears the risk that the actual real price increases over the Concession Period is greater than that estimated for the build up of the Service Payment.	More benchmarked services / more frequent benchmarking - more likely to be government risk Less benchmarked services / less frequent benchmarking – more likely to be Project Company risk
PPP arrangements with fixed price construction contracts transfer all construction inflation risk to the private sector. Any unanticipated inflation, often from bid submission, will be transferred to the Project Company.	More likely to be Project Company risk
Where a Project Company has a high proportion of its Service Fee unindexed then it will bear more risk of unexpected price movements than those with more of its Service Fee subject to indexation.	More likely to be Project Company risk

Residual Value Risk

Assessing Importance

Factor	Indicates
Pre-defined hand back conditions and significant remaining useful life.	Higher level of importance
Depreciated capital value at the end of the contract term is high relative to initial capital expenditure.	Higher level of importance
Facility may have significant value at the end of the term either in current or alternative use, e.g. public sector housing stock.	Higher level of importance

Assessing Allocation

Factor	Risk Allocation
No payment at the end of the contract term on the transfer of the asset back to government.	More likely to be government risk
Payment by government at the end of the contract term.	More likely to be Project Company risk if market based payment More likely to be government risk if pre-determined payment
Assert reverts to Project Company at the end of the contract term.	More likely to be Project Company risk
Government sets the contractual hand over conditions at the end of the term.	More likely to be government risk

Risk of Down Turn in the Broader Economy

Assessing Importance

Factor	Indicates
Reliance on few suppliers and in particular key suppliers. This will make the cost of transferring between suppliers greater as a result of a lack of competition in the market.	Higher level of importance
Unique processes or technology. For example, the provision of specialist laboratories and the facilities management of those facilities may have a limited market compared to more general building services such as cleaning and pest control within a school.	Higher level of importance
Complex construction, or facilities management services. This makes the cost of replacing a contractor more costly, in terms of time, impact on service and financial impact. For simple construction, or facilities management contracts the requirements of the project specifications, such as the Output Specification and the Services Specification, may be readily understood and work more readily transferred between one contractor and another. For a complex construction project it is likely that a replacement contractor would include a significant premium into its price for risk.	Higher level of importance
Projects with complex interfaces will be more affected by contractor failure than those with straightforward interfaces. For example, within a prison project there is likely to be a significant interface between the provider of the facilities services and the government, and finding a suitable replacement contractor is likely to be more problematic.	Higher level of importance
Construction, engineering and life-cycle costs include significant exposure to commodity prices affected by global demand, such as steel and copper.	Higher level of importance

Assessing Allocation

Factor	Risk Allocation
Project Company responsible for meeting performance requirements at all times.	More likely to be Project Company risk
Failure of a sub contractor or supplier is not mitigated through the Project Agreement, e.g. there is no right to an extension of the sunset date, or long-stop date, or an increase in price.	More likely to be Project Company risk
No relief, or only temporary/restricted relief from abatement when replacing a contractor.	More likely to be Project Company risk
Where a contractor becomes insolvent and the contract reverts to the government, the government will become responsible for the delivery of the project services. However, the termination regime in most PPP contracts provides a mechanism for the government to ensure that it is able to rectify any service short-falls and the termination sum is based on government delivering the service to the required specification. If a key supplier has become insolvent and the cost of a replacement is more expensive, this additional amount would normally be taken into account in determining the compensation due.	More likely to be Project Company risk though a residual element is likely to remain with the government

Appendix C: Case Study – A NSW Hospital

Introduction

This appendix is designed to provide practitioners with an example of the practical workings of the Methodology outlined in the main body of this paper, based upon an actual hospital project[4]. Details identifying the particular project have not been included (except where some of these details were used to inform the assessment of risks) because this example is provided primarily for illustrative purposes. The information provided here should not be taken to reflect the actual decision-making, or actual results of the project team for any particular project, nor should it be taken to be a critique of any PPP hospital the project team, or project outcomes.

This appendix sets out the approach in determining an appropriate Discount Rate used in the assessment of complying proposals (hereafter referred to as the "PPP Discount Rate") for a PPP hospital project in New South Wales. In considering this example practitioners should be aware that:

1. A small change in assumptions for the project may give a considerably different result to the allocation of Systematic Risks discussed below.

2. This is an example of a <u>net cost</u> project. If the project were a <u>Net Revenu</u>e Project, appropriate adjustments to the Methodology (as set out in Appendix F) would have to be made.

Determining the Project's PPP Discount Rate

The remainder of this discussion paper follows the steps described in the main body of the paper to estimate the PPP Discount Rate.

Step 1 – What are the Systematic Risks in the Project?

The following table of Systematic Risks was based on a review of, among other things, draft contract documents for the project. An assessment of Systematic Risks can also be based on industry studies and other references describing the particular services and their market characteristics. Further detail on the allocation and importance of these risks are contained in the discussion on Step 5:

---

[4] This Appendix is based on work done by PricewaterhouseCoopers and NSW Health. , This Appendix was prepared on the basis of various analyses prepared during 2003-04.

Type of Systematic Risk	Description	State	Project Company	Shared
Demand risk	That element of demand risk that is related to the level of general economic activity affecting the demand for the Hospital (but not that element of demand risk related to performance of services by the Project Company).			✓
Inflation	Risk of unexpected inflation (which could be represented by unusually high or low CPI). That is, the risk that the real value of payments made during the term of the arrangements is eroded (or increased) by inflation with a diminution (or increase) in returns.			✓
Residual value	The risk that either on termination of the Project Deed, or during the course of delivery of the contractual arrangements the Hospital does not have the value originally forecast when the arrangements were established and the cost of services were priced.	✓		
Downturn in broader market	Risk of downturn caused by factors in the broader market, resulting in a reduction in the quality of the Project Company's service provision, or an increase in the Project Company's costs due to its own financial distress/ insolvency or that of its major contractors/ subcontractors.			✓

Step 2 – Are predominantly all the Systematic Risks in the Project borne by the Public Sector?

The table above shows that there are a number of Systematic Risks evident in the Project allocated between the parties. At this stage of the assessment, it could not be definitively concluded that "predominantly all" risk lies with the government.

Step 3 – Identify Project Rate

The Project is essentially an accommodation project with a significant operating component (i.e. maintenance, catering, cleaning, security, utility provision and materials handling services currently represent approximately 56 per cent of the PSC's NPC). For investment purposes, the Project is classified as having "Very Low" Systematic Risk (indicative Asset Beta of 0.3). Further research was conducted to generate empirical information that might serve as a basis for establishing an Asset Beta for the procurement decision. This research is summarised below.

Empirical Evidence

Research was done on Betas for listed corporations on the Australian Stock Exchange ("ASX") that may lend comparable Beta data in terms of facilities management and /or similar infrastructure assets. Relevant market data obtained in relation to these listed corporations is contained in Attachment 1 found at the end of this Appendix. The information can be summarised as follows:

Category	Low Asset Beta	High Asset Beta	Mid point Asset Beta	Weighted Average Asset Beta	Arithmetic Average Asset Beta
Facilities Management	0.43	0.59	0.51	0.52	0.50
Energy (c)	0.05	0.36	0.20	0.27	0.24
Property Trusts	0.31	0.63	0.47	0.51	0.46
Property Development / Construction (b)	0.34	0.99	0.67	0.58	0.55
Overall	**0.28**	**0.64**	**0.46**	**0.48**	**0.44**

(b), (c) - Refer Notes to Attachment 1.

The market data above suggests that the Project Asset Beta is in the range of 0.28 to 0.64. A hospital project has risk characteristics, such as a sole government customer, that would place it at the lower end of the range quoted.

Based on the Systematic Risks identified, it could be argued that the Project's Asset Beta should be slightly higher than the health sector Asset Beta of 0.3. Accordingly, based on an understanding of the industries relevant to a typical PPP hospital contract and available market data, an Asset Beta of 0.45 is used. This translates into an estimated Project Risk Premium of 2.7 per cent.

The calculation for this is:

Project Risk Premium = Beta * MRP = 0.45 * 6.0% = 2.7%.

Step 4 – Are predominantly all the Systematic Risks in the Project borne by the Private Sector?

The table in Step 1 shows that not all the Systematic Risks are borne by the private sector and therefore, the risk premium is to be apportioned to more accurately reflect the level of Systematic Risk transferred to the private sector.

Step 5 – Evaluate proportion of Systematic risk transferred by the government

In this section, each Systematic Risk is analysed in terms of its relative importance compared to the overall Systematic Risk for the Project. The allocation of risk between the government and the Project Company is then analysed.

Demand Risk

Assessing relative importance

Any significant change in hospital demand will directly affect the ability of NSW Health to make the Service Payments to the Project Company out of its forecast budget.

Due to the long project term, there is a high probability that actual demand may be materially different to forecast demand. Consequently, this risk is assessed to be of high importance relative to the other Systematic Risks.

Assessing allocation

Hospital usage is a function of various factors including social policy and geographical location. With regard to the demand for the physical assets, it is assumed for purposes of this example that NSW Health has requested that the Project Company design and construct the Hospital Facilities and refurbish a number of existing buildings, with predetermined capacity. Any expansion in the Hospital Facilities will therefore be funded by the government, which suggests in the first instance that demand risk lies primarily with the government.

Notwithstanding this, it can be argued that there are elements of demand risk for the physical assets which the government is transferring to the private sector. Increased usage may, for example, result in increased maintenance costs, moving forward of refurbishment costs, additional soft facilities management services (including cleaning and waste removal), additional security services, or additional help desk requirements. These additional costs to meet increases in demand beyond that projected are assumed to be borne by the Project Company.

Whilst the hospital contract may provide for volume-related adjustments for other services (e.g. catering services, clinical waste) it is considered that in a project of this type, additional, or lesser costs to the private sector for additional, or lesser demand is marginal. Therefore, the allocation of this risk between the government and the Project Company is assumed to be 90 per cent / 10 per cent respectively

Inflation Risk

Assessing relative importance

The risk that the Project will be exposed to inflation is probable considering the long term nature of the Project – notwithstanding any wage, or labour services agreements that seek to provide some semblance of certainty regarding wage growth. Assessing relative importance of inflation risk would require further analysis of cost drivers for the project. For example, the following observations in relation to this NSW hospital PPP were used in drawing conclusions about the relative importance of inflation risk:

- Construction costs were deemed to be likely to increase from Financial Close to the end of the Construction Phase, given the market for construction services at the time. The PSC assumed a fixed price contract that included an allowance for escalation over the estimated three year construction period, but included no allowance for Systematic Risk.

- The cost of non-core services can include non-wage components. For example, catering services were found to consist of only 53 per cent labour cost, with the remaining 47 per cent being largely food costs. Catering costs represented 36 per cent of the operating service costs on an NPC basis.

- Operating costs account for a significant proportion (approximately 56 per cent) of the Raw Public Sector Comparator on an NPC basis, and represented the more significant inflation risk exposure to both the government and the Project Company. Labour was found to comprise approximately 67 per cent of the cost of the operating services.

- Specific side agreements governing the sharing of costs between the government and the private company can also be useful in determining relative importance of the risk. For example, under the terms of the Labour Services Agreement for this particular hospital PPP, the Project Company agreed to bear the risk of increases in labour unit costs only to the extent that they represent promotions or the need for agency staff/casual labour, while the government agreed to bear the risk of changes to wage rates under the Industrial Instruments.

Overall, compared to the other risks, this risk is considered to be of medium importance.

Assessing allocation

It is assumed here that the annual service payment to the Project Company may be indexed each period by reference to the Consumer Price Index ("CPI") from the previous period; and that proponents have been given the option to elect that the indexation is less than CPI.

The CPI is a weighted average of a 'basket' of goods and services in the Australian economy. The categories that make up this 'basket' are as follows[5]:

- Food;
- Alcohol and tobacco;
- Clothing and footwear;
- Housing Household furnishings, supplies and services;
- Health;
- Transportation;
- Communication;
- Recreation;
- Education; and
- Miscellaneous.

The following discussion deals with two groups of services under the contract that might embody different allocations for inflation risk:

---

[5] See www.abs.gov.au for further details on the components of the CPI.

Group 1 Services: Maintenance and Refurbishment Services
                           General Services
                           Utility Supply and Management Services
   Grounds Management Services

Group 2 Services: All other Services

Group 1 Services

The Services included here are those Services which will not be benchmarked and for which the Project Company is assumed to use its own staff- i.e. a Labour Services Agreement will not apply to the staff providing these services.

A major identified value driver for PPP procurement is whole-of-life costing. These associated costs and other non benchmarked costs will not be adjusted for during the Project Term apart from the CPI assumption made through the financial model.

It is argued that the CPI adjustment encompasses the requisite increases in these non benchmarked costs due to inflation, but it is highly likely that the weighting of the goods and services that make up the CPI number may be different to the cost weighting in the Project. For example, Maintenance and Refurbishment Services represent 20 per cent of the overall operating costs on an NPC basis. A large proportion of these costs are labour related. The change in average weekly earnings over the 12 months to December 2003 was 3.6 per cent, which was higher than the change in CPI. This is consistent with the historic trend of wages inflation being greater than CPI per review of wage rate changes from Access Economics[6].

The diagram below illustrates the potential build up of costs by the private sector in formulating the Service Payment:
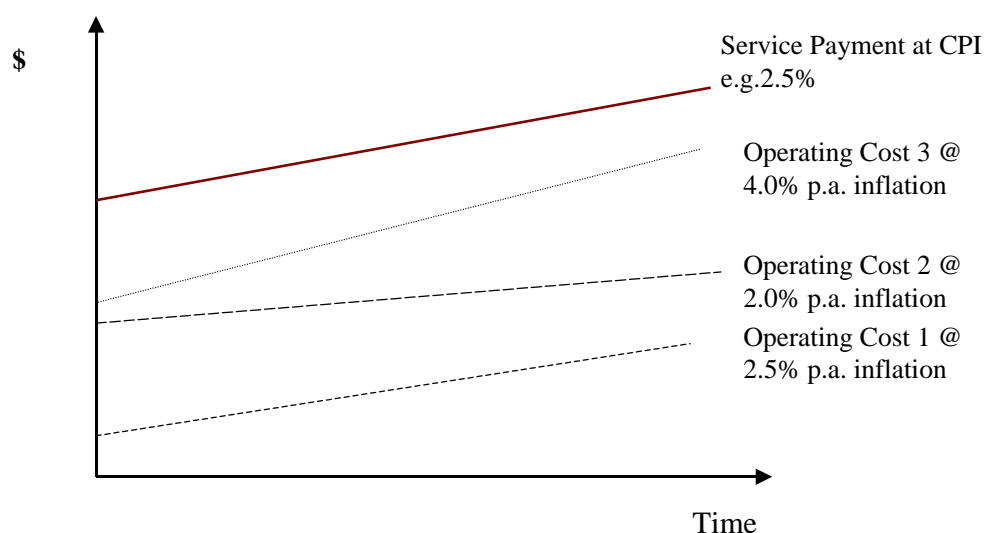
The build up of costs that underpin the Service Payment may not necessarily correlate with the CPI rate of, say, 2.5 per cent per annum In the above example, it is estimated that Operating Cost 1 and 2 will be compensated for by CPI, but CPI does not cover Operating

---

[6] Source: Wages and Price table WP6, *Access Economics* December 2003 quarter.

Cost 3 which is inflating at 4% per annum (i.e. CPI + 1.5%). It is deemed likely that the private sector will price in the estimated 4% per annum in the Service Payment, but this is only a forecast. The private sector will also price in a premium to account for the Systematic Risk that actual real price increases will differ from the estimated inflation Proposal in the financial model.

In the above example, the private sector would price in 4% per annum (i.e. CPI + 1.5%) as a real price index assuming CPI is 2.5%. But what happens if this is actually 5% (i.e. CPI + 2.5%) or there is a major shortage of supply in the market for this service and there is an unexpected sharp real price increase? This increase may not be fully reflected in the CPI as the effect on the Project may be greater than its effect on the market as a whole. It is this Systematic Risk premium that should be adjusted for in the private sector Proposal.

Group 2 Services

The Service included in this group will be subject to the terms of the Labour Services Agreement. The government also recognises that over a 28 year period it is difficult to estimate the cost of the various operating services and that not all services inflate at CPI. Therefore, it has included a benchmarking mechanism whereby specific services over the Operating Phase will be benchmarked to market.

The Specific Services included within this Category include:

- Security Services
- Cleaning Services
- Catering Services
- Materials Handling Services

Commencing eight years from Financial Close and every five years thereafter, the Service Payment may be adjusted upward, or downward for any change in the cost of providing the benchmark services, which is more than 5 per cent from the indexed base price[7]. The Project Company therefore bears the risk of inflation (apart from changes to the labour costs) affecting its underlying services by more than CPI for the first eight years of the Project. At this point, the Service Payment is reset to align with the underlying costs with the market and then the price is fixed for the next five years and so on.

Between benchmarking dates and for the first eight years of the Project, the Project Company is exposed to the cost of the non-labour component of the benchmarked services increasing at a rate greater than actual CPI, or the assumption in relation to CPI that may have been built into the financial model (e.g. CPI + 1.5%). In addition, the private sector will bear wage inflation risk for its management staff and the extent to which it requires the use of casual agency staff. This Systematic Risk will be priced into the Service Payments by the Project Company.

---

[7] Details like these can normally be obtained from the Project Deed and associated contractual documents.

Summary of inflation risk

Assuming the Service Payments is indexed at CPI;

- for Group 2 Services - the government is bearing the majority of inflation risk and only a very small portion of this risk lies with the private sector, as not all costs will increase at the same rate as CPI. The private sector may bear some wage risk on any management and agency staff, and the formal readjustment of the Service Payment level only occurs once the 5 per cent threshold is breached periodically.

- for Group 1 Services - the Project Company bears the risk that the actual real price increases over the Project Term is greater than that estimated for the build up of the Service Payment. As stated earlier, there will be no compensation paid by the government to the Project Company for any price changes for these Services.

Residual Value Risk

Assessing relative importance

Based on the PSC, the total nominal cost of construction of the Hospital Facilities at the end of the construction period is approximately $116m. Assuming an economic life of 40 years based on the tax depreciation of buildings, the written down value at the end of the Project term is estimated at $44m [$116m –(($116m/40) x 25)] assuming straight line depreciation. Using the estimated Project Rate of 8.58 per cent, the estimated present value of the written down value is approximately $3.7m which represents around 3.2 per cent of the nominal capital cost of the Hospital Facilities.

Given that the estimated residual value of the facility is not a materially large proportion of the capital cost of the Project the relative importance of this risk compared to the other Systematic Risks is considered to be very low.

Assessing allocation

At the end of the Project Term, the Project Company will handover the Hospital Facilities to the government for a nil consideration. The Project Company will be required to ensure that the Hospital and the Mater Hospital Site are returned to the government in the requisite condition at the end of the Project Term. Accordingly, four years prior to the end of the Project Term, an independent reviewer will be appointed to review the condition of the Hospital Facilities and recommend the refurbishments required to allow the Hospital and Mater Hospital Site to be in the Handover Condition at the end of the Project Term.

The government will then require the Project Company to set aside an applicable amount from each Service Payment that relates to its refurbishment obligations to be paid into an escrow account. Any monies remaining in the escrow account upon expiry of the Project Deed will be returned to the Project Company.

Although the Project Company will be required to ensure that the Facilities are in the condition required by the government at the end of the Project Term, it is the government who has set the handover conditions and the party who will bear the significant proportion of residual value risk. Consequently, this risk has been assessed to lie with the government.

Risk of downturn in broader market

Assessing relative importance

Over the Project Term, there is the risk that events may occur in the broader market economy which may affect the Project. The impact of this risk may take a number of forms. An example, may be a social policy which affects the number of patients referred to the emergency department. But as stated earlier, the majority of demand risk lies with the government with a small element transferred to the Project Company.

A further effect of a downturn in the broader market is its impact on the financial health of the Project Company's subcontractors and thus the Project Company may not be able to meet the requisite KPIs, resulting in a change in subcontractor (and hence increased costs), or the financial distress/ insolvency of the Project Company itself. This risk lies with the Project Company as it is responsible for the provision of specified services over the Project Term. It is this risk that should be adjusted for in the PPP Discount Rate. The risk of a market downturn cannot be diversified away and is a recognised Systematic Risk.

Compared to the other risks this risk is considered low, but as there are government restrictions on the private sector in its choice of alternate service provider/s, this risk is elevated to medium importance.

Assessing allocation

There is the likelihood that in the event of a downturn and the need for alternate service suppliers, the government requires certain conditions to be met for any change in major contractor/ subcontractors and for any change in control of the Project Company. These conditions restrict the potential suppliers of these services to the Project Company and it could be argued that the risk of the Project Company being unable to supply the requisite services is increased by these restrictions.

It could be argued that in a worst case scenario, if the Project Company cannot provide the requisite services then the government either has to step-in or terminate the contract and therefore this is a government risk. This may be true in the extreme case but it assumes that there is no risk transfer being effected through the Contract Documents. The contract that the Project Company signs with the government obliges it to perform and carry out its obligations to provide services over the Project Term, therefore, the Project Company has to find alternate suppliers for the service in the event of this risk occurring.

In summary, this risk is primarily a Project Company risk, but it is acknowledged that there is an element of sharing. The proposed allocation of the risk is 90 per cent Project Company risk and 10 per cent State risk.

Calculation of PPP Discount Rate

Based on the above qualitative assessment of the relative importance and allocation of the Project's Systematic Risks, the Draft Guidance methodology provides a quantitative apportionment of the project risk premium estimated in Step 3 to assist with determining the PPP Discount Rate.

The methodology is based on a four column table as follows:

Column 1 is used to assign a weighting (on a scale of 1 to 5 with 5 being a risk assessed as being of high importance) based on the qualitative assessment from Step 4.

Column 2 is the weighted proportion of each risk to the total Systematic Risk premium. This effectively quantifies each Systematic Risk.

Column 3 sets out the allocation of each risk to either the State (represented as 0) or Project Company (represented as 1) or shared between the parties as estimated in the discussion earlier in this paper.

Column 4 multiplies Column 2 by Column 3 to determine the appropriate risk premium to apply to the Risk Free Rate for the Project Company for the Complying Proposals.

Calculation of Risk Premium

The table below calculates the estimated risk premium:

	Column 1	Column 2	Column 3	Column 4
Systematic Risk type	**Weighting (Scale 1 – 5)**	**Estimated Portion of Project Risk Premium**[*]	**Allocation of risk based on Step 1 analysis**	**Risk Premium Transferred to Private Sector %**
	Based on relative importance	Project Risk Premium is 2.7% (per Step 3)	0<= Number <=1	Column 2 x Column 3
Demand	4.0	1.08%	0.1	0.11%
Inflation	3.0	0.81%	0.4	0.32%
Asset Residual value	1.0	0.27%	0.0	0.00%
Financial distress / insolvency	2.0	0.54%	0.9	0.49%
TOTAL PREMIUM	10 .0	2.7%		0.92%

[*](Risk weighting/Total Col 1)* Project Risk Premium

Recommendation

Based on the above assessment, the recommended PPP Discount should be the government Nominal Risk Free plus Project Risk Premium of 0.92 per cent.

Appendix D: Net Revenue Projects

Introduction

An important theoretical background to the development of discount rates to value the difference between PPP and government funded procurement processes is the difference in valuing assets and liabilities.

This guidance is based upon the presumption that in the absence of compelling social policy objectives, there is no valid reason that the state should seek a lower net return on their participation in economic projects than that sought by private sector participants in the same market. This means that when evaluating bids in a PPP process for economic infrastructure the PSC should ordinarily be developed as an asset purchase model and the decision structure based on selecting the best value investment.

Required Approach

The PSC model should be developed using observed returns private sector entities are seeking for similar projects to develop the model. This will naturally include a market premium for Systematic Risk since economic infrastructure cash flows are subject to such risks.

The PPP bids will include either a payment to, or from the state independent of the actual future revenue experience and are thus devoid of systematic and project risk, from the government perspective and hence should discounted by the risk free rate. There is no need to adjust this rate since the PSC directly values the cost of Systematic Risk and therefore there is no differential between valuation approaches as there is in social infrastructure projects.

In summary:

- The PSC is evaluated at the Project Rate; and

- Bid revenue streams are evaluated at the risk free rate.

Appendix E: Useful Further Reading

Brealey, Richard and Myers, Stewart, Principles of Corporate Finance, McGraw Hill 2001

Lonergan, Wayne, The Valuation of Businesses, Shares and Other Equity, Third Edition, Business and Professional Publishing

Department of Finance, The Choice of Discount Rate for Evaluating Public Sector Investment Projects - A Discussion Paper, November 1987

Department of Finance, Handbook of Cost-Benefit Analysis, September 1991

Commonwealth Competitive Neutrality Complaints Office, Rate of Return Issues, CCNCO Research Paper, Productivity Commission, Canberra, August 1998

Darrin Grimsey and M.K. Lewis, The Worldwide Revolution in Infrastructure Provision and Project Finance, Edward Elgar Publishing

Appendix F: Frequently Asked Questions

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. This does in no way remove the riskiness of the project. The fact is that when risk transpires it is the taxpayer that funds the risk.

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.

Should government use a single Discount Rate for all projects?

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.

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.

Why is it that only Systematic Risks are incorporated in the Discount Rate?

The Capital Asset Pricing Model (CAPM) assumes that investors — including Public Sector investors on behalf of taxpayers — will, through the process of portfolio Diversification, eliminate all the Diversifiable Risks. For example, umbrella makers do well when there is a lot of rainy weather, but badly when the weather is sunny. For ice cream makers, it's the opposite. Returns to investors in either umbrella makers, or ice cream makers are affected by weather risk. But this risk can be diversified by investing in both umbrella makers and ice cream makers, so no matter what the weather is, investment returns in total are unaffected.

The essential point is that investors should not be rewarded with a higher return for taking on risks that they can eliminate through portfolio Diversification. Systematic Risks, on the other hand, cannot be eliminated through portfolio Diversification. Systematic Risks are those that affect the market as a whole. For example, the economy might go into a recession. If so, that will affect the returns on all investments (to varying degrees). No amount of portfolio Diversification can eliminate the risk of recession, because recession affects everybody. Investors need to be rewarded for taking on Systematic Risk, otherwise they won't make the investment. How much they get rewarded depends on how much risk they take on. This is summarised by the parameter Beta in the CAPM.

What goes into the cash flows in a Discounted Cash Flow calculation?

The Expected Value of all revenues and expenses associated with a project. Often, these will not be known with certainty in advance, so the average (also known as expected) value over all contingencies is used. These contingencies may relate to events like the weather (which could cause cost overruns), or the state of economy (which could cause demand and sales revenue to be different from expected), or anything else, which might affect the cash flows of the project. Unlike the Discount Rate, in the cash flows there is no need to make any distinction between Systematic and Non-Systematic Risk.

You say that if the Public Sector retains all the Systematic Risks, the correct Discount Rate is the Risk-free Rate. But if the project is risky, how can you use the Risk-free Rate?

The Discount Rate is the cost of capital for the supplier of the services. If the Private Sector supplier is not facing any Systematic Risks, then there is no need to reward that supplier with a rate of return that is any higher than the Risk-free Rate. Therefore, when evaluating the cost to the Public Sector of the private supplier's bid, the Risk-free Rate should be used. Other things being equal, the cost to the Public Sector will be higher (i.e. a higher net present cost) when evaluating this bid at the Risk-free Rate. This makes sense, because the Public Sector is retaining the risks.

Do I evaluate bids at the same rate?

No. In practice PPP projects include Systematic Risks not reflected in the PSC. This is of value to the public sector and should be taken into account in the Discount Rate calculation. The differing levels of Systematic Risk between PSC, PPP and among different PPP bids should be reflected in the Discount Rate used to assess the cash flows for each bid.