AN ECONOMIC FRAMEWORK FOR ASSESSING THE FINANCIAL PERFORMANCE OF GTEs

STEERING COMMITTEE ON NATIONAL PERFORMANCE
MONITORING OF GOVERNMENT TRADING ENTERPRISES

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PREFACE

The Steering Committee on National Performance Monitoring of Government Trading Enterprises was established at the Special Premiers' Conference in July 1991. Its role is to facilitate the development of a consistent performance monitoring regime for Government Trading Enterprises (GTEs) across the Commonwealth, States and Territories.

To date, the performance monitoring regime mostly comprises financial indicators and measures of partial productivity. There is general recognition, however, that to obtain a comprehensive picture of performance, it is also necessary to compile comprehensive indicators such as Total Factor Productivity and Economic Rate of Return (ERR).

This paper was prepared to promote an understanding of the concepts associated with the measurement of ERR. Although, as is the case with all measurement, there are some limitations with the use of economic measures, the framework described in this paper provides a consistent approach to the development and application of appropriate rate of return measures and targets.

The target-setting and measurement methodology adopted in the paper is essentially the same as that recommended by the Commonwealth Working Group which reviewed financial targets for selected Commonwealth GTEs. The Steering Committee wishes to acknowledge the assistance provided by the Working Group, particularly Mr David Green of the Department of Communications and the Arts.

The development of the report was co-ordinated by a sub-committee chaired by Mr Steve Edwell of the Queensland Treasury, with representation from the Commonwealth, New South Wales, Victoria, South Australia and the Secretariat (Industry Commission). Mr Mark Christensen of the Queensland Treasury, and Mr David Green of the Department of Communications and the Arts drafted the report.

Bill Scales AO
Chairman

ABBREVIATIONS

AMSA	Australian Maritime Safety Authority
ARR	Accounting rate of return
AsRR	Asset revaluation reserve
CAA	Civil Aviation Authority
CAPM	Capital asset pricing model
CSOs	Community service obligations
CWIP	Capital works in progress
DCF	Discounted cash flow
EBDIT	Earnings before depreciation interest and tax
EBIT	Earnings before interest and tax
ERR	Economic rate of return
EVA	Economic value added
FAC	Federal Airports Corporation
GTEs	Government Trading Enterprises
IDC	Interest during construction
IRR	Internal rate of return
LTBR	Long-term bond rate
M–M	Modigliani and Miller
MWC	Melbourne Water Corporation
NIBLs	Non interest-bearing liabilities
NPV	Net present value
PBC	Port of Brisbane Corporation
PSA	Prices Surveillance Authority
SVA	Shareholder value analysis
VBM	Value-based management
WACC	Weighted average cost of capital

OVERVIEW

Governments, on behalf of the community, invest significant amounts of capital in Government Trading Enterprises (GTEs). Nationally, this investment accounts for approximately 14 per cent of gross fixed capital expenditure per annum. Much of this capital is subject to competing demands in areas such as health, education and infrastructure provision. It is therefore vitally important that GTEs employ their capital efficiently.

Historically, insufficient attention has been paid to the fact that equity capital committed to GTEs has an alternative use (that is, opportunity cost), in that it could be employed elsewhere or used to retire debt. This has been largely due to the limited ability of owner Governments to effectively measure GTE performance. There has also been a view that private sector financial disciplines were not appropriate in the case of GTE investments.

These issues, which have obvious implications for how well GTEs employ their capital, are the focus of this report. In particular, the report proposes a consistent approach to setting risk-adjusted cost of capital targets for GTEs. In addition, it provides guidance on how to develop a practical working measure of performance — the Economic Rate of Return (ERR) — which includes all income of relevance to the shareholder, both cash flow and changes in the capital value. This measure is seen as superior to traditional accounting rates of return as it is more comparable with objective financial benchmarks used in the private sector for assessing performance.

Government as a shareholder

In recent years, governments have embarked on reforms aimed at improving the efficiency of their GTEs. Central to these reforms is that GTEs must operate on a commercial basis and, desirably, in a competitive environment. Accordingly, governments have restructured GTEs and commercialised or corporatised them to establish an operating environment more akin to that found in the private sector.

If governments are to continue to own GTEs and to pursue further efficiency gains, it is imperative that they develop an improved monitoring framework encompassing a financial target and a GTE performance measure for comparison against this target. However, the implementation of this framework requires an appreciation of the key difference between GTEs and their private

sector counterparts, namely the lack of a traded equity market in the public sector.

Competitive debt and equity capital markets act as the ultimate commercial discipline for achieving efficient management performance for private sector entities. This discipline is largely absent in the public sector. For a listed company, shareholder perceptions of performance act as the final arbiter of management's performance — if shareholder's expectations are not met, the capital will be redirected into a higher yielding activity, leading to a reduction in share price and a corresponding fall in the value of the capital invested in the enterprise.

Implicit in the workings of the capital market is the shareholder notion that there exists a trade-off between risk and return. Shareholders expectations of return are based on their assessment of the risk of the investment relative to the alternatives available. Governments must, therefore, have an expectation of the return (that is, a rate of return target) they should require from a GTE, taking into account the riskiness of the investment.

Having established such a target, it is equally important that the measurement of financial performance against this required return be on a basis comparable with the approach taken by private sector investors. In this regard, basic ratios drawn from the financial statements may be ineffective. Governments should assess GTE performance according to total returns provided by the enterprise. That is, net cash receipts (for example, dividends) and changes in the value of the investment.

Benefits of the approach

Underlying this report is a view that a performance assessment framework for GTEs should, as far as possible, act as a surrogate for capital market disciplines. This framework is centred around establishing a cost of capital benchmark and using the firm's economic income to compare financial performance against that benchmark.

The Steering Committee views the methodologies outlined in this report, and the concepts supporting them, as offering considerable improvements to the performance monitoring framework for GTEs, not only in terms of a more appropriate measure of performance, but also in providing a greater understanding of the factors which drive efficient investment decisions.

Because of the nature of the topic, much of the discussion in this report is technical. Some of these technical issues are open to empirical debate. The

Steering Committee also recognises that the methodologies have shortcomings and that applying the framework will not be a panacea for productive or allocative inefficiencies associated with the public sector. In this respect, the ERR measure needs to be complemented with other performance indicators (for example, total factor productivity) and a range of other initiatives, including, where possible, policies which promote competition.

The setting of the target, construction of an ERR measure and their subsequent interpretation requires a technical skill which will only be developed by way of a detailed involvement in the implementation process. Senior management both within GTEs and government need not necessarily become familiar with the detail of the methodologies to gain an appreciation of the broader benefits the performance monitoring framework outlined in the report has to offer.

The Steering Committee considers that the adoption of the target-setting and performance measurement approach outlined in this report will promote an investor value-adding perspective by the government (as owner) and GTE management respectively, which, in turn, fosters improved decision making and efficient and effective performance. This is achieved by:

- establishing a financial target which is consistent with competitive market concepts, such as risk and opportunity cost;
- a measure of performance which better informs about value by making provision for including changes in the capital value of the organisation;
- the framework being consistent with the various value-based management systems which have gained popularity in the private sector and some GTEs; and
- facilitating potential enhancements in policy areas such as dividend distribution, regulatory pricing matters and corporate governance and remuneration.

These benefits are achieved at a minimal compliance cost for GTEs, as most of the information required for the ERR measure can be taken from publicly available, audited financial statements. This particular aspect also allows use of the measurement formula by interested parties outside governments and GTEs (for example, regulators and the public).

On this basis, the Steering Committee is convinced that the application of the framework provided in this report would improve the performance assessment process for GTEs. Moreover, it can be readily applied to a range of organisations other than GTEs — both within the public and private sector. In instances where prices reflect a return on assets, the target-setting approach, for

example, provides a basis for establishing an appropriate revenue benchmark for commercial user charges. Decisions relating to how – and at what pace – such charges may be incorporated into an entity's pricing practices will be a policy issue for owner governments.

Structure of the paper

The major objectives of the report are to outline the concepts associated with the cost of capital and an ERR measure and to provide directions on their application in a user-friendly fashion. In addition, issues which should be taken into account by policy makers, analysts and regulators when assessing (as opposed to mechanically measuring) the performance of GTEs against the required rate of return are raised.

The report is structured as follows:

- a discussion of the fundamental concepts associated with market-based performance assessment (Chapter 2);
- a methodology for estimating the rate of return a government should expect a particular GTE to achieve (Chapter 3);
- an outline of the measurement of a GTE's performance against this target, which is based on publicly-available data and accessible to groups outside government (Chapter 4);
- worked examples of how the proposed target-setting and measurement methodologies can be applied to GTEs (Chapter 5); and
- a discussion on the need to distinguish between performance assessment and the mechanical processes of target-setting and measurement and the potential implications of that assessment (Chapter 6).

Proposed approach

The following discussion provides an overview of the approach detailed in the paper for target setting, performance measurement and the subsequent performance assessment of GTEs.

Setting a cost of capital target for GTEs

To determine if a GTE is maintaining value by providing its shareholders with an adequate return, it is necessary to establish a target. The target rate of return is known as the cost of capital.

It is important that the cost of capital be defined on a basis consistent with measured return. In the case of taxation, for example, an after-tax cost of capital should only be compared with after-tax cash flows. If not, misleading conclusions can be drawn and comparisons across GTEs will require adjustments.

The Steering Committee recommends the use of nominal, pre-tax targets based on the entire asset base. It also considers fully effective dividend imputation as a sound working assumption for GTEs.

Risk-return trade-off

Investors would, in general, like low risk and high returns. In reality, they must make a trade-off between the relative certainty of receiving a return and the magnitude of the return. High-risk enterprises need to achieve a higher rate of return than low-risk investments, if they are to be successful in attracting and retaining capital. It is therefore important that the estimated required return for a GTE explicitly account for risk.

Weighted average cost of capital

The assets of trading enterprises are usually financed by different classes of capital. These classes (for example, debt and equity) are defined by the degree of associated risk and, hence, required return.

It is possible to estimate and, in some cases observe, the returns expected on the different classes of capital. The sum of these weighted returns provides an estimate of the expected or *ex ante* rate of return on total assets. This commonly used approach is known as the Weighted Average Cost of Capital (WACC) and can be represented as follows:

$$R_a = R_e\left(\frac{E}{V}\right) + R_d\left(\frac{D}{V}\right)$$

where
- R_a = the expected rate of return on total assets (that is, cost of capital);
- R_e = the expected rate of return on equity (that is, cost of equity);
- R_d = the expected rate of return on debt (that is, the cost of debt);
- V = the market value of total assets;
- E = the market value of equity; and
- D = the market value of debt.

Most of the data necessary to estimate a GTE's WACC are readily available. A GTE's balance sheet, for example, provides values for assets, equity and debt. The rate of return expected on debt is the current interest rate, although adjustments will be needed to account for the effects of government ownership and the attendant implicit (or explicit) guarantee. However, the return on equity should be estimated using the Capital Asset Pricing Model (CAPM), a method widely used in both the private and public sectors to model risk-return trade-offs.

Capital structure

The mix of the different classes of capital which go to finance an enterprise's asset base is known as its capital structure. Other than at extreme levels of debt or equity, changes in the capital structure should not affect the cost of capital. This is based on the corporate finance principle that, with perfectly operating capital markets, the required rate of return reflects the level of risk associated with the assets and not the choice of capital structure.

Dividend imputation

The Steering Committee considers it a sound working assumption to have cost of capital targets for GTEs set as if the shareholder fully utilises the value of dividend imputation. This reflects the fact that dividends distributed by GTEs are not subject to further taxation and an expectation that if GTE credits were available, they would be priced highly by the market. A decision to assume less than fully effective imputation would lead to a higher pre-tax target, which would have implications for investment and pricing decisions.

Structure of the target

The Steering Committee recommends that the required or target rate of return on assets for GTEs be viewed as a variable risk-free rate plus a fixed risk margin. The *ex ante* cost of capital can be easily recalculated when there are changes in the risk-free rate. In this form, the target can be readily adjusted for comparison with *ex post* performance.

Measuring performance

The most objective measure of value or performance is given by a listed company's share price.

This price reflects investors' expectations of a company's earnings capacity, based on the varying degree of information available to them. A major source

of public information is provided by a company's audited financial accounts. It is doubtful, however, that investor analysis of such accounts is restricted to basic accounting measures, such as reported earnings as a proportion of the historical capital base. Because accounting standards allow for key items such as income and asset values to be treated in a variety of ways, it is likely that basic accounting measures are adjusted before forming part of the information base drawn on to make investment decisions.

In the public sector, performance measurement has relied very much on basic accounting measures. A commonly used form of accounting rate of return (ARR) is given below:

$$ARR = \frac{EBIT}{\frac{1}{2}(BV_b + BV_e)}$$

where

	ARR	=	the pre-tax accounting rate of return on total assets;
	$EBIT$	=	operating profit before income tax and after abnormals, plus gross interest expense;
	BV_b	=	the 'book' value of the asset at the beginning of the period; and
	BV_e	=	the 'book' value of the asset at the end of the period.

This rate of return is not comparable with the cost of capital (as developed in Chapter 3 of this paper). For example, the measure of income may not include upward movements in capital value and the capital expense due to depreciation (as captured in EBIT) may bear little relation to the 'economic' consumption of the assets. It is therefore deficient for performance monitoring and investment decision purposes.

A market-based rate of return includes all income of relevance to the providers of the capital. To facilitate a more sophisticated analysis of a GTE's target and realised performance, the Steering Committee has adopted a measure of financial performance, the Economic Rate of Return (ERR), which better informs about value, as it makes provision for both cash and capital returns. The ERR concept can therefore be put simply as:

$$ERR = \frac{\textit{Net Cash Receipts + Change in Market Value}}{\textit{Opening Market Value}}$$

The ERR formula given in this paper provides a first-cut measure of economic performance by reconstructing information taken from a GTE's financial statements. The paper also discusses a number of additional adjustments which can be made to accounting income to give a measure of income which better reflects underlying earnings potential. The Steering Committee considers that, in spite of the decision to use accounting information, the ERR formula has a number of intrinsic advantages over traditional accounting measures.

The basic formula for an operational ERR is given as follows:

$$ERR = \frac{(EBIT + Da + NIBL + FL + CSO) + (A_e - A_b - NI)}{A_b + (NI/2)}$$

where

	$EBIT$	=	earnings after abnormals and extraordinaries, but before interest and tax;
	Da	=	accounting depreciation and amortisation;
	$NIBL$	=	an adjustment for the implicit interest cost of non-interest bearing liabilities;
	FL	=	an adjustment for interest cost of assets under financial leases (only made if not already included in EBIT);
	CSO	=	an adjustment for the net economic cost of CSOs (if applicable);
	A_e	=	the end of period value of total assets;
	A_b	=	the beginning of period value of total assets; and
	NI	=	value of net investments throughout the year.

The ERR measurement formula offered in this paper is not the objective equivalent of an enterprise's share price. It must be supported by a thorough understanding of the enterprise's business and the issues which would impact on measured performance. Nonetheless, the Steering Committee sees it as a significant improvement on performance assessments which are based on a simple comparison of basic accounting measures and a target rate of return.

Consistency with Value-Based Management

In recent years, many leading Australian and overseas private sector organisations have revisited their major corporate performance objectives. The result has been a greater focus by senior management on what has generally been referred to as maximising shareholder value.

In simple terms, creating value involves achieving returns in excess of those originally expected by the investor – that is, they are greater than the cost of capital.

The shift in strategic direction reflects a formal recognition that it is the cash flow generated by a company which is valued by shareholders. Capital providers are concerned with the present and future cash flows achieved by their investment, taking into account what they could have earned elsewhere. Market share, accounting profits and the size of an organisation, while useful as partial performance measures, are of themselves insufficient as global indicators of value. For example, a company may be performing well against these traditional measures of performance, while at the same time adopting strategies which do not add value. Management strategies aimed at increasing market share and accounting profits, for example, do not necessarily improve a company's ability to generate cash flows sufficient to cover the opportunity cost of the capital it uses.

Although an organisation's share price can be used as a performance measure over all its activities, it provides little guidance on how effectively line or divisional management are utilising capital. This has given rise to the development of a range of internal performance monitoring systems which compare performance and proposed strategies against the cost of capital. These are generally referred to as Value-Based Management (VBM). The VBM techniques provide a framework which allows managers to assess past performance and screen future investment strategies on the basis of shareholder value creation or diminution.

The ERR measurement methodology in this paper is primarily for external monitoring purposes. However, its underlying concepts are consistent with many internal VBM techniques now commonly used in the private and public sectors. On this basis, adoption of ERR should assist in establishing a link between maximising shareholder value and managerial decision making within GTEs.

ERR and the cost of capital over a period

As discussed above, the cost of capital can be considered as a fixed risk margin above a *variable* risk-free rate. As performance is measured over a period – as opposed to a forward-looking target, which is set at a point in time – account will need to be taken of changes in the risk-free rate (as reflected in the long-term bond rate).

Measured annual performance can be subject to random variations and events outside the control of management.

To account for changes in the cost of capital over the performance period and events outside the control of the GTE, the Steering Committee recommends that a GTE's ERR be represented as a rolling average of three years performance and compared with an adjusted cost of capital target over the same period.

Chapter 5 of this paper provides an example of how this approach can be applied to a GTE.

Performance assessment

The formal methodologies outlined in this paper provide a risk-adjusted target and an ERR measure. Conclusions based solely on a comparison of these two estimates would be deficient.

Performance assessment should also include a range of measures other than ERR, each of which can be used to evaluate various aspects of GTE performance. Since GTEs often have monopoly power and can therefore increase their rate of return by increasing the charges to consumers rather than increasing efficiency, the Steering Committee recommends that this suite of indicators include a measure of technical efficiency, such as Total Factor Productivity.

The mechanical process of arriving at a measure of value added (or destroyed) is but one part of a comprehensive performance assessment process. To gain a thorough understanding of performance, account must be taken of number of qualitative issues, such as:

- past investment decisions;
- relative performance of other organisations with similar-risk assets;
- changing market and regulatory conditions;
- level of competition;
- the interaction of pricing and ERR performance; and
- the process of adjusting to a new performance regime.

Policy decisions stemming from the adoption of the framework provided in this paper need to include a full consideration of these matters.

1 BACKGROUND

Government Trading Enterprises (GTEs) are significant users of resources and providers of services, whose level of efficiency affects the overall performance of the Australian economy. GTEs typically require high levels of capital to provide their services.

For these and other reasons, governments and tax payers require assurances that the capital committed to GTEs is being efficiently employed and earning a satisfactory return. As expressed by the Commonwealth Treasury (1990, p. 1):

> If the investment in a government business enterprise is not realising an adequate return (after allowing for the cost of any government-enforced non-commercial services provided) the question can rightly be asked why the community should not demand that at least some of the assets of the enterprise be sold and the resulting funds used in more productive activities or possibly to pay off public debt.

Over the last few years, most governments have embarked on a series of administrative changes aimed at improving the efficiency of GTEs. Broadly speaking, these have involved increasing the commercial focus of GTEs and exposing them to competition. In some instances, the changes have extended to privatisation.

Performance monitoring and the choice of indicators are important in assessing the outcomes of these changes. Where governments are to retain ownership of GTEs, they will wish to assess the financial performance of the governments' (and ultimately the community's) investments in these enterprises. They will require this assessment to be carried out on a basis consistent with that used by private sector investors. Methods for assessing the financial performance of GTEs should closely relate to market-based concepts such as shareholder value and the cost of capital.

1.1 An adequate return

To determine if a particular GTE is delivering an adequate return to its owners it is necessary to develop a benchmark or target. In the private sector, this target is commonly referred to as the cost of capital. It represents the rate of return or the yield expected by investors for providing the capital used in the enterprise and is usually expressed as a ratio of the expected return to the value of the investment.

If an enterprise meets this target it is said to be covering its cost of capital, and shareholder value will be maintained. If expected returns are not adequate, the value of the organisation or asset will fall until the cost of capital is once again achieved. If a company is listed on the stock exchange, the value of its equity will be expressed through the price of its shares. Hence, in the stock market, expected returns are immediately capitalised into the value of the company through movements in share prices, so that the required cost of capital (or yield) is achieved. At any particular time, the price of an enterprise's shares encapsulates investors' views of its financial performance.

With respect to GTEs and unlisted companies, there exists no stock market to establish the value of the enterprise. This paper provides guidance as to how, in the absence of traded equity, the owners of such enterprises can assess financial performance through the application of appropriate targets and measures.

The setting of cost of capital targets for GTEs is designed to assist decision making and promote the efficient use of resources. Such targets are based on the concept that the value of an investment in a particular enterprise should always be assessed against its best alternative use (that is, opportunity cost). If 'rational' investors do not expect to receive an adequate return on their capital in a particular investment, and a better alternative exists, they will redirect their funds into the higher yielding activity, causing a corresponding fall in the value of the enterprise.

In recognition of this, management is encouraged to make decisions designed to ensure that the providers of capital receive the highest possible return. Competition prevents this from being excessive. It is for these reasons that the cost of capital target is accepted as a means of determining whether capital is being efficiently utilised.

Consistent with this emphasis on efficiency, the required rate of return target for GTEs should be developed within a framework which incorporates the elements of return considered important by the providers of capital. A high risk enterprise needs to achieve a higher return than a lower risk enterprise if it is to be successful in attracting and retaining capital.

In the past, there may have been a tendency to treat the shareholder's (that is, the community's) equity in GTEs as if it were free or had a low opportunity cost. The recognition that the public's equity in GTEs has an opportunity cost is an important element in improving the performance of GTEs and is the basis for the framework recommended in this paper.

1.2 Current measures of return

The desire to replicate private sector disciplines for GTEs is not a new development. In the 1980s, governments adopted a range of accounting-based indicators and targets to aid them in the performance assessment of GTEs. In addition to being widely reported and understood, accounting information is readily available, timely and open to financial audits. Various forms of accounting rate of return have become a central element of most governments' performance monitoring arrangements for public sector enterprises.[1]

However, a corollary to the adoption of a cost of capital target is that measurement of performance against this benchmark be consistent with the definition of market-based returns. In this regard, although widely reported by enterprises outside the public sector, the accounting rate of return measure has limitations. It does not adequately capture certain key elements of return which drive efficient capital markets. These are changes in the value of the enterprise and risk.

For an investment such as shares in a publicly listed company, measuring economic performance is not a difficult exercise, since the basic information — share prices — is freely available and widely understood. Since GTEs have no traded share base, it is necessary to derive information about their performance from data in GTE's published accounts.

Against this background, in 1990 the Commonwealth Treasury published an economic paper (Treasury Economic Paper No. 14), *Financial Monitoring of Government Business Enterprises: An Economic Framework*. Elements of this paper were further developed by a Commonwealth Working Group (the 'Working Group') which reviewed financial targets for Commonwealth transport GTEs. The Commonwealth is implementing an economic framework for performance assessment of its major GTEs which is based on the findings of the Working Group. This framework incorporates the setting of forward-looking targets based on the cost of capital and the subsequent measurement of Economic Rate of Return (ERR) performance against these targets.

Notwithstanding the improvements offered by the approach recommended in this paper, it must be kept in mind that the return on assets is only one dimension of economic performance, and should be interpreted in conjunction with a range of other indicators which measure aspects of overall performance. For example, a GTE which enjoys a substantial degree of monopoly power can

[1] The most common accounting rates of return are profit/equity and earnings before interest and tax/total assets. For more information on this see the Steering Committee's annual reports on performance indicators for Government Trading Enterprises.

potentially meet any rate of return target — whether accounting or economic-based — through price increases or through reductions in service quality. Also, there is potential for governments to set prices to maintain the value of their equity and their dividends. Thus, the effectiveness of using a cost of capital target and ERR as performance measures is very much dependent on their interpretation in light of the factors that these benchmarks — as with any performance measure — cannot capture.

1.3 Objectives of the paper

The Steering Committee contends that there is a need to develop indicators of GTE financial performance which encompass a more comprehensive assessment of income and shareholder value than that provided by basic accounting measures, and which are amenable to comparison against the opportunity cost of capital.

On this reasoning, the major objectives of this paper are to outline the concepts associated with the cost of capital and ERR and provide directions on their application in a user-friendly fashion. In particular, the paper:

- recommends a consistent approach to setting cost of capital targets and to the measurement of ERR, using data re-constructed from published accounts;
- seeks to provide GTEs with a better understanding of what drives shareholder value and how it relates to investment decisions and performance; and
- discusses a number of issues which should be taken into account by policy makers, analysts and regulators when assessing (as opposed to measuring) the performance of GTEs.

To this end, the paper includes :

- a discussion of the fundamental concepts associated with the assessment of a market-based rate of return (Chapter 2);
- a framework for estimating the required rate of return a government should expect a particular GTE to achieve (Chapter 3);
- an outline of the measurement of a GTE's performance against this target (Chapter 4);
- examples of how the proposed target-setting and measurement methodologies can be applied to GTEs (Chapter 5); and

- a discussion of certain issues associated with performance assessment (Chapter 6).

In summary, the methodologies outlined in this paper enable economic rates of return to be derived from GTE accounting data and compared to an appropriate target based on the cost of capital. As a performance measure, ERR suffers, as do all performance measures, from some limitations. It needs to be complemented by a range of other measures. Nevertheless, the Steering Committee on National Performance Monitoring is convinced that it is a more informative indicator of the efficiency with which assets are utilised by GTEs than the basic accounting rate of return.

2 MARKET-BASED PERFORMANCE ASSESSMENT

Governments increasingly require their GTEs to operate in a commercial manner. Consistent with this requirement is the notion that the method of assessing a GTE's financial performance should, as far as practicable, reflect the methods used by investors to assess private sector enterprises which compete for capital in debt and equity markets. For governments to behave like market investors, they should:

- regard themselves as investors in GTEs;
- set targets for GTEs which relate to opportunity cost and the relative risk associated with the particular entity; and
- concern themselves with the economic income returned by individual GTEs.

Economic income consists of both net cash receipts (for example, dividends) and changes in the market value of investments. It is the appropriate measure of income because it represents all sources of return relevant to shareholders.

However, despite the apparent appeal of ERR as a basis for evaluating the performance of GTEs, governments have tended to rely on measures of basic accounting earnings, a more limited measure of income.[2] This reflects a number of factors, including:

- the fact that accounting figures are readily available, verifiable and have been developed according to a long-established framework;[3]
- the fact that private sector enterprises publicly paper earnings as detailed in audited accounts; and
- a view, previously held, that a private sector shareholder outlook was not appropriate for governments (and indirectly the public) in their assessment of GTE performance.

More recently, these issues have been re-examined. More emphasis has been placed on the need for GTEs to provide an adequate rate of return. The methods used by owner governments to estimate return targets have become more market-based, in that they formally recognise that the equity capital invested by

[2] Accounting earnings consist of earnings before interest and tax (EBIT).

[3] The first published work describing double-entry bookkeeping is accredited to Luca Pacioli in 1494 (Hendriksen 1977).

GTEs *is not free*, given that it has an alternative use. It has also become apparent that basic accounting ratios taken from published accounts are inadequate for value-based management decisions and performance assessment (Rappaport 1986; Johnson and Kaplan 1987). However, as discussed later in this paper, published accounting data can be reconstructed into a more informative working measure of performance.

The purpose of this Chapter is to discuss the reasons for progressing beyond the external monitoring regime presently used by most governments, by explaining why the accounting rate of return is only a partial measure of financial performance and thus unable to adequately inform about *value*.

2.1 Performance assessment in competitive capital markets

A stock market with a large number of listed companies represents a highly competitive equity capital market. The owners of shares in companies listed on the stock exchange expect to be compensated for providing the capital, given a range of alternative investments. If an event occurs that causes a company's expected returns to be higher than previously anticipated, value is added to the investment, and *vice versa*.

In this way, the stock market continually adjusts the value of the investment (as reflected in the share price) to reflect additional information about what return companies are expected to provide their shareholders. To determine if an enterprise is adding value (whether in the private or public sector) it is necessary to understand, first, what investors want to be compensated for and, second, how this compensation is measured.

2.1.1 Cost of capital

The rate of return expected on an investment represents a simple and widely accepted target against which owners and management can benchmark performance. Expressed as income or cash flow as a percentage of the value of the asset, such targets are also used by enterprises for internal capital budgeting purposes. To assess the viability of a particular project, for example, managers often discount expected cash flows by a 'hurdle' rate to arrive at a present value. This approach to investment appraisal is known as the discounted cash flow (DCF) method.

The concept of a hurdle rate or minimum return can be extended to the operations of capital markets and the performance assessment of business

entities. In competitive markets, the required rate of return on an investment is commonly known as the cost of capital.

It is referred to as a 'cost' because those with access to the capital must pay for its use. The need to service the capital committed to an enterprise — both debt and *equity* — is simply a cost of doing business. In this sense, capital is not unlike any other resource in the production process: those that provide the resource will only do so if they expect to receive adequate compensation. In the case of capital, this compensation or price accounts for the fact that capital:

- has an opportunity cost (the time value of money), in that it could have been committed to an alternative use; and
- has been exposed to some level of risk.

To assist in estimating a required return target for different investments or assets, the risk-free rate of return is often used as a measure of the time value of money. Thus, the required rate of return target can be represented as:

$$\textit{Cost of capital} = \textit{Risk-free Rate} + \textit{Risk Margin} \qquad (1)$$

Presenting the cost of capital in this form allows it to be estimated using empirical data.

2.1.2 Market-based measures of performance

As with project appraisal, the link between required return and measured performance is founded in the DCF method. The DCF approach is a widely used and analytically-sound method for valuing enterprises in the private sector, as it provides a process for discounting future cash flows in line with the opportunity cost and a margin for risk. Its application as a valuation tool reflects the central importance of cash flow to shareholders.

The DCF is closely related to the Internal Rate of Return (IRR) — a general concept also widely used in corporate finance. As stated by the Commonwealth Treasury (1990, p. 7), the IRR:

> ... is that discount rate which equates the stream of future 'income' flows from an investment to the original cost of the associated asset. The return becomes an **economic rate of return** when the income flows incorporate the market value of these assets.

An Economic Rate of Return (ERR) is similar to the concept of a single-period IRR. That is, it is the growth rate required on an investment over a single

period which equates the initial value of the asset to the sum of the net cash receipts and the market value of the asset at the end of the period. The relationship between these variables can be expressed as follows:

$$MV_b(1+r) = CF + MV_e \tag{2}$$

Re-arranging and solving for *r* provides the market-based measure of ERR:

$$r = \frac{CF + MV_e - MV_b}{MV_b} \tag{3}$$

where
- r = the measured rate of return;
- CF = the net cash receipts received by providers of the capital during the period;
- MV_e = the market value of the asset/enterprise at the end of the period; and
- MV_b = the market value of the asset/enterprise at the beginning of the period.

The ERR is said to be economic because it includes all relevant income, including capital gains. It recognises that, from the standpoint of investors, value can be influenced through changes in both cash returns and in capital value (see Box 2.1). Individual investors will supply their capital based on their preferred mix of returns.[4] The inclusion of changes in value is the major distinction from traditional rate of return measures based on accounting income.

Equation (3) can be restated in the following general form:

$$ERR = \frac{Net\ Cash\ Receipts + Change\ in\ Market\ Value}{Opening\ Market\ Value} \tag{4}$$

[4] In the case of GTEs, the degree of indifference to the mix of cash and capital may be affected by the fact that the owner government is more restricted in its ability to access economic income accrued through capital gains.

Box 2.1: **Performance measurement for a real estate investment**

An investor has purchased a property for $100 000 at the beginning of the year (MV_b). The property is leased for the entire year and the investor has the market value of the property appraised at the end of the year (MV_e). The ERR, for scenarios A and B, can be calculated as follows:

	MV_b	*Cash Receipts*	*Costs*	*Net Cash Receipts*	MV_e	*ERR*
			($ 000)			*%*
A	100	6	1	5	105	10
B	100	6	3	3	107	10

Both scenarios have the same beginning value and ERR. However, the mix of net cash receipts during the period and the market value of the property at the end of the period are different. In scenario B, the investor has decided to spend an additional $2000 on renovations. This results in lower net cash receipts, but a higher end market value. The increase in value reflects an expectation of greater cash flows in the future.

Comparing an actual rate of return with a target rate of return or cost of capital is the first step in performance assessment of investments in the private sector. If the ERR of an investment is greater than its cost of capital, over a period of time, then it is said to be adding value — and eroding value if it is less. The change in value, however, does not alter the cost of capital.

In the case of equities traded on the stock exchange, any discrepancy between required and expected returns is immediately capitalised into the value of the shares. That is, if the returns on an investment fail to meet its cost of capital, the value of the shares in question (which represents the denominator in the rate of return) can be expected to fall relative to the market to the point where the achieved rate of return is brought back to equal investors' expectations of the required rate of return (in other words, their perceived cost of capital).

These value corrections are a key feature of competitive capital markets. If governments wish to apply targets and measure performance in a manner which is consistent with the outcomes achieved in the marketplace, then having GTEs achieve their cost of capital over a period of time is an appropriate goal.

2.2 Accounting-based performance framework

To make an informed decision about investment performance (that is, value), it is necessary to estimate rate of return targets and measures within a framework which incorporates elements such as risk, total returns and opportunity cost. From this standpoint, the accounting-based approach to performance monitoring presently used by many governments and reported by GTEs is inadequate.

2.2.1 Accounting rate of return

For an enterprise as a whole, accounting income, for the purpose of calculating rate of return, is usually defined as earnings before interest and tax (EBIT). The Steering Committee uses the following definition of accounting rate of return (ARR):

$$ARR = \frac{EBIT}{\frac{1}{2}(BV_b + BV_e)} \tag{5}$$

where
- ARR = the pre-tax accounting rate of return on total assets;
- $EBIT$ = operating profit before income tax and after abnormals, plus gross interest expense;
- BV_b = the 'book' value of the asset at the beginning of the period; and
- BV_e = the 'book' value of the asset at the end of the period.

There are many definitions of ARR, but this is the one most commonly used for GTEs.

Comparison with ERR

Accounting income (EBIT) is essentially based on past earnings. Its components are determined according to a set of standards and principles, established by the accounting profession, which are designed to facilitate the verification and assessment of financial accounts. These standards and principles can, however, result in different estimations of accounting income depending on the approach used and the method adopted to revalue assets.

ARR is often poorly correlated with a market-based measure of return. Moreover, accounting profit may be subject, as are most forms of information, to strategic manipulation. ARR can therefore provide for incorrect valuations (and thus performance assessments) and management decisions by misrepresenting the underlying ability of an investment to generate future cash flows.

These concerns were expressed by Copeland, Koller and Murrin (1991, p. 74):

> Only the cash flow generated by the business can be used for consumption or additional investment. [A]ccounting earnings is useful for valuation only when earnings is a good proxy for the expected long-term cash flow of a company. Not all companies generate the same cash flow for each dollar of earnings, however, so [accounting] earnings approaches are generally only useful for first-cut value approximations. They fail as a comprehensive management tool.

The Steering Committee recommends an approach which seeks to address these concerns by reconstructing the information contained in financial statements in to a better measure of financial performance.

The deficiencies associated with ARR stem largely from the following aspects of the measurement of accounting income:

- Unrealised capital gains or losses — The accounting treatment of unrealised capital losses resulting from an asset revaluation usually has a negative effect on accounting income, as recorded in the profit and loss statement.[5] However, unrealised capital gains are included in asset revaluation reserves and are not included in the profit and loss statement (and are thus not included in EBIT). EBIT will therefore not be consistent with the market-based notion of economic income which includes both a cash and capital stream.
- Depreciation — Asset depreciation expenses are generally calculated according to an agreed schedule which is intended to represent the consumption of the asset over its productive life. However, this allowance may be somewhat arbitrary and frequently does not represent the 'economic' consumption of the asset. To the extent that this is the case, accounting depreciation is not a reliable measure of the existing service potential of the asset (that is, ability to produce future cash flows).[6]

Apart from income measurement, ARR also differs from ERR in terms of the asset base (the denominator in the above equations) against which it is assessed. First, for the purpose of calculating ARR, the asset base is the *average* of the values at the beginning and end of the period. On the other hand, ERR takes as its capital base the opening value of the assets. Consistent with the market basis of ERR, changes in the value of assets are included in the capital stream of economic income (that is, in the numerator of the ERR equation).

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[5] Under Australian Accounting Standard 10 (AAS10), unrealised losses are treated as expenses (and so affect EBIT) or as reductions in previous revaluations. AAS10 does not dictate the circumstances in which revaluations should be undertaken. This is left to the discretion of the management.

[6] For more discussion on this issue, see Fischer and McGowan (1983).

The second issue relating to the asset base is the appropriate method of valuation. Accounting standards allow for assets to be valued on bases ranging from historical cost to market value, provided they do not exceed the asset's recoverable value. Most GTEs currently value the majority of plant and equipment using historical cost accounting, which takes as its foundation an asset's initial purchase price and affects EBIT through depreciation. Although values on this basis are widely reported by private sector enterprises in their published material, they are not consistent with those used for assessing performance against a cost of capital measure. Historical cost, for example, does not necessarily move in sympathy with the value of the asset or group of assets as affected by changing demand patterns and technological advances. Current valuation of assets is designed to provide an indication of the opportunities available to the GTE (and owners) and thus promote better use of resources.

If the Australian Accounting Standards are amended to accommodate more appropriate valuation methods for GTEs, accounting measures will tend to converge towards economic measures of performance. However, changes in asset values will still need to be incorporated in EBIT.

Relevance for decision-making

The fact that accounting measures only provide owners and managers with a partial view of performance does not render them totally ineffective. However, it does mean that they may not adequately inform about value and shareholders' expectations. As stated by Rappaport (1986, p. 44):

> The problem lies not so much with accounting but rather its use by managers for unintended, inappropriate purposes. Accrual accounting conventions are governed by the objectives and institutional constraints of corporate financial reporting. Corporate reporting assesses a company's past performance and is designed primarily for non-management groups. Performance for the most recent year cannot be properly evaluated without a recognition that the investments made by management during this and preceding years may not be recouped until subsequent years. Accounting copes with this lag and the uncertainty surrounding the amounts and timing of the prospective cash flow by assigning the cost of certain investments such as R&D exclusively to the period in which the outlay takes place. For investments in fixed assets, the cost is assigned systematically, albeit arbitrarily, to a set of future time periods by the depreciation process.

Reliance on ARR can lead to inappropriate investment decisions and performance assessment. For example, a high ARR may indicate high present earnings, but shareholder value will be eroded if these high earnings are at the cost of future earnings capacity. In this instance, the GTE will not cover its cost

of capital – which should be a commercial imperative – despite appearing to be a good performer in an accounting sense.

ERR is relevant for decision-making because it is comparable with the cost of capital. This is significant for GTEs as many undertake investment appraisals using hurdle rates based on opportunity cost. The discrepancy between market based measures of return and those based solely on accounting was observed by Ijiri (1978, p. 332):

> ... investment decisions are primarily based on forecasted cash flows, yet when it comes to performance evaluation, [accounting] profit flows become the primary source of data. This is confusing since an investment can look good on one basis and poor on another.

An improved external monitoring regime incorporating the cost of capital and ERR provides owner governments with a greater ability to identify – and if they wish, reward – those GTEs who make the correct investment decisions and cover their cost of capital. To this end, the proposed framework in this paper is entirely consistent with internal Value-Based Management Models used in the private sector to assess performance (see Section 4.4 for more information).

2.2.2 Accounting targets

The widespread use of accounting measures has necessitated the development of accounting-based targets. Targets for comparison against ARR are usually developed according to some form of trend analysis and *ad hoc* adjustments for the performance of other enterprises.

As discussed above, the appropriate target is the cost of capital. The accounting approach provides no objective method for recognising opportunity cost and risk. The cost of capital, on the other hand, signals that the capital committed to a GTE has an alternative use and that both debt and equity capital have a cost. This could counter any tendency to regard equity as if it were free.

2.3 Benefits of the suggested methodologies

Notwithstanding the special characteristics of GTEs, governments as shareholders should adopt targets and measures of performance which, as far as possible, are developed to assess market-based performance. Such an approach is essential to ensure that GTEs focus on, and are evaluated on, their ability to at least maintain the value of the public funds invested in them. This is in spite of the fact that the owner government may wish to chose to accept this value in the

form of either commercial returns, improved quality or other benefits to the community (for example, price reductions).

Having addressed the conceptual advantages of market-based targets and measures, the following two chapters provide the Steering Committee's preferred approach to establishing a cost of capital target and an ERR measure for GTEs. Combined with other policy initiatives already in train (particularly the promotion of competition in associated capital and product markets), the explicit adoption by governments of an external monitoring regime based on market-based concepts has a range of benefits to the wider community in terms of improved use of public sector capital (including that committed to non-GTE agencies).

Target-setting

As noted by the Commonwealth Working Group (1993, p. 15), objectively set financial targets (as provided in this paper) can be used to:

- identify and report the opportunity cost of resources managed by the GBEs;
- provide a benchmark against which to monitor the overall performance of the enterprise and its management;
- provide a basis for management to assess annual commercial performance of individual business units and the enterprise as a whole;
- assist management to establish an appropriate pricing policy;
- assist management to screen the viability of new projects; and
- provide regulatory bodies with important information for their role of evaluating proposed price changes by GBEs.

The implementation of elements of the National Competition Policy agenda, such as access pricing, will require a framework for setting objective, risk-based targets for certain GTEs. Indeed, the target-setting approach detailed in this paper can be readily applied to a range of organisations other than GTEs — both within the public and private sector. In instances where prices reflect a return on assets, the target-setting approach, for example, provides a basis for establishing an appropriate revenue benchmark for commercial user charges. Decisions relating to how — and at what pace — such charges may be incorporated into an entity's pricing practices will be a policy issue for owner governments.

Measurement

With regard to target-setting, there is general acceptance that models widely used in the private sector for estimating the cost of capital can be successfully

applied to GTEs. Despite data constraints and some necessary assumptions, models such as the Capital Asset Pricing Model provide a useful and widely used framework, one that includes value drivers such as opportunity cost and risk.

The measurement of return achieved by a GTE against such a target is more problematic. Nonetheless, there are a number of potential benefits to be gained from adopting the ERR methodology.

As with private sector businesses, the cash flow a GTE produces is a major determinant of its value. As previously explained, the accounting conventions under which reported earnings are gauged, whilst permitting a verifiable measure, can give a distorted view of the underlying income generating potential of an enterprise.

Chapter 4 of this paper outlines a formula for measuring ERR which uses data drawn from audited accounts, but which is more comparable with a cost of capital target than basic measures of ARR, such as the ratio of EBIT to the average value of assets. In addition to minimising compliance costs for GTEs, a measure based on publicly reported information has the advantage of being available to groups outside government. The Steering Committee considers that reliance on financial accounts for calculating this measure does not diminish its intrinsic advantages over traditional accounting measures. The construction of the ERR measure provides both shareholders and GTEs with a greater awareness of what affects underlying earnings and how this relates to management decisions which add value. Improved measures such as ERR can also provide guidance to governments that wish to review and improve their systems of GTE corporate governance and management.

3 COST OF CAPITAL TARGETS

The shareholder–corporate governance relationship for GTEs is unique to the public sector. As owners, governments often have a stronger influence over the strategic direction of a GTE and its investments than that exercised by shareholders in companies listed on the stock exchange. This, and the absence of a market for shares in GTEs, makes the relationship between governments and GTEs very similar to the holding company–subsidiary arrangement common in the private sector. Governments also have a range of interests, such as social policy considerations, that come to bear on decisions about investments in GTEs.

These specific aspects of government ownership may have important influences on the measured financial performance of GTEs. However, because capital should be valued regardless of whether it is used in the public or private sectors, these issues do not affect the cost of capital. This Chapter is therefore only concerned with setting financial targets for GTEs, and with those aspects of financial markets of relevance to investors. In particular, it is concerned with the relationship between risk and return, and the effect of this relationship on the cost of capital.

This Chapter outlines the Steering Committee's preferred method of setting *ex ante* or forward-looking financial targets for GTEs. This approach is commonly used in the private sector for performance assessment and as a means of determining a hurdle or discount rate for new investment. The chapter reviews the basic tenets of investor behaviour before giving details of the method of target setting. A worked example is given in Chapter 5.

3.1 Risk–return trade off

Investors would generally like low risk and high returns. In reality, they must make a trade-off between the relative certainty of receiving a return and the magnitude of the return. High-risk enterprises need to achieve a higher rate of return than low-risk investments if they are to be successful in attracting and retaining capital. If an investment does not earn an adequate rate of return for its risk, its value will fall relative to the market. In this way value, risk and return are inextricably linked.

3.1.1 Diversification

The risks which investors face are of two kinds: unique risk and market risk.

Unique risk is specific to a particular enterprise, but can be eliminated through diversification. When setting cost of capital targets, it is assumed that investors, at little or no cost, can diversify their investments by holding a portfolio or mix of assets. This is designed to minimise their exposure to unique risk. As explained by the Commonwealth Treasury (1990, p.13):

> If the returns on different investments in the portfolio are uncorrelated (they are not affected similarly by changing circumstances), at any one time some returns on individual investments are likely to be higher than expected, offsetting returns lower than expected ... In other words, risk can be minimised by diversification, provided the returns of individual investments are not directly related.

Unique or diversifiable risk affects only a specific industry and perhaps related sectors of the economy. Examples would include the risk of legal liability arising from a faulty product or changes in industry-specific regulation.

The extent of unique risk does not affect the cost of capital. This is because investors can, by diversifying, reduce unique risk without reducing the returns from an individual investment. They cannot be expected to be compensated for this form of risk. On this reasoning, investors with well-diversified portfolios do not take unique risk into account when assessing the appropriate risk-return trade-off for a particular investment.

The only form of risk investors can expect to be compensated for is the risk they *have* to bear. This form of risk is known as *market, non-diversifiable* or *unavoidable risk*. Market risk affects the returns on all investments in the market portfolio to some degree. It is measured by an investment's sensitivity to those elements which affect general economic conditions, such as interest and exchange rates, fiscal policy, incomes policy and the general rate of inflation. It is the only form of risk assumed to be given a value, *ex ante*, by equity markets.

Care must be taken so as to not confuse market and unique risk (see Box 3.1).[7]

[7] A more detailed account of how to distinguish between market and unique risk is provided at Appendix C.

Box 3.1: **Unique and market risk in a gold investment**

Many people intuitively associate risk with the variability of book, or accounting, earnings. But much of this variability reflects unique risk. Lone prospectors in search of gold look forward to extremely uncertain future earnings, but whether they strike it rich is not likely to depend on the performance of the market portfolio. Even if they did find gold, they do not bear much market risk. Therefore, an individual investment in gold may have highly variable earnings (unique risk) but low market risk. Thus, the required return from such an investment — assuming a reasonably diversified portfolio of assets — would be anticipated to be low compared to the overall market.

Source: Brealey and Myers (1991, p. 199)

3.1.2 Unique risk and GTEs

The desire of individual investors to diversify for unique risk does not mean that enterprises need do likewise. Analysis of competitive capital markets indicates that investors do not pay a premium for highly-diversified companies. Diversification — whilst important to the investor — is a sensible corporate objective only in the case where a company's shareholders are themselves unable to do so at a similar cost.

The Steering Committee considers it sound to assume that governments, like other investors, *can* cost-effectively diversify their portfolios to reduce unique risk. This is demonstrated by the fact that most governments diversify not only through the ownership of several GTEs but also by ownership of a variety of government investments.

If the assumption that governments can diversify is not made and it is assumed instead that both they and GTEs attempt to incorporate unique risk into the target-setting framework, rate of return targets are likely to be set above those used by private sector investors for assets with the same level of market risk. This may lead to GTEs undertaking higher risk investments, adopting economically inefficient pricing or discarding investment opportunities which should be undertaken in order to achieve the target. When calculating risk-adjusted rate of return targets consistent with those used in the private sector, the unique risk associated with an individual GTE — its business activities and investments — should not be taken into account.

This does not imply that unique risk is unimportant. Indeed, unique risk may be a relevant issue for a GTE, but is more effectively dealt with when assessing actual performance, rather than when setting targets. As discussed in the following Chapters, the *measured* rate of return achieved by a GTE will need to account for the impact of unique risk.

In instances where a government remains concerned about the unique risk exposure of a particular GTE (if, for example, it represented a significant portion of the government's GTE portfolio) it would be better to address such concerns through the established processes which enable owner governments to influence the GTE's strategic direction (for example, corporate plans or statements of corporate intent), rather than adjust the target.

3.1.3 Business unit targets

The target-setting framework outlined in this Chapter relates to a cost of capital target for the enterprise as a whole, rather than for individual business units. However, the target is an excellent reference point for assisting GTE management to assess the annual financial performance of individual business units and to screen new projects.

Targets for individual business units should be based on the level of risk of the particular business unit.[8] Although this may result in different targets for each business unit, when combined on a weighted basis these targets should average out at the total return required for the enterprise as a whole. This is consistent with the private sector practice of setting rates of return for business units which vary with changes in the opportunity cost of capital and the business unit's risk profile. It is ultimately for governments to decide whether to apply risk-based targets at the GTE level or to individual business units.

3.2 Target-setting methodology

The cost of capital reflects an asset or group of assets' level of market risk. As discussed further in the following section, the setting of cost of capital targets for GTEs is based on the corporate finance principle that *it is the risk associated with the assets, and not how they are financed, which affects the required rate of return*.[9]

To estimate the cost of capital it would therefore be preferable to determine the level of risk relating to the assets. This, however, is not measurable in practical terms. As an alternative, it is possible to estimate or observe the level of risk (that is, required return) associated with the various classes of capital used by an

[8] Some insight into the process for setting different targets for business units is outlined at Appendix C.

[9] That the return from the assets is independent of the capital structure is a widely accepted principle based on the Modigliani-Miller assumptions discussed in section 3.3.2.

enterprise to finance its assets (for example, debt and equity). The weighted aggregate of these returns should equate with the return on total assets.

3.2.1 Weighted average cost of capital

The mix of securities issued by an enterprise is known as its capital structure. The different securities or classes of capital (for example, debt and equity) are defined by the contractual claims investors have on the income flows. Debt holders have prior rights to an enterprise's earnings over common stock or equity holders, who are residual claimants. This being the case, debt holders face less uncertainty about receiving a return than the other providers of capital. From the previous discussion on the risk-return trade-off, it therefore follows that not all providers of capital expect the same rate of return.

The sum of the returns to the various classes of capital, weighted by their relative contribution to the asset base, provides an estimate of the expected or *ex ante* rate of return on total assets. This approach is known as the Weighted Average Cost of Capital (WACC) and is commonly used in the private sector for setting the required return on assets.

On the basis of only two classes of capital, the WACC can be represented as follows:

$$\begin{array}{c}\textit{return}\\ \textit{on}\\ \textit{assets}\end{array} = \begin{array}{c}\textit{return}\\ \textit{on}\\ \textit{equity}\end{array} \times \begin{array}{c}\textit{proportion of}\\ \textit{equity in capital}\\ \textit{base}\end{array} + \begin{array}{c}\textit{return}\\ \textit{on}\\ \textit{debt}\end{array} \times \begin{array}{c}\textit{proportion of debt}\\ \textit{in capital base}\end{array} \qquad (6)$$

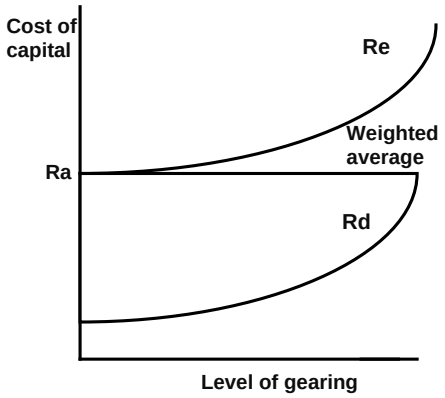
It is possible to estimate, and in some cases observe, the returns expected on the different classes of capital. For example, the required return on debt is usually the rate at which an enterprise can raise debt financing. The return on equity, however, needs to be estimated using methods such as the Capital Asset Pricing Model.

Capital structure and returns on debt and equity

Although it should not affect the required return on assets, capital structure is, nonetheless, a issue which needs to be accounted for when setting cost of capital targets using the WACC. This is because changes in capital structure *will* affect the returns required on debt and equity. For example, higher levels of debt increase the required return on both debt and equity but, as discussed in Box 3.2, the weighting process inherent in the WACC ensures that the return on assets remains constant.

Box 3.2: **The theoretical relationship between capital structure and cost of capital targets**

Debt holders have prior claim on the cash flows of an enterprise. Therefore, the cost (or return) on debt is usually lower than the return to equity holders (who are residual claimants). The required return — as reflected in the betas — on both equity and debt are assumed to rise in line with higher levels of debt (that is, gearing). , However, at the same time the return on assets remains constant. This seemingly paradoxical outcome occurs because the weighting process in the WACC balances out the increasing proportion of the cheaper source of finance (debt) with the increasing cost of debt and equity, leading to a stable required return on assets.



The net result is that the return on assets derived from the weighted average remains the same for all combinations of debt and equity. Thought of another way, the return on assets of an enterprise with no debt would be equal to the return on equity. At the other extreme of all debt, debt-holders essentially become the same as equity-holders (given that they have no other security holders to share the risks with, they become the residual claimants) and thus the required return would be the same as that in the all-equity case. All combinations of debt and equity between these two extremes provide a weighted sharing of the risks, resulting in a constant return on assets.

This relationship is supported by several assumptions, including perfectly functioning capital markets, no income taxation and no legal costs of bankruptcy (see Commonwealth Treasury (1990, pp. 19–22) for more details). At a more practical level, it is possible the capital structure of an enterprise will affect the required return on assets at the extremes of the debt and equity ranges. This would result in a 'U-shaped' weighted average cost of capital curve as opposed to the horizontal one represented in the diagram above.

The issue of capital structure and rate of return is discussed further in Section 3.3.2.

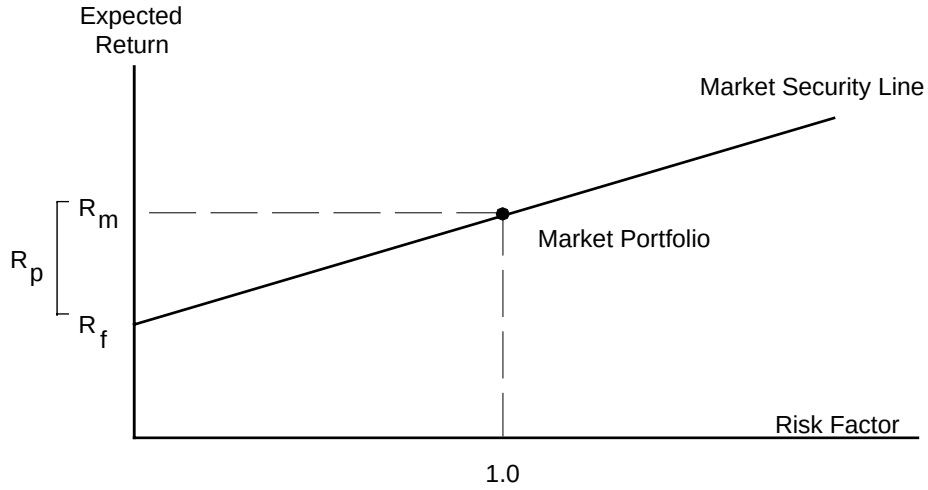
3.2.2 Capital asset pricing model

Risk, total returns, and value are all market-based concepts. If they are to be successfully applied to GTEs, targets will need to be developed which are forward-looking and intrinsically linked to the opportunity cost of capital. The Capital Asset Pricing Model (CAPM) incorporates these concepts and is thus widely used in both the public and private sectors.

The Steering Committee recommends that the CAPM be used to estimate the return on equity for application in the WACC.[10]

As discussed in Section 2.1.1, a cost of capital target can be represented as a risk-free return plus a margin reflecting the level of market risk associated with the asset. The relationship between risk and the trade-off with expected return is graphically represented in Figure 3.1.[11]

Figure 3.1: **Graphical representation of the risk-return trade-off**



Source: Brealey and Myers (1991, p. 162)

The CAPM framework models the risk-return relationship by seeking to define, in the form of an equation, the market security line shown above. In its most commonly used form, the CAPM equation is given:

[10] The CAPM is most commonly used for deriving the return on equity. As outlined in Appendix B, the CAPM can be used to calculate the return on assets and the return on debt. However, it is recommended that the CAPM be used only to estimate the return on equity. These matters are discussed further in section 3.3.

[11] The CAPM assumes a linear relationship between risk and return.

$$R_e = R_f + \beta_e (R_m - R_f) \quad (7)$$

where
- R_e = the expected rate of return on equity security *e*;
- R_f = the observed nominal risk-free rate;
- R_m = the expected return from the equity market portfolio;
- β_e = the market risk factor for equity security *e*; and
- $R_m - R_f$ = the market risk premium.

The risk-free rate (R_f) represents the expected rate of return from a investment where the expected variance is zero. While no investment is entirely free of risk (be it market or unique), some investments, most notably government bonds, carry only minimal levels of risk and can therefore be used as proxies for the risk-free rate of return.

The Steering Committee recommends that the Commonwealth Government ten-year nominal bond rate be used as a proxy for the risk-free rate.

The second component of the CAPM — the risk margin for an individual enterprise — is the product of a market risk premium (R_p) and a market risk factor (β_e).

Market risk premium

As shown in Figure 3.1, R_p is the difference between the average return achieved by the equities market (R_m) and the risk-free rate. As the market rate of return on all investments (the return on the market portfolio) is difficult to measure, the weighted average of observed rates of return on the stock exchange is often used as a proxy.

Several studies have been undertaken in Australia in an attempt to estimate empirically the historical market risk premium (see Appendix A). As capital is increasingly mobile internationally, it may also be useful to analyse market risk premium achieved in equity markets overseas.

On the basis of Australian and overseas studies of risk premium, and the rate adopted by the Commonwealth Working Group in developing targets for Commonwealth GTEs, the Steering Committee recommends that 7 per cent be used as the forward-looking estimate of the risk premium expected to be achieved over and above the risk-free rate. Comparisons between jurisdictions would be facilitated if a consistent R_p were adopted for the purpose of setting cost of capital targets for GTEs.

Beta

The beta measures the sensitivity of the return on an individual investment to changes in the returns on the total market. An enterprise with a beta of 1 has returns which are perfectly correlated with the market. In the case of companies listed on the stock exchange, share prices allow for observable equity betas. For entities with no traded equity base (for example, GTEs and non-listed companies), it is necessary to form a judgment on the appropriate beta. However, this does not diminish the integrity of the target-setting framework, as the cost of capital is the rate of return deemed necessary by the *shareholder*. An important principle in this regard is that the estimated equity beta should reflect the level of risk perceived by the investor (in this case the government), not the GTE or some third party.

Alternative models

The CAPM methodology has some weaknesses. It relies on the assumption that investors successfully diversify to eliminate unique risk and are thus exposed to market risk only. There are also practical difficulties in estimating betas and the risk premium of the complete market portfolio.[12]

However, the most notable aspect of the CAPM – the reason why it is so widely used in the private sector – is its objectivity compared with alternative models. Although there are other models which consider opportunity costs and risk, they do not offer the relative objectivity of the CAPM. Alternatives such as the Real Options Model and Arbitrage Pricing Model, sometimes used in the private sector, place greater reliance on a subjective analysis of the factors which come to bear on investment decisions.[13]

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[12] The strengths and weaknesses of using the CAPM were summarised by the Commonwealth Treasury (1990, p. 17): "The apparent precision of this CAPM approach in setting a loading above the government bond rate to match market risk is illusory. That is mainly because of difficulties in estimating betas and the risk premium of the complete market portfolio. *Considerable judgement is therefore needed in applying the CAPM approach. Nevertheless, it can be a useful tool in assisting with judgements concerning risk loadings for public enterprises. Regardless of practical difficulties of applying the CAPM methodology, the concepts underlying the CAPM, which conclude that the margin (over the government bond rate) on returns of individual investments need cover only market risk, are robust and generally applicable. These concepts focus enterprise managers and owner governments on important quantitative issues and provide a coherent framework within which rate of return targets can be specified on the basis of informed judgement and estimation.*"

[13] For more discussion on alternatives to the CAPM, see Brealey and Myers (1991, pp. 168–173).

3.2.3 Return-on-assets CAPM

Reliance on the WACC method reflects the fact that the return on assets required by investors cannot be readily observed. It must be estimated by summing the weighted returns from the different classes of capital used to finance the asset base. In spite of this, it is often suggested that the CAPM be used to directly estimate the return on assets, rather than the return on equity.

The return-on-assets CAPM (which uses an asset beta) is a superficially appealing alternative to the WACC method described above, as it seemingly avoids the need to account for financial risk and changing capital structures. However, this approach is not widely used because of the practical difficulties in estimating asset betas.[14]

Asset betas

An asset beta represents the risk arising from the sensitivity, or co-variance, of the operating cash flows generated by the assets of an enterprise compared with the market in general. Asset betas are not directly observable and therefore need to be derived from equity betas.[15] This is the reason why the Steering Committee recommends that CAPM be used only for determining the expected return on equity.

The difference between an asset beta and equity beta for a company reflects the extent to which it uses debt to finance its assets. As the level of debt increases, so does the risk to equity holders and therefore the equity beta (an equity beta would be the same as the asset beta if the firm had no debt). As discussed above, financial leverage *does not* affect the risk of the assets but does, however, influence the risk associated with the different classes of capital providers.

The use of asset betas for GTEs would avoid the need to account for financial risk and changing capital structures. However, attempting to estimate asset betas for GTEs without a reference to observed market estimates of risk (equity betas) for listed firms is not a practical option, given the level of information available. The return on assets should be estimated as the sum of the weighted expected returns on the different classes of capital.

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[14] While the Steering Committee does not recommend their direct application to the CAPM for deriving a return on assets target for GTEs, asset beta can be used as part of the information process necessary for estimating an equity beta for a GTE or unlisted company (see Appendix C).

[15] The theoretical relationship between asset and equity betas is discussed in Appendices B and C.

3.3 Defining a GTE's cost of capital

The cost of capital can be set a number of ways (for example, before or after tax). Therefore, the form of the target needs to be expressly defined.

Major issues which need to be considered when framing targets include:

- whether the target should be set in real (constant dollars) or nominal (current dollar) terms;
- whether the return should be required on assets (pre-financing) or on equity (post-financing);
- whether the return should be based on pre-tax or post-tax earnings; and
- the extent to which dividend imputation is effective.

A brief consideration of each of these matters is provided below.

The Steering Committee recommends that cost of capital targets for GTEs should, in general, be set on a total assets, pre-tax and nominal basis. It also regards fully effective dividend imputation as a sound working assumption (this is discussed in Section 3.3.4).

A preferred approach does not, however, imply that other target forms should not be used. For example, it may be appropriate to adopt return on equity targets rather than return on assets targets for government-owned financial institutions. Choosing an alternative approach need not affect the integrity of the target-setting and performance assessment process, provided that there is consistency between the target and the measure. A return on equity target may be applied provided the measured rate of return is income after interest, as a proportion of the value of shareholders' equity. On the other hand, cash flow before interest, expressed as a percentage of the entire capital base (that is, interest-bearing debt and contributed equity) is the relevant measure for comparison with a return on assets target. Calculations based on inconsistent definitions will be meaningless and may lead to misleading conclusions about performance.

3.3.1 Nominal and real targets

The Steering Committee recommends that targets should typically be set in nominal terms. Cost of capital targets set in nominal terms are relatively easy to measure. Although they suffer from volatility during periods of high and variable inflation. On the other hand, real targets are based on estimates of inflation, rather than in the prices prevailing at the time of the transaction. Thus, setting a cost of capital target in real terms requires an estimate of the real

bond rate (the minimal-risk component of the target, deflated by the expected, as opposed to the current, rate of inflation). This introduces an additional step in the estimation process.

On balance, nominal cost of capital targets are favoured as they are conceptually simple and the most direct means of matching targets with performance measures.

3.3.2 Pre- and post-financing targets

In financial markets, returns are often quoted on equity after the payment of company tax. In the case of GTEs, however, it is recommended that targets be set on the entire asset base.

Financing decisions and the rate of return

In the private sector, enterprises have often sought to change their capital structure as a means of maximising the value of the organisation to shareholders. Modigliani and Miller (1958), however, hypothesised that under certain conditions, changes in capital structure do not influence the total amount of risk associated with an asset or group of assets (and thus the cost of capital) but merely rearrange the distribution of the relative risks among the capital providers.

> In other words, the market value of the firm and therefore the expected return on the firm's total assets are not affected by its choice of capital structure: a complete separation of investment and financing decisions is possible (Commonwealth Treasury 1990, p. 19).

Under the assumptions made by Modigliani and Miller (M–M) there is no 'optimal' capital structure for an enterprise. However, it may be argued that the tax deductibility of interest payments, and the ability of firms in general to borrow at more favourable rates than individuals, reduces the cost of debt relative to equity. This has tended to promote the use of debt financing as a means of increasing the value of businesses. On the other hand, any preference for debt financing has been reduced considerably by changes to the tax system allowing for dividend imputation.[16] As discussed in Section 3.3.4, the assumption of full imputation for GTEs negates any tax benefits associated with debt over equity funding.

[16] Dividend imputation in effect eliminates company taxation by making it a pre-payment of personal tax for certain shareholders.

Consequently, the M–M assumptions can be regarded as applicable to GTEs. It therefore appears reasonable to assume that there exists a wide range of capital structures within which the expected rate of return on total assets is unaffected by changing debt-to-equity ratios.[17] This provides GTEs with relatively stable targets (return on equity targets are more variable) and avoids the need to re-estimate targets in the event of changes in capital structure.

On the grounds of its practical and conceptual appeal, the Steering Committee recommends the use of return on assets when setting cost of capital targets for GTEs. These targets should be estimated using the following version of the WACC:[18]

$$R_a = R_e\left(\frac{E}{V}\right) + R_e\left(\frac{D}{V}\right) \qquad (8)$$

where

	R_a	=	the expected rate of return on total assets (that is, cost of capital);
	R_e	=	the expected rate of return on equity (that is, cost of equity);
	R_d	=	the expected rate of return on debt (that is, the cost of debt);
	V	=	the market value of total assets;
	E	=	the market value of equity; and
	D	=	the market value of debt.

For an enterprise listed on the stock exchange, many of the variables used in Equation (8) are readily observable, while others can be estimated using past observed data:

- *V*, *E* and *D* are the market values of the total assets, debt and equity (net assets) of the organisation. Estimates for these variables can be taken directly from the balance sheet. Guidance on what to treat as *V*, *E* and *D* is provided in Box 3.3.
- R_e — An enterprise is under no contractual obligation to provide a specific return to its share (equity) holders.[19] In the absence of a specified return, it

[17] Moreover, it is most likely that GTEs are presently operating within this range (say, 20 to 80 per cent gearing).

[18] Although equation (8) provides an after-tax cost of capital target, under the assumption of full dividend imputation, it also estimates the pre-company tax cost of capital (refer to Box 3.4). For a discussion of different versions of the WACC and the appropriate cash flows see Officer (1994 and 1995).

[19] Note that it is the greater uncertainty associated with the lack of a contractual arrangement which results in equity-holders requiring a higher return than debt-holders. That is, returns for equity-holders have a greater distribution of possible outcomes (ie risk).

is necessary to assume that observed past returns on equity adequately reflect what investors require in the future. To model this relationship, investors commonly use the CAPM. As explained previously, the return required by equity-holders will vary with the proportion of the assets which are debt financed.

- R_d — Debt-holders have a contractual right to a specified return. In the case of an enterprise that regularly raises debt capital in competitive markets, it is reasonable to assume that the cost of debt is the observed interest payable on borrowed funds or issued debt securities (for example, debentures or bonds). Although observed rates are usually appropriate for competitive firms, adjustments will probably be necessary for GTEs (see discussion of the cost of debt in Section 3.3.3 below).

  Another important consideration when calculating the required return on debt is the different classes of debt securities. Although the WACC formular (Equation (8)) assumes only one form of debt, most enterprises are likely to have a variety of debt instruments with varying maturities and risk exposures. If so, it is best to calculate a weighted average return for all the debt capital committed to the organisation, using the following equation:

$$R_d = r_{d1}\left(\frac{d1}{D}\right) + r_{d2}\left(\frac{d2}{D}\right) + ... + r_{di}\left(\frac{di}{D}\right) \qquad (9)$$

where
- R_d = the expected, annualised rate of return on debt instrument i;
- r_{di} = the expected rate of return on debt;
- di = the market value of debt instrument i; and
- D = the market value of all debt instruments 1 to i (that is, $D = d1 + d2 + ... + di$).

The observed cost of debt is not taxed at the company level, as it is an allowable expense on taxable income.

3.3.3 Determining a GTE's WACC

There is generally less available information on the variables needed to estimate the required return on assets for GTEs than there is for listed companies. Using the WACC to establish a cost of capital target for a GTE requires a greater exercise of judgement and, by implication, a firmer understanding of the characteristics of the enterprise and how they relate to risk and value. Nonetheless, the exercise is not unique to GTEs, as a similar process is

undertaken in the private sector when assessing the cost of capital for unlisted companies, business units and projects.

Capital structure

The values for assets, equity and debt can be derived directly from a GTE's audited accounts (see Box 3.3). An example of data extraction from published accounts is given at Appendix H.

An estimate of total assets can be taken from the balance sheet, although account should be taken of the particular valuation methodology being employed. Some form of current cost approach (for example, deprival value) generally provides a better indication of the market value of the asset than an historical valuation.

As a general rule, debt should be classified as those items which the GTE is to repay. To determine the status of particular balance sheet items it may be necessary to refer to the notes that accompany the accounts. There may be components of the balance sheet that do not explicitly bear interest. The bulk of the debt carried by a GTE, however, would be expected to be borrowings, with a value readily taken from the accounts.

The most common forms of debt found in the balance sheet include:

- borrowings (for example, mortgage loans, overdrafts);
- creditors (for example, trade creditors);
- pre-paid revenue; and
- other loans, including those not explicitly bearing interest.

The difference between total assets and the market value of debt can be assumed to be the value of equity (that is, net assets).

Box 3.3: **Classification of Balance Sheet items for a listed company**

BALANCE SHEET

Financial Obligations	**Assets (V)**
Equity **(E)**	*Current Assets*
Issued and fully paid ordinary shares	Cash receivables
Preference shares	Inventory
Reserves —	Prepayments
Share Premium	
Asset Revaluation	
Foreign currency	
Capital profit	
Provisions —	
Dividends	*Non-Current Assets*
Taxation	Property plant and equipment
Long service	Investments
Bad debts	Goodwill
Convertible notes	
Debt **(D)**	
Current Liabilities —	
Trade creditors	
Bank loans	
Bills of exchange	
Non-Current Liabilities —	
Creditors	
Debentures	
Mortgage loans	

Source: Officer (1995)

The cost of equity

Because GTE equity is not traded, it is not possible to observe an equity beta for use in the CAPM as in the case of a listed enterprise. The equity beta must therefore be estimated using a comprehensive risk assessment, which benchmarks the risk of the GTE against the average risk of the market.

Appendix C outlines a number of information sources and methods which can be drawn on to assist with the estimation of equity betas. Nevertheless, the

process necessarily involves the exercise of judgement and will require a thorough understanding of the GTE's business on the part of the analyst.[20]

Once an equity beta has been estimated, R_e can be determined using the CAPM, as per Equation (7).

The cost of debt

While an interest rate required for GTE debt may be *observable*, it is less likely to be an accurate measure of the cost of debt than in the case of a firm which actively trades debt in capital markets. The implicit guarantee and the debt pooling arrangements often associated with government borrowing afford GTEs debt financing on better terms than their private sector counterparts. Interest rates charged to public sector entities therefore reflect an expectation on the part of the debt providers that the government (and ultimately the community) will make good on the debt should the GTE fail. As noted by Fay, Richwhite (1995, p. 30):

> It is true that Governments [and their agencies] do pay lower interest costs than private sector companies. However, this debt is collateralised by all the Government's assets, including the ultimate right to tax future generations of citizens. The risk of default is very low because the Government has the ability to increase taxes to meet financial obligations and is much more likely to meet these obligations than the private sector. The lower explicit cost of funds is implicitly subsidised by taxpayers.

An adjustment will need to be made to the observed interest cost to reflect the true cost of providing debt capital to a GTE; otherwise the required rate of return will be understated.

The cost of debt should be estimated as if the GTE was not owned by government and had to raise debt in direct competition with other enterprises and pay interest according to the risk borne by its debt-holders. Information to this effect can be gathered by undertaking a debt rating of the GTE under the assumption that it is not owned by the government. The application of guarantee levies, which more closely align a GTE's cost of debt with that assessed by the rating agency, would go some of the way to addressing this matter.[21] Provided the levy is set correctly and included in its cost of funds, a GTE's observed cost of debt may be suitable for use in the WACC calculations.

Discrepancies between the observed and 'real' cost of debt may be less of a problem where GTEs raise capital by issuing their own debt securities, although

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[20] The Steering Committee intends to publish a research report on beta estimation for GTEs.

[21] It is acknowledged that a full debt rating may not be cost effective and governments may wish to commission less comprehensive analyses of GTE's cost of debt, based on debt grades and estimated margins above the bond rate.

there will still be a need to account for any government guarantee, whether implicit or explicit.

Structure of the target

The return on assets target can be represented as a risk-free rate plus the weighted average of the margins for different classes of debt and equity. The weighted margin is the return on assets target less the risk-free rate used in the CAPM. That is:

$$RM_i = R_a - R_f \tag{10}$$

where RM_i = the individual risk margin associated with asset *i*;
R_a = the expected rate of return on total assets derived using the WACC; and
R_f = the observed nominal risk free rate used in the CAPM.

Provided the risk of the enterprise does not change, this risk margin can be added to varying risk-free rates to arrive at an *ex ante* cost of capital target at any point in time (for example, for use as a benchmark for assessing project hurdle rates).

The Steering Committee recommends that rate of return targets for GTEs be considered in terms of a *fixed risk margin above a floating risk-free rate* (that is, the ten-year bond rate). As such, the cost of capital to be easily recalculated when there are changes in the risk-free rate.

Arbitrary adjustments

A cost of capital target set on the basis described above represents an objective measure of the return required on a particular investment, based on realised market returns. In both the public and private sector, there can be a tendency to increase this objective target as a means of 'stretching' the organisation to improve performance or to give the shareholder comfort on a number of perceived concerns (for example, unique risk factors). These 'stretch targets' and 'fudge factors' are inappropriate. Such adjustments have no basis and are likely to increase prices, restrict investment options, distort investment decisions and drive GTEs into higher risk areas. In this sense, the resulting targets are no more meaningful than arbitrarily set accounting-based targets.

The Steering Committee recommends that no arbitrary adjustments be made to the cost of capital once the target has been correctly set using the proposed methodology and considers there are more appropriate policy responses to matters such as unique risk.

3.3.4 Income tax and cost of capital targets

Because interest payments are deducted from earnings prior to the application of company tax, debt is said to have a tax shield at the company level. Whilst taxable in the hands of individuals, the return on debt capital is not subject to corporate tax. With the introduction of dividend imputation, some shareholders have been afforded a similar tax shield with respect to equity.

While companies still pay tax, under the dividend imputation system introduced in Australia in 1987, shareholders receive franking credits for company tax which can off-set their own tax liability. For those able to use the credits, this effectively makes company tax a withholding tax or a pre-payment of personal tax. As these imputation credits are valued by investors (because they reduce their own tax) they must be accounted for when estimating the required rate of return.

Dividend imputation

As discussed in Box 3.4, the impact of imputation can be accounted for either in the measure of income compared with the target or by adjusting the WACC.[22]

The Steering Committee does not recommend that analysts attempt to account for the effects of dividend imputation within the CAPM. This practice has increased in recent years. However, as discussed in Hathaway and Dodd (1995), this approach can produce unsound risk-return trade-offs and give rise to incorrect estimates of the required return. To correctly incorporate the impact of taxation on investor decisions, the returns on debt and equity can be adjusted before weighting within the WACC. Alternatively, adjustments to the WACC can be omitted, with imputation accounted for in the measure of cash flow.

An Australian citizen on a marginal tax rate above the company rate can fully utilise the tax credits available under the system of dividend imputation. In this situation, and if timing impacts are eliminated, he or she is completely compensated for company tax.

Not all investors can fully utilise imputation credits. In developing cost of capital targets or undertaking a valuation it is necessary to estimate the proportion of corporate tax that can be deducted from the personal tax liability of the company's shareholders. As there are often insufficient empirical data available to estimate confidently the extent of utilised credits for individual

[22] Most WACC formulas contained in corporate finance text books do not account for dividend imputation. This is because they are based on the tax system of the United States, which does not have imputation.

enterprises, there is a widespread practice of using market averages. However, this is a second-best solution in many cases. For reasons which are explained below, it is not appropriate to use simple market averages for dividend imputation when estimating a GTE's cost of capital.

The full imputation assumption

The Steering Committee recommends that the full value of dividend imputation should be assumed when determining cost of capital targets for GTEs. The reasons for this and the issues which need to be considered when determining a working dividend imputation assumption for GTEs are outlined below:

- The Government as shareholder

  Governments have moved to ensure that GTEs face similar pressures to firms operating in competitive markets and do not have an advantage because of their Government ownership. The observed behaviour of firms and the imputation uptake within the market is substantially determined by investors' decisions. With this in mind, Governments should, for the purposes of determining a GTE's cost of capital, seek to ensure competitive neutrality at the *shareholder level* in the investment decision process. In other words, they should seek to act as individual shareholders do. This will encourage behaviour at the GTE level consistent with private sector practice.

  Although they are also taxing agents, when determining cost of capital targets for GTEs it is paramount that governments view themselves primarily as shareholders. Thus, the focus should be on the fact that dividends distributed by GTEs are free of any further tax liability and not that the tax or tax equivalent is paid to the government.

- Market valuations of imputation credits

  Shareholders value returns on a post-tax basis, and will seek to maximise their earnings by choosing investments which provide the best after-tax returns. Investors will place a different value on the dividends, and therefore on the firm itself, depending on the level of imputation applicable.

  The value of imputation credits is determined by the shareholder's tax status and taxable income. Timing effects aside, those on high marginal tax rates will fully value the credits, while those on lower levels may only partially value them. Tax exempt investors (for example,. Universities) and foreign companies cannot access credits.

As investors of differing tax status set the price for imputation credits, the observed value of such credits reflects the average level of imputation. Recent research indicates that on average around 70 per cent of imputation credits are utilised by shareholders, with different companies and industry sectors having different rates (Bruckner, Dews and White 1994). For example, the banking sector has an uptake of imputation credits by investors of around 90 per cent, close to the full value when timing effects are considered.

- Franking credits for GTEs

  If the value placed on imputation credits by the shareholder is known, then it should be used in setting the correct cost of capital for an enterprise. Market averages should only be used if more accurate shareholder or industry sector information is not available.

  High-yielding, fully franked industrial stocks would appear to be suitable benchmarks for determining the appropriate level of imputation for GTEs. Listed trading banks demonstrate these characteristics. Research undertaken by Hathaway and Officer (1996) indicates that banks have a imputation credit take up rate of more than 90 per cent. For practical purposes this is essentially the full value of imputation, with much of the difference accounted for by timing effects.

Box 3.4: **Accounting for dividend imputation**

It is important that tax be treated correctly when assessing performance. Inconsistency between the target (or discount rate) and measured income (or cash flow) is one of the most common errors when valuing enterprises. As noted by Dodd (1993, p. 5):

> It has been argued by many analysts that because the State Government does not pay tax the retention value of a business owned by the State is higher than its sale value to a tax paying private sector participant. This conclusion is achieved by taking pre-tax cash flows and discounting them by a post-tax cost of capital.

The prospects of analysts adopting inconsistent targets and measures has probably been heightened with the introduction of dividend imputation. Some of the most common definitions of the WACC and the appropriate measure of income are given below.

	'Classical' WACC	*Dividend imputation system*	
		WACC	*Income*
(1)	$\frac{R_e}{(1-t)}\left(\frac{E}{V}\right)+R_d\left(\frac{D}{V}\right)$	$\frac{R_e}{[1-t(1-\gamma)]}\frac{E}{V}+R_d\left(\frac{D}{V}\right)$	EY
(2)	$R_e\left(\frac{E}{V}\right)+R_d\left(\frac{D}{V}\right)(1-t)$	$R_e\left(\frac{E}{V}\right)\frac{(1-t)}{[1-t(1-\gamma)]}+R_e\left(\frac{D}{V}\right)(1-t)$	EY(1–t)
(3)	$R_e\left(\frac{E}{V}\right)+R_d\left(\frac{D}{V}\right)$	$R_e\left(\frac{E}{V}\right)+R_d\left(\frac{D}{V}\right)$	EY – T + Tγ

where variables are those stated in Equation (10); and

t	=	the corporate tax rate;
γ	=	the portion of imputation credits which can be used by shareholders;
EY	=	economic income before interest expense and corporate tax; and
T	=	the effective amount of tax paid at the company level (that is,. t [EY-interest expense]).

In WACC (1), the return on equity estimated using the CAPM is 'grossed up' by the corporate tax rate. This provides for a pre-corporate tax return on assets and income measure. WACC (2) is arrived at by multiplying WACC (1) throughout by (1–t). In the classical tax version of WACC (2), the tax shield afforded debt is allowed for in the target and therefore the appropriate measure of cash flow is net of tax on all economic income. It should be noted that income based on financial statements may need to be adjusted, given that interest expense is usually deducted before corporate tax is levied. WACC (3) is the preferred version, as an estimate of EY and T can be taken directly from the profit and loss statement. The value of imputation credits is included in the measure of income. Under the assumption of full imputation (γ = 1), no tax is effectively paid at the company level, making measured income the same as pre tax earnings. Likewise, substituting γ = 1 into

It could be assumed that GTE imputation credits, if available, would be valued highly by the market, and that the appropriate level of imputation would be in excess of 90 per cent. The impact on the cost of capital of assuming full, as opposed to 90 per cent, imputation is not material, particularly if targets are rounded. In addition, a shift away from full imputation means a divergence between pre- and post-tax targets. This would introduce an unwarranted complication to the approach recommended in this paper.

Despite the fact that Governments do not pay tax on the dividends paid by their GTEs, the tax environment for GTEs replicates one in which dividend imputation is fully effective. That this, when dividends are distributed by GTEs, there is no tax liability attached to them. The fact that the GTE's shareholder is also the taxing agent does not change this relationship.

Using a significantly lower level of imputation would increase the target. This would have implications for a range of management issues, including investment and pricing decisions.

Based on the above arguments, and the simplicity of an approach which uses full imputation, the Steering Committee considers full dividend imputation to be a sound working assumption for determining cost of capital targets for GTEs.

3.3.5 Summary

The cost of capital should be defined on a basis consistent with the cash flows or measure of income used in the measurement of performance.

The Steering Committee recommends that cost of capital targets should be estimated using the WACC (that is, Equation (8)), using an adjusted, observed return on debt and a return on equity estimated using CAPM. This version of the WACC is the one which is most comparable to reconstructed income data taken from an organisation's audited financial statements.

Assuming that the shareholder can fully utilise franking credits, the value of imputation equates to the full amount of corporate tax paid by the organisation. This should be added to the measure of income in assessing actual performance. The Steering Committee does not recommend that imputation be dealt with by adjusting the CAPM.

A summary of the recommended approach to target setting for GTEs is outlined in Box 3.5. (A more detailed practical application is given in Chapter 5 and Appendix H.)

Box 3.5: **Summary of proposed *ex ante* target-setting methodology**

1 Determine the GTE's capital structure (V, E and D):
- use market values of debt and equity; if these are unavailable, use book values;
- preferably, total assets are valued on a current cost basis;
- debt should include all capital that is required to be repaid regardless of whether it is explicitly bearing interest; and
- equity is assumed to be equal to total assets less debt.

2 Determine the cost of equity (R_e):
- use the prevailing risk-free rate (R_f), as proxied by the Commonwealth Ten-year nominal bond rate;
- use a market risk premium of seven per cent;
- estimate the equity beta after undertaking a comprehensive risk analysis of the GTE's operations (see Appendix C for more details); and
- apply the CAPM as per Equation (7).

3 Determine the cost of debt (R_d):
- determine an appropriate split for materially different classes of debt (for example, long and short term);
- observe the return required on the different classes of debt;
- make adjustments for the effects of government-related matters (for example, guarantee) possibly using information taken from a debt rating of the GTE; and
- weight the adjusted costs of the different debt classes to provide an average cost of debt, as per Equation (9).

4 Set a cost of capital target (R_a):
- enter the estimated variables into the WACC formula presented as Equation (8).

5 Re-setting the adjusted target:
- subtract the risk-free rate (R_f) from the cost of capital target to determine the individual GTE's risk margin; and
- add this margin to the prevailing risk-free rate when resetting the target (provided the risk of the GTE has not changed).

4 MEASURING THE FINANCIAL PERFORMANCE OF A GTE

To estimate an enterprise's cost of capital, two basic things are required:

- a model which accounts for the factors that determine what investors expect in return for committing their capital; and
- appropriate information to apply to the model.

The previous chapter described the use of the WACC and the CAPM as frameworks for developing cost of capital targets. The information required to apply these models is not always readily available. However, in the case of GTEs, difficulty in obtaining the appropriate information has not prevented governments from using these analytical frameworks to establish targets.

This has not necessarily been the case with performance measurement.

There has been some resistance within the public sector to the use of concepts such as economic income and ERR when assessing performance. This has largely been due to difficulties in obtaining the appropriate information. It is important to recall, however, that data problems, particularly relating to asset valuation, beset all financial indicators for GTEs, whether they are based on accounting or economic concepts.

This chapter outlines the Steering Committee's recommended approach to measuring ERR performance. Because the data needed to assess GTEs' financial performance are not directly observable, it is necessary to use accounting information from a GTE's accounts to measure ERR performance. The ERR measure presented in this chapter is reconstructed from published accounting data and thus has the advantages of imposing minimal compliance costs on GTEs; of being based on verifiable and audited data; and of being available to a range of interested parties outside government (for example, taxpayers and regulators). Nonetheless, the raw performance measure provided by the formula is only one element within a wider framework of performance assessment.

Together with an outline of the information requirements of ERR, this chapter includes a discussion of the suggested treatment of certain items included in the accounts. The chapter concludes with an outline of some of the value-based management systems which are consistent with ERR, such as Shareholder Value Analysis (SVA) and Economic Value Added (EVA).

4.1 ERR measurement

The Steering Committee recommends that the following formula, developed by the Commonwealth Working Group (1993), be used by the jurisdictions to measure actual ERR:[23]

$$ERR = \frac{(EBIT + Da + NIBL + FL + CSO) + (A_e - A_e - NI)}{A_b + (NI/2)} \qquad (11)$$

where

	$EBIT$	=	earnings after abnormals and extraordinaries, but before interest and tax;
	Da	=	accounting depreciation and amortisation;
	$NIBL$	=	an adjustment for the implicit interest cost of non-interest bearing liabilities;
	FL	=	an adjustment for interest cost of assets under financial leases (only made if not already included in EBIT);
	CSO	=	an adjustment for the net economic cost of Community Service Obligations (CSOs) (if applicable);
	A_e	=	the end of period value of total assets;
	A_b	=	the beginning of period value of total assets; and
	NI	=	value of net investments throughout the year(see Equation (12)).

This equation includes a number of adjustments to EBIT, which is the base estimate of accounting earnings, before tax and adjusted to include gross interest payments.[24] The major adjustments to EBIT relate to depreciation, the implicit interest cost of non-interest bearing liabilities, the interest cost of financial leases and CSOs. They are discussed further in Sections 4.1.1 and 4.2.2.

[23] First cut performance assessment involves comparing the cost of capital with the ERR. Alternatively, economic income can be compared with a target level of income to provide a measure of valued added. The necessary conversion for this approach is discussed in Box 4.1.

[24] Pre-tax earnings is the appropriate measure of income for comparison with the WACC defined in Chapter 3 only because of the assumption of fully effective dividend imputation.

Box 4.1: **Converting ERR to a measure of value added**

Many of the value-based management (VBM) models, discussed in this chapter, represent changes in shareholder value as a dollar amount over a period. An assessment of whether value has been created or lost is based on actual income net of the income that was expected by the shareholders. The target level of income is the product of the cost of capital and the capital base. A GTE's performance, in terms of value added, can therefore be expressed in the following terms:

$$Value\ Added = EY - (r \times K)$$

Where EY = economic income, that is, the numerator of Equation (11);
r = the cost of capital, as defined in Equation (7); and
K = the capital base, that is, the denominator of Equation (11).

The estimate given by this formula needs to be subjected to the same form of analysis as that proposed for the ERR ratio.

The data used in the ERR formula are taken from published accounts, 'unwrapped' and reconstructed into a measure which is more amenable to comparison with cost of capital targets than accounting rates of return. However, although the use of accounting data has several advantages, some governments may still prefer to use cash-based data.[25] While the latter is more commercially sensitive than accounting data, it may be more accurate. If this data is provided, adjustments to the ERR formula may be needed.

Economic income (that is, the numerator in Equation (11)), should be viewed as consisting of two components: cash earnings and changes in capital value. Further explanation and analysis of these components is given below, while Appendix E provides advice on where these items can be found in the published accounts.

The transformation of accounting items to a measure of total returns requires the exercise of judgement. The analyst must decide whether or not to include certain items in economic income. In some instances, the arguments in favour of inclusion may be just as valid and convincing as for exclusion. Furthermore,

[25] Fay, Richwhite (1995, p.18) considered the suitability of using cash flow accounts for performance monitoring. It found that "cash flow accounting standard AAS28 has improved the reporting of cash flow information. While the standard still allows for discretion in respect of the inclusion or classification of certain cash flows, the requirements to separately disclose specific cash flows and to reconcile cash flows to the P&L will, in general, allow analysts to overcome inconsistent or idiosyncratic presentations".

the treatment of certain provisions will necessitate an assessment of the extent to which they create a divergence between economic and accounting income.

To facilitate a consistent approach, the Steering Committee, in line with the Commonwealth Working Group, has provided a preferred position on certain matters. In some cases, however, it cannot be prescriptive and the effectiveness of the formula will depend on the skill of the analyst in making informed decisions about the treatment of certain items in economic income and the capital base. Consideration should be given to:

- the level of materiality;
- the potential impact on the sustainability of the GTE's cash flows; and
- the need to adjust the components of accounting earnings to allow for their cash rather than accrual effect.

4.1.1 Cash component of economic income

As explained above, Equation (11) contains a number of adjustments to EBIT. For example, accounting depreciation is often an arbitrary non-cash adjustment to EBIT. In Equation (11) depreciation is added back to EBIT to avoid double counting because a measure of the economic depreciation of the enterprise is accounted for in the capital component of economic income. [26]

Important issues to take into consideration when developing and measuring the cash component of ERR include:

- EBIT may include capital items — This occurs because all downward asset valuation adjustments are recorded in the profit and loss account unless they reverse a previous upward adjustment to the same class of asset. Similarly, where assets are sold at a price different to their book value, accounting practice is to record the capital gain or loss against profit, rather than in the asset revaluation reserve.

  These accounting practices would affect the distribution of economic income between the cash and capital components, but they would not affect total economic income. No adjustment to EBIT needs to be made in this case, although, if it is material, consideration may be given to moving it to the capital component of income.

[26] Unlike the accounting measure, economic depreciation need not mean a reduction in the value of the asset.

- Status of abnormals and extraordinaries — EBIT is usually defined as being after abnormals but before extraordinaries.[27] A reason for excluding extraordinaries is that they may distort the underlying performance of the enterprise. However, extraordinaries can have a material effect on the financial performance and value of an enterprise, particularly in regard to the funds available to be distributed as a dividend. While a compromise solution is to include only those extraordinaries that were under the control of management, this still ignores the actual variation in returns, which is a function of an enterprise's underlying risk. EBIT therefore should include both abnormals and extraordinaries.

  The resulting year-by-year variation in the ERR measure would, in any event, be smoothed by the averaging technique detailed in the following section, with any remaining concerns about the material impact of extraordinaries being accounted for in the final analysis of performance undertaken by the analyst.

There are other items included in published accounts that may cause a difference between accounting and economic income. For example non interest-bearing liabilities (NIBLs), such as trade creditors, have an implicit interest charge incorporated into their cost. [28] This represents a return on (debt) capital and thus should be included in economic income.

Because EBIT is calculated before interest expense but after other expenses, an adjustment may be required, if thought material, to ensure that implicit interest costs are included in economic income. As expressed by Fallon (1993, p. 8):

> When a firm uses trade credit then *ceteris paribus* prices paid should be higher than for a firm that does not have such a facility. That is interest will be built in to the prices paid since presumably credit will not be provided free. The rate of return on assets (based on EBIT) for a firm using trade credit will be lower than for a firm using interest-bearing debt or equity to finance working capital.

Other common adjustments needed to cash earnings include financial leases and CSOs. Financial leases are a good example of an item which may impact significantly on value, but which may not have a direct impact on the audited figures in the accounts. If their effect on income has not been already accounted

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[27] Abnormals are financial items that are abnormal because of their size but within everyday operations. Extraordinaries are financial items that occur because of events or transactions outside everyday operations and are not of a recurring nature.

[28] The term non-interest bearing liabilities is somewhat misleading in that the need to make an adjustment reflects the assumption that they do in fact bear interest, albeit implicitly. A more detailed account of how to deal with NIBLs is given in Commonwealth Treasury (1990, pp. 63-7).

for in EBIT, it will be necessary to calculate and include interest on financial leases and incorporate it into the cash component of income.

The preferred treatment of CSOs is to ensure economic income reflects the full value of the cost of providing the service. This is discussed further in Section 4.2.2.

Other provisions

Because GTEs are capital-intensive, adjustments to account for economic, as opposed to accounting, depreciation are likely to dominate any changes needed for other provisions. Nonetheless, it will be necessary to consider non-cash adjustments other than depreciation on a case-by-case basis.

Again, the materiality of the provision, and the benefit gained from extracting and manipulating the data, has to be weighed against its usefulness and impact on measured earnings. Most of the problems associated with other non-cash adjustments relate to timing. Two examples of the preferred treatment of provisions are discussed in Box 4.2.

Box 4.2: **Treatment of certain accounting provisions in the ERR formula**

Under-funded superannuation

A GTE has assessed its provision for superannuation as insufficient. This implies that the amount expensed in the past has been inadequate and that observed performance based on accounting income was therefore inflated. Although this problem relates to past performance, it is common practice that the difference between the old and revised estimates of superannuation liability will be expensed in the year it is identified. EBIT will be distorted if this occurs. To provide a more accurate measure of underlying earnings, the expense for previous underpayment may need to be added back.

Contingent liability

A provision for a contingent liability placed on a GTE's accounts can have a substantial impact on accounting earnings in a particular year. As it is contingent, it has probably not yet had a direct impact on the cash flow of the organisation and thus ERR (although it could affect expected cash flows and thus value). The analyst will need to make a judgement on the significance of the provision and the likelihood of it occurring. For this to happen, the analyst will need to be informed of the nature of the liability, its impact on the organisation and when it is expected to have an impact on cash flow. If this is not provided in the notes to the accounts, it may be necessary to request advice from the GTE directly. As a general starting point, the expense associated with a contingent liability should be added back to EBIT and taken into account when the expense is incurred.

4.1.2 Capital component of economic income

The calculation of economic income includes the annual change in value of the assets *held at the start of the year*. This is represented in the formula as $A_e - A_b$. However, the cash component of ERR may include earnings from assets *purchased during the year*. To the extent that this income has had a material effect on measured economic income, it is necessary to adjust the capital component and the capital base to allow for net investments during the period. The value of net investments is calculated as: [29]

$$NI = A_e - A_b - (AsRR_e - AsRR_b) + Da \qquad (12)$$

where $AsRR_e$ = the end of period value of the asset revaluation reserve; and
$AsRR_b$ = the beginning of period value of the asset revaluation reserve.
Other variables as per Equation (11)

An asset revaluation reserve (AsRR) is established when the carrying amount of certain non-current assets is increased or subsequently decreased in value, provided these amounts are not offsets from previous changes.

It has been suggested that the ERR measure will not be suitable for some GTEs as they do not actively use their AsRRs. If this is the case, it is clearly a matter associated with the reporting requirements of GTEs and their enforcement, rather than a fundamental problem with the ERR formula. The fact that GTEs do not actively use their AsRR implies, amongst other things, that asset revaluations have not been brought to account or that revaluations have not been undertaken. Governments may wish to question outcomes such as these, which are relevant not only to the ERR formula, but to any other performance measure which takes account of the value of the enterprise.

If governments wish to have more sophisticated information on the performance of their GTEs, it may be necessary to improve the quality of the information GTEs provide to analysts on behalf of the shareholders. *The AsRR is the most readily available means of obtaining a measure of economic depreciation presently available to governments*.

A summary version of economic income

Expanding the elements in the capital component of Equation (11) and cancelling out common terms reduces economic income to EBIT plus

[29] Account may need to be taken of any asset revaluations that had been taken through the profit and loss account.

adjustments (for example, CSOs) and the change in the AsRR. Although such a mathematical simplification of the ERR formula would provide a less complicated representation of economic income, it detracts significantly from the performance assessment process. If economic income is to be an effective tool for financial monitoring it is best to analyse the ERR measure according to its different components. An analysis of the changes in the cash and capital components should be incorporated into the performance assessment process.

4.1.3 Capital base

The Steering Committee recommends the use of rate of return targets on the total asset base. The ERR formula provides a measure of income (earnings before interest and tax) and a capital base (total assets) consistent with the cost of capital developed in the previous chapter. However, there may be a need to make adjustments to the opening value of the asset base if it is thought that the measure of income includes earnings on assets which were not part of the opening value. This is most likely to occur where the reporting time frame spans a period in which the GTE has made a number of purchases or commissioned large assets.[30] This poses a problem for GTEs which have large infrastructure assets, such as railway corporations.

The GTE should provide the government with additional information on its actual investments during the year. Details of exactly when certain assets started producing income would allow an analyst to add the correct proportion of the value of the asset to the opening capital base. If this is not possible, it is suggested that half the net investments calculated from the balance sheet be added to the opening value of assets as a reasonable proxy for the asset base, which should be compared with economic income.[31]

4.2 Other information requirements of the formula

There is currently room for improvement in the data which is available for GTE performance measurement.

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[30] The problem with within-period purchases could be avoided if ERR was measured on a much shorter time span, although this may not be cost effective. Commonwealth Treasury (1990) provides more discussion on within-period sales and purchases. See, for example, Chapter 5 (p. 61) and Attachment B.3.

[31] This is the approach taken in Equation 11. Note that this process averages the amount of net investments, not the total asset base as at the start and end of the period (as is the case with ARR).

An important aspect of the ERR framework is that it places an onus on both analysts and GTEs to acquire the skills needed to overcome information deficiencies and to facilitate an identification of the value drivers of these enterprises. This was recognised by a GTE when commenting on a draft of this paper:

> With a revolutionary measure such as ERR, most of the issues will not be resolved until it is in operation and experience is accumulated. The real benefit from such a measure will be what is gleaned from detailed analysis of the results — more so than the results themselves. For the first time GTEs will have to consider the factors that drive business value. In many GTEs, under utilised assets are sure to be the first area looked at.

This paper cannot provide answers to all the practical issues which may arise during implementation of the measurement formula. Information constraints will lessen as shareholder governments and GTEs increasingly come to understand what influences value. Recent developments in the areas of current cost valuation and cash flow statements indicate signs that the reporting of performance in audited accounts is improving. At present, however, there is a clear distinction between the information provided under a GTE's statutory reporting requirements and that needed by shareholders and the GTE to make informed decisions regarding value-based performance.

In commenting on a draft of this paper, many GTEs expressed concern over the usefulness of the ERR measure given problems with asset valuation. Such concerns, however, apply equally to other measures, and do not diminish the intrinsic advantages of ERR over traditional accounting measures.

4.2.1 Asset valuation

In a competitive capital market, performance measurement essentially involves tracking changes in the value of an investment compared with the market.

Changes in the value of the existing capital committed to an asset or an enterprise are the result of the difference between the cost of capital and the flow of returns it generates. GTEs have a range of special features which make the process of valuing them somewhat different to that applicable in the private sector. Such features include the presence of significant monopoly elements and the absence of share trading.

If correct decisions regarding the performance of GTEs are to be made, asset valuations need to be based on a market measure of current value. As explained by the Steering Committee (1994b, p. 30):

> While SAC 2 does not specify that current value information is required, there is a strong and growing body of opinion that information which does not measure current values cannot provide an adequate basis for the assessment of performance in the use of resources.

Market assessments of current value are usually determined by some form of discounted cash flow analysis, with the cost of capital used as the appropriate discount rate. The use of this approach for GTEs with a monopoly for their services, may result in circularity between the appropriate discount rate, expected earnings and the value of the asset. For example, given a specific discount rate, a monopoly GTE may be able to increase its prices sufficiently to achieve a desired discounted cash flow and in this way a desired valuation for the asset which produces the cash flow. Enterprises operating in competitive markets are more limited in their ability to increase cash flows.

In an effort to overcome this problem, the Steering Committee, in its publication *Guidelines on Accounting Policy for Valuation of Assets of Government Trading Enterprises* (1994b), has suggested that the current value of a GTE should be based on the deprival value concept. The overview to the paper (p. 4) states:

> In applying deprival value concepts, the basic principles are:
>
> - Where an entity would replace the service potential embodied in an asset if deprived of it, the asset should be measured at its *current cost* (that is, the lowest cost at which the gross service potential of the asset could currently be obtained in the normal course of business). This is the amount which an entity would need to receive in compensation to restore the asset to its former capacity.
> - Where an entity would not replace an asset if deprived of it, the asset would be measured at the greater of its *market value* and the *present value* of future net cash inflows expected from continued use of the asset. This is the amount by which an entity would be worse off if deprived of the asset.
> - Where an asset is surplus to requirements, the asset should be measured at its market value.

A summary table drawn from the guidelines is included at Appendix D.

The advantages of the deprival value methodology, as identified by the Steering Committee, include:

- The measurement and depreciation of physical non-current assets at deprival value provides relevant information about the current cost of providing goods and services.
- The measurement and depreciation of physical non-current assets at deprival value provides relevant information about the current value of the resources deployed for this purpose.

- Deprival value reflects whether the capacity of the entity to continue its present level of operations has been maintained. Consequently, it avoids inadvertent erosion of the entity's operating capacity.
- Deprival value reflects price changes that are relevant to the particular classes of assets held by an entity as opposed to those based on a general index of price changes.

Many of these advantages depend on the assumption that the GTE would choose to replace the asset if deprived of it. Those assets that would not be replaced may be valued at their recoverable amount, which may be estimated by the net present value of the cash flows they provide. These cash flows are inextricably linked to pricing practices, which therefore have important implications for the usefulness of an ERR regime. For example, if prices are set to achieve a GTE's cost of capital target, then the sum of its cash flows discounted at the same rate will, by implication, equal its present value, thus rendering the performance monitoring process ineffective. There is also the danger that prices could be set at a level necessary to achieve a cost of capital target on an over-valued asset base.

The deprival approach is therefore of most benefit for GTEs that would replace most of the service potential of their assets if deprived of it.

4.2.2 Matching economic income and the asset base

The Steering Committee's ERR measure is consistent with the cost of capital defined in Chapter 3. This approach recognises that all assets have an opportunity cost and should be included in the asset base. Nevertheless, the inclusion of all assets may require adjustments to economic income where a readily measurable return to a particular asset may not be observable. Notable areas in which this may be needed include assets employed to deliver Community Service Obligations, developer-funded assets and assets under construction.

Community Service Obligations

The Steering Committee (1994a, p. 8) proposed the following definition of a CSO:

> A Community Service Obligation arises when a government specifically requires a public enterprise to carry out activities relating to outputs and inputs which it would not elect to do on a commercial basis, and which the government does not require other businesses in the public or private sector to undertake, or which it would only do commercially at higher prices.

This definition covers many different types of CSOs, including those where:

- government requires GTEs to provide access to certain services for final consumers at uniform or 'affordable' prices;
- GTEs are required to grant price concessions to special groups of consumers as a way of implementing the income redistribution policies of government; or
- particular public enterprises are required to purchase inputs to meet specific government objectives regarding source and conditions of supply which do not apply to competing public or private firms.

(Steering Committee, 1994a, p. viii)

The capital committed to providing a CSO has an opportunity cost. To the extent that GTEs do not receive an adequate financial return on the assets used in delivering CSOs, they will be restricted in achieving their cost of capital. If governments require their GTEs to provide such services, but at the same time wish to measure performance on a comparable basis to the private sector, they need to take account of the impact of CSOs on measured rates of return.

In some instances, GTEs are compensated for CSOs with a direct cash payment. To fully cover the cost of CSOs, the compensation should be equal to the shortfall between income received from delivering the service and its full cost (that is, including an appropriate return on the committed capital).[32] A precise assessment of the cost of a CSO makes transparent the extent to which the community is paying for the benefits provided through the CSO. If a GTE does not receive a direct payment from government sufficient to cover the full cost of the CSO, the value of any shortfall should be imputed and added to economic income for ERR calculations.

Treating CSOs this way will enable governments to assess the effectiveness with which GTEs use their capital to provide these services. The Steering Committee does not support accounting for CSOs through assets exclusions or arbitrary adjustments to the cost of capital.

Developer-funded assets

GTEs often receive funds to build an asset (or receive the asset itself) from a developer or other external party. In exchange, a developer would usually expect to receive goods or services at a reduced cost. While a GTE technically owns the asset and depreciates it over time, there are various options for accounting for a developer's capital contribution. For example, a capital contribution can be:

[32] The full cost of the CSO should equal the price which would be charged by a private sector company to undertake the service.

- not recorded in the profit and loss account as revenue at all;
- recorded in the profit and loss account as revenue in the year in which the GTE gains control over the asset; or
- amortised through the profit and loss account over the expected useful life of the asset.[33]

The accounting and charging policies to be adopted on user-funded assets will rest with individual governments. However, for the purposes of calculating ERR, consistency between the numerator (economic) income and the denominator (asset base) must be maintained. Consistency requires that, in addition to the annual capital charge recorded in the profit and loss account, the implicit interest on the contribution should also be included in income.

Some jurisdictions do not seek a rate of return on contributed assets. If contributed assets are included in the asset base, revenue should be adjusted to reflect the returns that would have accrued had the GTE financed the asset itself. In the absence of this adjustment, measured ERR would be artificially low. On the other hand, consistency requires that if a rate of return is sought on contributed assets, no adjustments will be necessary.

Assets under construction

The value of assets under construction may increase as construction proceeds. This is reflected in increases in the Capital Works in Progress (CWIP) account. The value of assets under construction should be calculated as the construction costs plus capitalised interest. Including the appropriate interest component (calculated at the cost of debt) as a capital gain in economic income, while adding the value of an asset under construction (including interest) to the asset base, should have the net effect of moving measured ERR toward the GTE's cost of capital target.

Interest during construction (IDC) for inclusion in economic income can be calculated as follows:

$$IDC = CWIP_{e} - CWIP_{b} + CTB_{e} - CAPEX_{e} \qquad (13)$$

[33] This approach may be inconsistent with the Conceptual Framework being developed by the Public Sector Accounting Standards Board and the Australian Accounting Standards Board, as reflected in the Statements of Accounting Concepts (SACs) and various Australian Accounting Standards (AASs), for example AAS27 *Financial Reporting by Local Governments*. Having regard to the concepts contained in the SAC 4, such contributions represent revenue as they are received and therefore cannot be amortised over the life of the relevant asset. This accounting approach, however, does not preclude adjustments for external monitoring purposes.

where
- $CWIP_e$ = the value of the capital works in progress account at the end of the period;
- $CWIP_b$ = the value of the capital works in progress account at the beginning of the period;
- CTB_e = the value of assets constructed by the enterprise and commissioned (closed to book) at the end of the period; and
- $CAPEX_e$ = the value of asset construction costs (capital expenditure) for the current period.

Alternatively, all assets under construction could be included in the asset base only upon completion. Although this approach may appear simpler, it does not explicitly recognise that the cost of capital tied up in the construction until the assets are actually commissioned. Hence, the Steering Committee favours including such assets in the asset base and making an appropriate adjustment to economic income.

4.3 Reconciling measured ERR with the target

As noted throughout the paper, ERR must be measured on a basis which is comparable with the target. It is also desirable to consider performance over a period of time rather than over a single financial year.

Adjusted Targets

As discussed in Chapter 3, the cost of capital can be considered as a fixed risk margin above a long-term bond rate. The return on bonds vary over time. As performance is measured over a period, where as a target is set at a point in time, account will need to be taken of changes in the bond rate.

To be consistent with performance measurement, cost of capital targets (*ex ante*) need to be re-based or adjusted to take account of the actual cost of capital over the assessment period. Because the target is represented as a risk-free rate plus a margin (which can be expected to be reasonably stable), re-basing targets only requires estimating an average ten-year bond rate over the period.

Adjusting cost of capital targets this way explicitly recognises that the opportunity cost of capital can change over the period of measurement. The implication for governments is that they will need to determine the *ex post* cost of capital when assessing a GTE's performance at the end of a period. The implications for GTEs is that they would be expected to have been adjusting

their operations during the year.[34] This is consistent with private sector practice.

Averaging the measure and the target

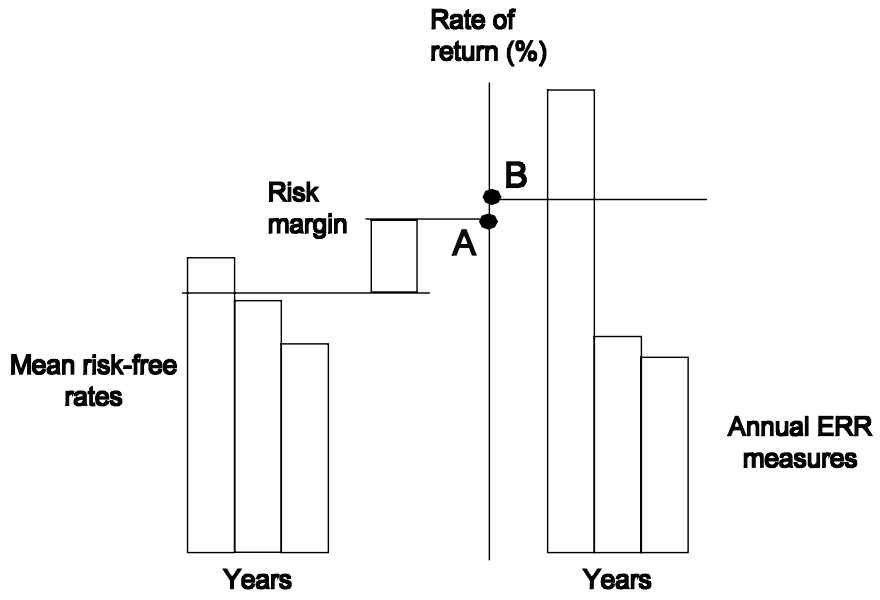
In addition to putting ERR measures and cost of capital targets on the same *ex post* basis, the performance assessment process will be assisted by having them averaged over a period greater than a single financial year. This may help take account of any random variations in a GTE's financial performance which are beyond its control. While these averages could conceivably be calculated over any number of years, it is recommended that the period to be consistent with the period of a GTE's corporate planning cycle, as GTEs usually revalue their assets fully during this time.

The Steering Committee (1994b) recommended a complete asset revaluation at least every five years. For illustrative purposes, however, the following analysis assumes that adjusted cost of capital targets and measured ERR performance are averaged over a three-year period.

The adjustment and averaging process recommended by the Steering Committee is graphically displayed in Figure 4.1, while examples are given in Chapter 5 and Appendix A.

[34] The ability of a GTE to adapt to changing economic conditions should be an issue addressed in the performance assessment process.

Figure 4.1: Averaging ERR measures and adjusted cost of capital targets



As the target can be represented as a risk-free rate plus a margin, it is simpler to average the risk-free rate over the three-year period and add on the individual risk at the end to arrive at an adjusted target (A). ERR performance is the average of the ERR measure over the three years (B).

A detailed analysis of the process for averaging both the risk-free rate and the ERR measure is given at Appendix G.

4.4 Value based management

The ERR measure recommended by the Steering Committee is intended to be used by governments for external monitoring purposes. One of the advantages of monitoring GTEs using a measure which is more value-based than traditional accounting earnings, is the generation of financial information of greater 'decision relevance' to the internal management systems and procedures of GTEs themselves. The use of such information to forge a causal link between managerial decision making and the objective of maximising shareholder value is commonly referred to as Value Based Management (VBM). As explained by Fay and Richwhite (1995, p. 39):

> Value Based Management is a planning and performance measurement system which, when adhered to, requires managers to invest only in projects which actually add value to the firm by generating free cash flow returns in excess of their implicit and explicit costs of debt and equity capital.

The high-profile development of VBM and its increasing use in the private sector in recent years has led to the introduction of a number of proprietary models based on the concept of value creation. Methods include Economic Valued Added, Shareholder Value Analysis, Economic Value Created and Shareholder Value Created. Regardless of the terminology, these models basically seek to provide a global, as opposed to partial, measure of performance that is an improvement on that provided by accounting rate of return. While the measurement approach may be new, the concepts associated with VBM — as with ERR — are not (see Box 4.3).

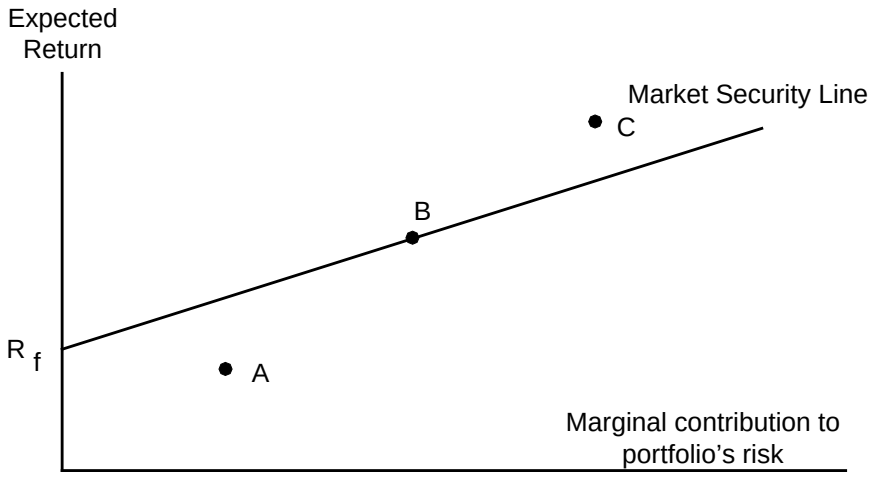
Proprietary VBM models provide a means of determining how a particular enterprise or asset is performing compared to expectations. They are conceptually consistent with the ERR measure recommended in this paper. They can provide a detailed breakdown of the factors which are relevant to the ability of the organisation to generate value for its shareholders (that is, its 'value drivers') as well as an indication of how management can make better decisions regarding the use of capital in both new and existing investments. Recognition that capital has an opportunity cost is central to the development of successful VBM policies (see Box 4.4).

The Steering Committee believes that GTEs should be encouraged to adopt VBM techniques. The Commonwealth Government, for example, recently commissioned a report on the relevance and application of VBM techniques by GTEs. The use of such techniques will follow the adoption by governments of improved measurement methodologies, which, like those developed in this paper, are consistent with VBM models used by GTEs.

Box 4.3: **VBM as a 'new' management tool**

The fundamentals underpinning VBM approaches are not revolutionary. The notion of value added is essentially the same concept of economic rent or quasi-rent developed by academics such as Ricardo and Marshall in the 18th and 19th centuries. In addition, because VBM is intrinsically linked to the cost of capital, its framework owes much to the principles of corporate finance developed by the likes of Markowitz, Modigliani and Miller close to forty years ago.

As shown in the figure below, adding value can be readily understood within the portfolio theory and the risk-return trade-off framework outlined in Section 3.2.1.



VBM models such as EVA estimate where an asset is performing on the risk–return spectrum. In an efficient capital market, that is, in equilibrium, all investments are placed on the market security line. Stock B is meeting its cost of capital, while the performance of stock C is adding to shareholder value and stock A is eroding value. Stock A is clearly losing value for the owner because, as an alternative, the investor could invest in government bonds and receive a return of R_f while facing less risk.

Stock C is said to be adding value because it is expecting to provide a return in excess of what the market has assessed as adequate, given the stock's level of risk compared with the rest of the market. However, if the market is efficient, stock C will be unable to perform at this level for a sustained period of time. The most likely outcome is that the market will increase the value of stock to the point where the expected yield is in line with its cost of capital. In this way, the cost of capital is a target which should be achieved on average over a period of time. It is therefore an appropriate goal for GTEs.

5 THE APPLICATION OF A COST OF CAPITAL TARGET AND FINANCIAL PERFORMANCE MEASURE TO SELECTED GTEs

This chapter presents several worked examples to illustrate the techniques outlined in the preceding two chapters. The Melbourne Water Corporation (MWC), the Port of Brisbane Corporation (PBC) and the Federal Airports Corporation (FAC) have been used as sample GTEs for the application of the methodology recommended in this paper.

The data associated with each GTE are for illustrative purposes only.

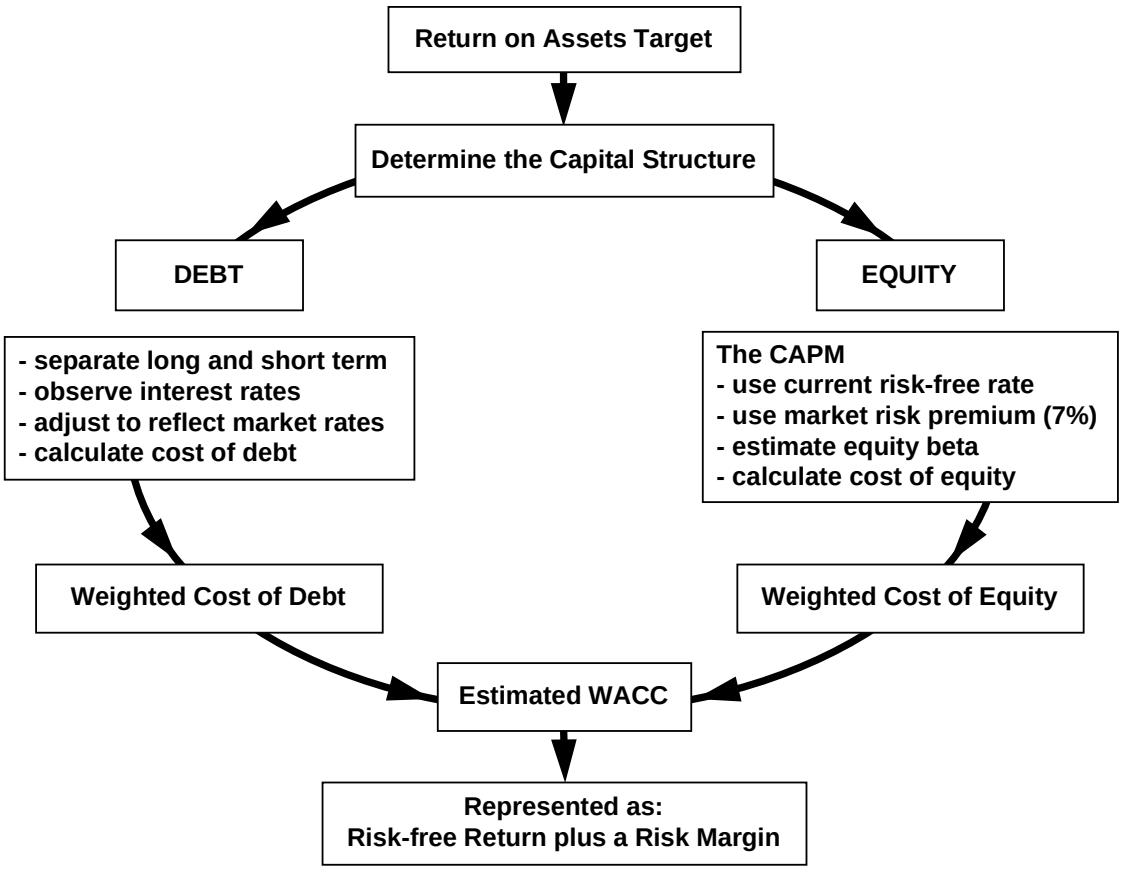
5.1 Target setting

Figure 5.1 depicts the approach described in Chapter 3 of this paper for deriving the weighted average cost of capital (WACC) as the target rate of return on assets.

The use of the return on total assets as a financial target for GTEs recognises that all classes of capital have an alternative use and thus an opportunity cost. To calculate this cost it is necessary to estimate the expected returns from the various sources of financing. The WACC method provides a weighted average of the returns on debt and equity which can be summed to give a total cost of capital for an enterprise.

For GTEs, the cost of debt for inclusion in the WACC is the observed return flowing to debt-holders (that is, interest), adjusted for government ownership. The cost of equity is estimated using the capital asset pricing model.

Figure 5.1: **The WACC approach to developing cost of capital targets**



The following sections illustrate the process for determining cost of capital targets for the MWC, the PBC and the FAC.[35] A more detailed account of the target-setting approach for the FAC is contained in Appendix H.

The variables used and the final cost of capital target are in no way intended to represent actual rate of return targets agreed to between GTEs and their respective governments and are only used to illustrate the application of the methodology described in this paper. As stated in Chapter 3, the Steering Committee has a preference for developing return on asset targets according to the following WACC formula:

[35] Victoria is currently revising its framework for oversight and performance appraisal of GTEs with the intention of using economic indicators such as ERR. Negotiated cost of capital targets with its GTEs do not therefore currently exist. In Queensland, the Port of Brisbane Authority was corporatised on 1 July 1994, after which it became the Port of Brisbane Corporation. It now has a rate of return target which has been agreed to by the Queensland Government. It previously participated in an ERR exercise undertaken by the Steering Committee, the details of which have been published (Steering Committee, 1992).

$$R_a = R_e\left(\frac{E}{V}\right) + R_d\left(\frac{D}{V}\right)$$

where R_a = the expected rate of return on total assets;
R_e = the expected rate of return on equity;
R_d = the expected rate of return on debt;
V = the market value of total assets;
E = the market value of equity; and
D = the market value of debt.

Under the assumption of full dividend imputation, this provides for a nominal pre-company tax rate of return target on the entire asset base.

5.1.1 Capital structure

Capital structure does not affect the cost of capital over a reasonable range. It does, however, influence the individual returns on debt and equity and must be accounted for in the WACC.

To the greatest extent possible, estimates of V, E and D for use in the WACC formula should be at 'market' value. If the GTE provides audited accounts on some form of current cost basis (e g deprival approach), the value of total assets provided in the balance sheet should be a reasonable estimate of V.

The value of a GTE's debt may also be taken from the balance sheet and should include items such as borrowings, trade creditors, pre-payments, overdrafts and other creditors. Because of the relationship between variables of the capital structure (that is, V = E + D), once an estimate of total assets and debt has been determined, the residual can be used as a measure of equity. The process for determining these variables for the FAC (taken directly from its 1992–93 Annual Report) is shown below.

	$
Total Assets (A)	2 141 486 000
Debt (D)	838 170 000
- current borrowings	120 000 000
- non-current borrowings	670 000 000
- trade creditors	2 976 000
- other creditors	45 194 000
- pre-paid revenue	0
- other loans	0
Equity (E = A–D)	1 303 316 000

5.1.2 Cost of debt

If targets for public sector entities are to be set according to a market assessment of their risk, the estimations of the cost of debt must take account of the impact that government ownership has on a GTE's observed cost of debt. In attempting to net out the impact of government ownership, two important adjustments may be necessary:

- Government guarantee. This has the effect of reducing the explicit cost of a GTE's debt. Consequently, a compensating margin should be added to the observed interest cost bringing it in line with the cost borne by a private sector company carrying a similar debt-risk. In the case of the Melbourne Water Corporation, a loading of 0.5 per cent on outstanding long-term debt has been assumed.
- Centralised borrowing. It is common for GTEs to borrow through a central agency. The rate charged by this agency will be based on the pooled risk of a number of government entities and will be inappropriate for the purpose of determining the economic or market cost of debt for a particular GTE. It is therefore preferable to have the GTE credit-rated by a qualified agency and a cost of debt imputed on this basis.

  Centralised borrowing will not be a problem for those GTEs which issue their own debt, although adjustments to the cost of debt may still need to be made for any implicit or explicit government guarantee.

Another issue in determining the cost of debt is its duration and the maturity associated with its yield. For example, the current and non-current borrowings held by the FAC in 1992–93 are unlikely to provide the same return. For reasons of simplicity, debt for the three GTEs in this example has been categorised into two classes: short- and long-term.

On this basis, the annual return on debt (R_d) for the MWC was estimated as the weighted return on long-term debt plus the weighted return on short-term debt. As per Equation (9) in Chapter 3, this can be estimated as follows:

$$R_d = r_{d1}\left(\frac{d1}{D}\right) + r_{d2}\left(\frac{d2}{D}\right)$$

where		
	Nominal long-term borrowing rate (r_{d1}) (including a loading of 0.5% for the government guarantee)	10.7%
	Long-term debt (d1)	$ 2.9b
	Short-term nominal borrowing rate (r_{d2})	7.3%
	Short-term debt	$ 0.9b
	Non interest-bearing liabilities	$ 0.2b
	Total short-term debt (d2)	$ 1.1b
	Total debt (D = d1 + d2)	$ 4.0b

Therefore $R_d = (10.7 \times 2.9/4.0) + (7.3 \times 1.1/4.0)$

$= 9.76$ per cent

Non interest-bearing liabilities (for example, trade creditors) are classified as short-term debt and an imputed cost of debt is calculated on the assumption that the price paid for the good or service includes some implicit interest charge. The prime overdraft rate is an appropriate rate at which to adjust these items. In the example above, this is assumed to be equal to the short-term borrowing rate.

5.1.3 Cost of equity

To determine the cost of equity, it is necessary to use the CAPM. As indicated in Chapter 3, the suggested form of the CAPM is as follows:

$$R_e = R_f + \beta_e (R_m - R_f) \qquad (6)$$

where

R_e	=	the expected rate of return on equity security *e*;
R_f	=	the observed nominal risk free rate;
R_m	=	the expected return from the equity market portfolio;
β_e	=	the market risk factor for equity security *e*; and
$R_m - R_f$	=	the market risk premium.

It is necessary to estimate three variables: the risk-free rate of return, the market risk premium associated with the market portfolio, and the equity beta for the particular GTE.

Risk-free rate

The Commonwealth Government long-term bond rate (LTBR), which represents a minimal risk benchmark for investors, is considered by the Steering

Committee to be a reasonable proxy for the risk-free rate of return (R_f) for most GTEs. For practical purposes, the ten-year bond rate is the most commonly used LTBR and is regularly quoted in major financial publications. The rate to be used for the *ex ante* cost of capital is that which prevails at the time the target is set (for example, 30 June for the following financial year).

Market risk premium

The market risk premium (R_p) is the risk loading over the risk-free rate returned to investors on the 'market' portfolio as a whole. The future risk premium can be estimated by examining the historical returns gained in equity markets (R_m) less the risk-free rate, with adjustments for any identifiable changes which would affect the underlying relationship between the two variables. Based on empirical studies on issue, the Steering Committee recommends a market risk premium of 7 per cent.

Equity beta

The equity beta (β_e) is an index comparing the risk margin of a particular investment with that of the 'market'. Assuming the share market is representative of the market portfolio on offer for investors, equity betas can be readily observed using data based on traded shares and dividend payments for publicly listed companies.

Given that most GTEs do not have traded equity, estimation of the equity beta is a more difficult exercise, as in the case of a non-listed company.[36] Estimating the equity beta for a GTE involves a systematic and detailed analysis of risk factors and the benchmarking of the GTE against comparable listed companies for which an equity beta can be observed. For GTEs with diverse operations, it may be beneficial to undertake this benchmarking at a business unit level. This approach was used by the Working Group when developing an equity beta for the FAC, given that its operations could readily be split into aeronautical services, trading and property. (See Section 2.2 of Appendix C for further discussion).

5.1.4 Calculating a cost of capital target

After the necessary variables have been estimated, they can be entered into the formulae for the WACC and CAPM, as shown below in Table 5.1.

[36] The Steering Committee is presently undertaking further research into beta estimation for GTEs.

Table 5.1: **Illustrative cost of capital targets for selected GTEs**

	MWC	*PBC*	*FAC*
Capital structure			
proportion of debt (*D/A*)	0.58	0.30	0.39
proportion of equity (*E/A*)	0.42	0.70	0.61
Total (*A*)	1.00	1.00	1.00
Debt			
cost of debt (R_d)	9.76	9.93	9.88
Equity			
risk-free rate (R_f)	9.65	9.65	9.65
market risk premium (R_p)	7.00	7.00	7.00
equity beta (β_e)	0.82	0.86	0.65
cost of equity (R_e)	15.39	15.67	14.20
Nominal weighted cost of capital (R_a)	12.10	13.9	12.5
$\therefore$ Implied Risk Margin (RM_i)	2.45	4.25	2.85

Notes: The beta factor used in the estimation of MWC's cost of equity and the capital structure was drawn from a study of the MWC performed for the Office of State Owned Enterprises, Victorian Treasury.

Variables for PBC are based on the assumptions used in a study of its long-run rate of return target requirement undertaken for the Government Owned Enterprises Unit, Queensland Treasury.

Variables for FAC are those used by the Working Group, adjusted for changes in the risk-free rate.

The risk-free rate was the prevailing ten-year Commonwealth Bond rate as at 30 June 1994.

The implied risk margin for the individual GTEs (RM_i) can be re-used without having to revisit the formulas, provided the risk profile of the GTE has remained constant. If this is the case, an *ex ante* financial target for a GTE can be set as the prevailing ten-year bond rate plus the individual risk margin.

5.2 Performance measurement

The Commonwealth Working Group developed a performance measure which draws on published accounting data, is more closely aligned with the market-based concepts encapsulated in a cost of capital target, while recognising the data limitations which come with government ownership. The formula and the calculation of the ERR performance of the FAC in 1992–93 can be represented as follows:

$$ERR = \frac{(EBIT + Da + NIBL + FL + CSO) + (A_e - A_b - NI)}{A_b + (NI / 2)}$$

$$= \frac{260993 - 104768}{2132628}$$

$$= \mathbf{7.3\ \%}$$

where

Cash component of income	= 153 576 + 104 768 + 2 649 + 0 + 0	= 260 993
Capital component of income	= 2 141 486 – 2 019 001 – 227 253	= 104 768
Capital base	= 2 019 001 + (227 253 / 2)	= 2 132 628

Most of the information needed to derive an ERR measure according to this formula is provided in publicly available annual reports. The extraction of the data from the FAC's 1991–92 and 1992–93 annual reports and the necessary manipulations are explained in more detail at Appendix F.

5.3 ERR performance and reconciliation with an adjusted cost of capital target

As discussed in Chapter 3, the cost of capital can be considered as a fixed risk margin above a long-term bond rate. The return on bonds vary over time. As performance is measured over a period, where as a target is set at a point in time, account will need to be taken of changes in the bond rate.

To be consistent with performance measurement, cost of capital targets (*ex ante*) need to be re-based or adjusted to take account of the actual cost of capital over the assessment period. Hence, a GTE's cost of capital is averaged over the period. As a means of identifying underlying performance, the Steering Committee also recommends that the measured performance and the *ex post* target be averaged over a three year period.

Reconciliation of performance with cost of capital targets will therefore involve the following steps:

- measure actual performance over the latest period;
- set the duration of the averaging period to be consistent with the asset revaluation cycle (in this case, three years); and
- estimate the geometric mean for the long-term bond rate *ex post* cost of capital target and the actual performance over the averaging period.

The details of the process carried out by the Working Group for determining the FAC's adjusted target and its performance against this target is provided at Appendix G and summarised below.

Table 5.2: **Adjusted cost of capital targets and ERR performance FAC, 1990–91 to 1992–93**

Year	*Mean Risk-free rate*	*Risk Margin*	*Adjusted cost of capital target*	*ERR performance*
1990–91 (actual)	12.3	2.9	15.2	27.77
1991–92 (actual)	10.1	2.9	12.0	8.10
1992–93 (actual)	8.4	2.9	11.3	7.33
1990–91 to 1992–93	10.2	2.9	13.1	14.02

Note: In 1990–91, the FAC had a large increase in its asset revaluation reserve and changed its accounting policy.

As indicated in Table 5.2, when adjusting the targets it is usually only necessary to estimate the geometric mean of the Commonwealth LTBR (the proxy for the risk-free rate). Assuming no changes in the underlying market risk of the enterprise, the average cost of capital target can be found by adding the GTE's individual risk margin (rounded to 2.9 per cent, in the case of the FAC) to the average risk-free rate.[37]

5.4 Performance assessment

Once the adjusted target and measure have been calculated it is necessary to analyse other factors which may not have been captured by the data. This may require judgement. Some of these matters are discussed in Chapter 6.

[37] The risk margin of 2.9 per cent for the FAC was derived from data in the Working Group's review. It is for illustrative purposes only and does not necessarily represent the risk margin, or the actual financial target set, for the FAC over the period 1990–91 to 1992–93.

6 ASSESSING A GTE'S FINANCIAL PERFORMANCE

Comparing a GTE's ERR with a cost of capital target is intended to provide a global *indication* of its financial performance. A major strength of the ERR technique lies with its potential to stimulate further inquiry into the factors that underlie performance. Analysts should be aware that:

> ... there is a potential tension, even conflict, between the use of rigid financial targets to improve cost recovery and profitability, on the one hand, and the goal of improving the efficiency of GTEs on the other (Industry Commission 1993, p. 172).

A rigorous assessment will need to examine the raw estimates produced by the methodologies offered in this paper. It will need to look beyond the estimates to the factors which gave rise to the level of performance observed and to the implications of any policy response. Adjusting targets and averaging performance over three years will make comparisons more worthwhile, but there may still be legitimate reasons for measured performance to deviate from the adjusted target.

The purpose of this chapter is to discuss the issues that need to be dealt with when using the Steering Committee's recommended approach to performance measurement, in order to achieve a considered assessment of the performance of a GTE. It is important that, once equipped with the estimates, analysts further develop their understanding of the economic performance of the GTE by taking into account issues such as the impact on performance of unique risk and past investment decisions.

As part of this assessment process, this chapter discusses four matters:

- factors affecting a GTE's measured performance;
- the use of a suite of performance indicators to assess overall performance;
- the interaction of pricing and ERR performance; and
- the process of adjusting to a new performance regime.

6.1 Factors affecting a GTE's measured performance

To judge the performance of a GTE solely on a comparison of the (adjusted) cost of capital target and performance as measured by the ERR formula would be inappropriate. Policy and operational decisions resulting from external monitoring should be based on a global *assessment* of performance, this

involves more than a simple comparison of the raw estimates provided by the methodologies discussed in this paper.

As shown in Figure 6.1, the mechanical process of determining and then comparing targets and measures is but one of a number of information sources which should be used in performance assessment.

This is because the target-setting and measurement methodologies are supported by a number of assumptions which are necessary to simplify some complex and intricate processes.

In this regard, the observations of Dodd (1993, p.7) are instructive:

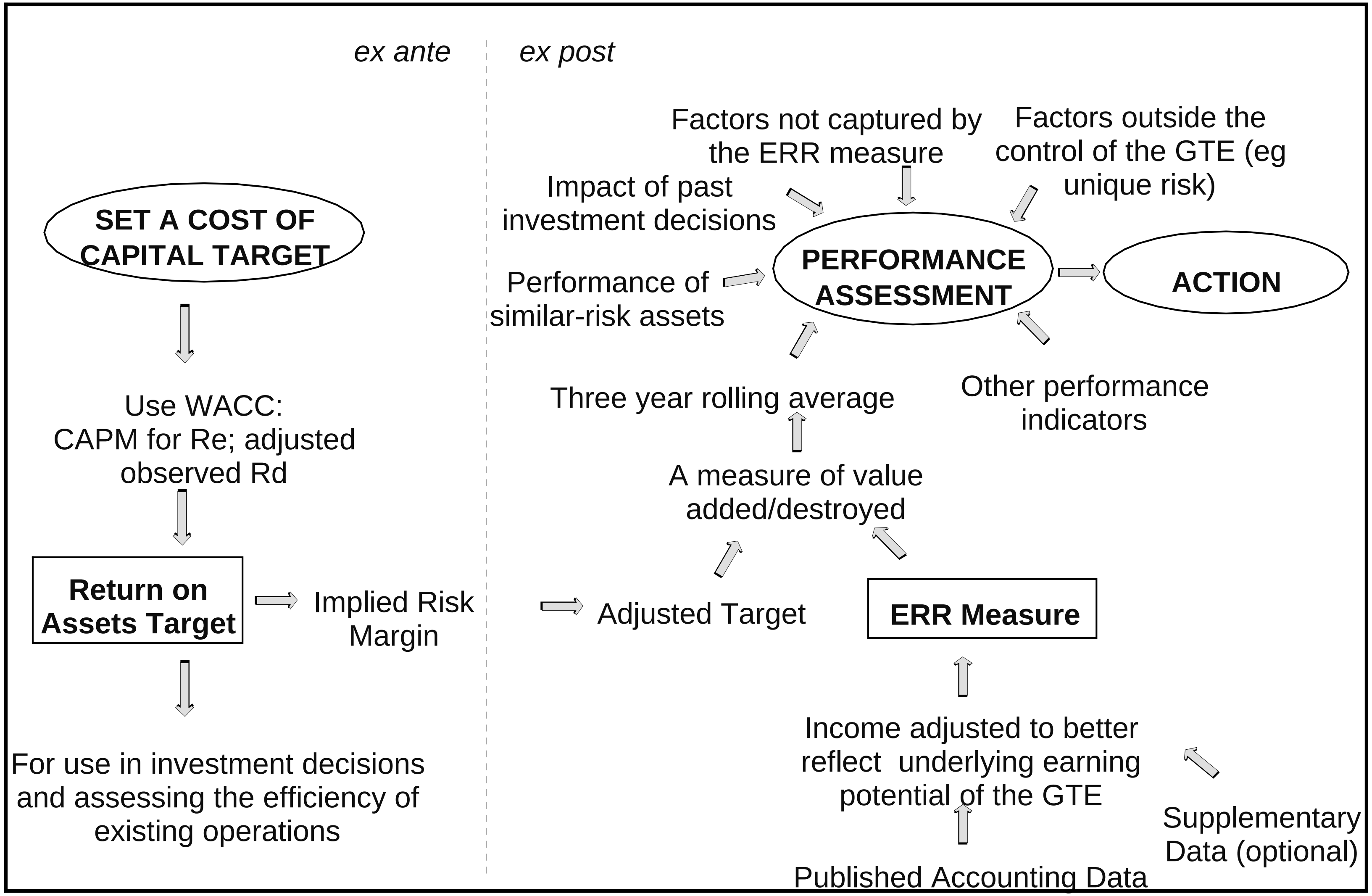
> 'In the social sciences models are to be used but not believed!'...The CAPM is a model and a useful tool, but it does not eliminate professional judgement and financial common sense from the valuation exercise. There are a number of issues in the practical application of the rate of return model. In particular it seems that some users forget that the numbers used in the model (for example, the measure of beta) are usually statistical estimates drawn from probability distributions. These users imply a level of precision to the estimate that is often unwarranted.[38]

The adoption of the accountability framework offered in this paper therefore poses a considerably more difficult task for analysts than that presented by an ARR framework.

When assessing actual performance against cost of capital targets, analysts need to take into account a range of factors which may have affected performance during the assessment period. Some of these factors, (changing economic conditions, changes in the regulatory environment, increased or reduced competition) are external to the GTE but can still have a significant impact on performance. Some of the more important issues which should feed into the assessment of the financial performance of a GTE are discussed below.

[38] The opening sentence is attributed to Professor Bob Officer of the Melbourne Business School.

Figure 6.1: **Factors to be considered in the performance assessment of GTEs**



Past investment decisions

Some GTEs may have a measured ERR which is considerably lower than their target. This may be the result of past decisions which may only be correctable over a period of years. In such cases, governments are faced with two basic choices:

- write down the value of the under-performing assets (that is, treat the discrepancy as a sunk cost), while allowing the GTE sufficient time to dispose of or rationalise other assets where this would improve performance; and, or
- establish interim benchmarks of performance (that is, transitional targets) which are expected to be achieved, with the cost of capital seen as a long-run target.

The decision as to which option, or combination of the two, is chosen will largely depend on the size of the gap between the GTE's realised and expected performance and on the environment within which the GTE operates (for example, the extent of the competition it faces and the nature of its incentive structure). If the GTE sets an appropriate hurdle rate of return on all new projects, then, over time, its measured performance should tend towards its targeted cost of capital. The application of a cost of capital target can also facilitate the improved operation of existing investments by providing a market based benchmark.

The writing down of asset values is what one would expect for publicly listed companies, but this option has generally not been adopted within the public sector. More recently, the introduction of AAS10 has influenced the approach to valuing under-performing assets for reporting purposes.

Impact of significant new investments

To the extent that the capital component of the ERR formula does not fully account for the future benefits of recent investments, measured ERR will be depressed in the early period of a significant capital expansion program. Analysts should be aware that the capital commitments which typically occur in the initial period of a project may depress ERR until the positive cash flows from the investments are achieved. Measured ERR will then increase. Realised performance should be considered in conjunction with individual investment appraisals provided by the GTE.

Corporate plans represent the ideal vehicle for combining the necessary financial information (for example, net present values and expected rates of return) with discussion of how the capital investments are to improve the GTE's performance (and thus its ERR) over the longer term.

Changing market conditions

Financial targets are an important part of the market-like mechanisms which can be applied by governments to their GTEs. Set objectively, they provide a benchmark against which performance can be assessed. However, they are *ex ante* targets and there may be legitimate reasons for not achieving them. The challenge for the analyst will be to discern whether any measured under-achievement relates to poor operational efficiency or to unanticipated changes in market conditions.

The Steering Committee's proposed approach to adjusting cost of capital targets provides a built-in adjustment mechanism. By averaging bond rates over a three-year period, the adjusted target automatically reflects broad changes in market returns. This process, however, may not adequately account for the impact of unique risk.

Although it is appropriate to exclude unique risk from the target-setting process which uses the CAPM, it can nonetheless affect measured performance and thus be an important aspect of performance assessment.

The performance assessment process involves more than mechanics and the manipulation of raw data. This is well highlighted by Officer (1985, pp. 87–88):

> It is not critical if the cost of capital (required rate of return) set by management turns out to be significantly different from the rate of return which was ultimately achieved. What is critical is how the returns from a company's investments compare with the returns achieved by alternative investments...The implication is that it is misleading to set a required rate of return as a control mechanism and then conclude that the system has got out of control if that required rate of return is not met. The firm or investments have only 'got out of control' if the return that they have realised has fallen relative to returns realised for investments of the same risk class. It is only in these circumstances that investments and perhaps management decisions should be changed to ensure a more efficient allocation of resources. In short, the appraisal of the firm by the market place is not done in a vacuum, it is done in the context of the return achieved or expected by alternative investments.

What is important in assessing performance is the relative performance of the GTE, or how the returns generated by the GTE compare with the returns achieved by alternative investments, given a particular level of risk. As an indication of the level at which a GTE should have performed, the returns it generates can be compared with the percentage change in the relevant industry (or relevant grouping of industries) accumulation index at 30 June of the current year compared with the index value at 1 July of the previous year. This approach, however, may need to be qualified. First, the capital gain/loss captured in the accumulation index may not be directly comparable with the

capital income captured in the GTE's ERR measure. This is because the former will include the present value of changes in the expected future earnings of the companies making up the comparable industry sector — a value which may not be captured in changes in GTE asset values. Second, the index measures the total returns to equity capital only, not the total returns to all capital. An accumulation index by industry sector is published in the *Australian Financial Review*.

Unique events affecting a GTEs returns

A GTE's performance will probably be affected by unique or independent events outside its control. There is a need to take such circumstances into account when assessing performance.

As discussed in Chapter 3, the target-setting methodology used in this paper is concerned with market risk (that is, that form of risk which affects the market in general). When setting targets using the CAPM, the unique risk factors that may affect a GTE's returns are ignored and the only risk to which a valuation is attached is the systematic or market risk. However, in assessing a GTE's performance, analysts should be aware of unique events which are outside the influence of the management of the GTE. These can have a significant effect on the GTE's returns in a particular period, while having no effect on similar firms or the market generally. Such factors should be taken into consideration when the performance of the GTE is compared with the returns generated by other equities of similar risk.

Interpretation of variations in returns

The fact that a GTE's returns are expected to vary both with market conditions generally and through the influence of unique events, implies that at times a GTE may be making extremely high or low returns.

Analysts of GTE performance should be aware of this and properly identify the reasons for the level of return achieved, particularly when they intend to use their assessment of performance as the basis for providing policy advice in areas such as deregulation, the pricing of monopoly provided goods and services, and the ongoing viability of the enterprise.

Accounting data

The ERR formula presented in Chapter 4 uses data from audited accounts, and may be subject to the limitations inherent in accounting data. If these are not addressed by the analyst, a GTE's measured ERR may differ from its true performance. In Chapter 4 advice is provided on the treatment of several items

which need to be considered when determining the components of economic income and the capital base. Analysts will need to understand how to 'unwrap' the accounting data to obtain a better picture of a GTE's underlying, cash-based performance.

Examples of how the effects of accounting standards can flow through to the measurement of performance, discussed in Chapter 4, include the absence of an actively used asset revaluation reserve and the potential for EBIT to contain capital value adjustments. With respect to the former, in periods between asset revaluations the estimation of the capital component of economic income may be inaccurate to the extent that the accounting depreciation of assets, based on management estimates of useful lives and residual values, differs from the economic consumption of the assets. When asset revaluations occur, they should, in principle, capture any discrepancy between accounting and economic depreciation over the period.

Analysts should also consider the potential for the opening value of total assets to differ from the market value of the entity.

Asset valuations

The denominator of the ERR equation is given by the opening value of the assets of the GTE and the numerator includes the change in the value of assets held at the start of the year. Consequently, asset values and changes in asset values are a significant determinant of the measured ERR. Analysts therefore need to account for matters such as:

- the frequency of asset revaluations and the appropriateness of the accounting depreciation rates used in periods between asset revaluations;
- the appropriateness of the asset valuation techniques employed by the GTE, including such issues as whether the land assets are valued separately to building assets; and
- the distribution of assets by type and value.

If a GTE does not undertake regular asset revaluations the major factor affecting the closing value of assets and the changes in asset values will be accounting depreciation. In this instance, analysts may need to assess the appropriateness of the accounting depreciation rates chosen by the GTE. For example, in the absence of an adjustment to the asset revaluation reserve, measured ERR will be depressed if the GTE's assets are being depreciated too quickly. In this case, it may be necessary to re-assess ERR using a revised measure of depreciation. The estimate of the appropriate rate of depreciation should be based on separate asset classes.

Length of performance measurement period

It is possible that the period used to average the measured performance may not be long enough to capture the representative performance of the GTE. This may be the case for GTEs with long-lived assets and 'lumpy' capital expenditure programs. In this case, capital expenditures can have a significant impact on short-term measured performance and governments may wish to extend the three-year performance monitoring cycle recommended by the Steering Committee, although this may lessen the comparability of the data across GTEs and jurisdictions.

The distribution of economic income between income and capital

Where a cost of capital target is achieved primarily through changes in asset values, performance might be considered unsatisfactory. For instance, if a fortuitous increase in asset values compensates for an otherwise unacceptable level of earnings, it would be unwise to conclude that the enterprise in question has performed well during a particular financial year simply because it has achieved its cost of capital target. Conversely, a sudden decrease in asset values due to factors outside management's control may mask an otherwise acceptable level of earnings.

For these reasons, analysts should consider the distribution of economic income between the income and capital components of the ERR formula. In addition, governments should consider requesting data from GTEs on land holdings and changes in the value of these.

6.2 Other financial performance indicators

While the ERR measurement techniques described in this paper can provide governments with valuable information on the performance of their investments in GTEs, there are practical constraints on how accurately performance can be measured. Income is a function of a number of variables, such as the GTE's cost structure and pricing policy. ERR as a global measure of performance should therefore be supported by a range of other indicators.

The Steering Committee currently publishes a suite of financial and non-financial performance indicators centred on accounting rates of return (defined as EBIT/average assets). Additional indicators that might be utilised in conjunction with ERR include EBDIT/assets (a measure that indicates how successfully a GTE's management has used the assets under its control), various cash flow ratios (cash from operating, investment and financing activities relative to total assets) or measures of productivity such as total factor

productivity (TFP). A TFP measure may be particularly relevant if the GTE has sufficient pricing flexibility to enable it to meet a cost of capital target by raising prices rather than through efficiency improvements. This issue is discussed further below.

6.3 Interaction of pricing and ERR performance

If an enterprise adds value, it could be viewed as achieving a return which is more than that considered reasonable by the market. The prospects of a private company providing a return in excess of its cost of capital are usually constrained by product competition. Given the monopoly franchise available to some GTEs, it may be inappropriate simply to assess GTEs on the extent to which they exceed their target.

Requiring GTEs, particularly monopoly GTEs, to achieve an appropriate financial target will not, by itself, always ensure improved allocation and a more efficient use of resources. It may be possible for a GTE to achieve its cost of capital target by charging higher prices while operating inefficiently.

It is therefore advisable to review a GTE's pricing policy as part of the performance assessment process. Such a review should consider that:

> ... the annual rate of return earned particularly by enterprises with monopoly power should ideally be the result of pricing strategies related to capacity utilisation; prices should not be set passively to achieve a rate of return target (Commonwealth Treasury, 1990, pp. xv–xvi).

If GTEs are required to set prices at levels sufficient to just cover current operating costs and the decline in the value of associated assets, together with the opportunity cost of the capital tied up in the particular activity of the enterprise, their scope for charging excessive prices will be limited. Such a pricing regime is the equivalent of setting prices so that a GTE's cost of capital is just achieved overall.

However, this approach places no pressure on GTEs to reduce costs, as they can provide a 'market' return on whatever value has been ascribed to their assets. GTEs with a monopoly can pursue inefficient pricing strategies (and thus hide inefficient work and management practices) unless both efficiency performance targets (for example, TFP) and/or price regulation are introduced to discourage inappropriate cost structures.

An alternative strategy is to require GTEs to price individual services flexibly with the object of having sufficient capacity available to meet demand without excessive queuing during peak periods while avoiding significant under-

utilisation during slack periods. The requirement to cover current operating costs would act as a floor on prices. This pricing strategy is suited to GTEs with geographically disparate and 'lumpy' investments. Under this approach, the ERR achieved by each business unit within the GTE would indicate whether capacity should be expanded or contracted. Where the rate of return is consistently above the target, this may indicate that capacity should be expanded, and vice versa.

There are several avenues open to governments to prevent the abuse of market power. The approach which has gained increasing acceptance in recent years has been the introduction (where feasible) of effective competition. Under competition, customers influence prices through their collective expression of capacity and willingness to pay. Super profits are lost to competitors or new entrants and sub-normal profits are generally corrected by the withdrawal of resources. Analysts will need to be mindful of whether or not the GTE faces effective competition when assessing economic performance.

6.4 Adjusting to a new performance regime

Wide-spread incorporation of ERR into accountability regimes would enlarge the scope for comparisons between jurisdictions and for the sharing of knowledge between enterprises and governments. Together with other indicators, it can show how well public assets are being managed and the owners' equity preserved. The notion of shareholder value and the principle of opportunity cost, encapsulated in a concept such as the cost of capital, need to be understood if improved governance of public sector enterprises is to be achieved.

However, once the reasons for introducing ERR are understood, incorporating it into accountability regimes will require sensitivity. The approach taken by governments may need to be modified to suit the circumstances of individual GTEs.[1]

Just as ERR is a challenge to GTEs, there is an obligation on central agencies (and portfolio departments, where appropriate) to smooth the transition. Leadtimes for implementing the new regime should be ascertained and programmed. The rate of adoption of ERR by jurisdictions has to be a matter of individual choice and might be governed by technical factors (for example, data availability).

39 An example is the GTE which operated under legislation which specified that financial targets must be set in dollar terms rather than as ratios.

A THE CAPITAL ASSET PRICING MODEL AND THE WEIGHTED AVERAGE COST OF CAPITAL

A.1 General

This appendix outlines the theory underlying the use of the Capital Asset Pricing Model (CAPM) and the Weighted Average Cost of Capital (WACC) to estimate a cost of capital target. The approach follows that of Brealey and Myers (1991).

It should be stressed that the CAPM approach taken in this paper is different from the exposition of CAPM provided in Commonwealth Treasury's Economic Paper No. 14 (1990). Research since the publication of that paper suggests that attempts to adjust the CAPM formula to account for dividend imputation (that is, by adjusting the required rate of return on equity) were misguided and could result in perverse outcomes. It is better to account for imputation through adjustments — either to the WACC formula or in the cash flows — when assessing actual performance, rather than setting targets.

At the outset, it is important to realise that the CAPM is designed to provide an estimate of the required after-company tax return on the equity (or shareholders' funds) invested, rather than on the equity plus debt. The return on debt can be obtained directly from the capital markets, although adjustments may be needed. The enterprise's cost of capital can then be expressed as the weighted average of the required return on equity and debt. This is known as the Weighted Average Cost of Capital (WACC).

The CAPM models the fact that in a competitive market the expected market risk margin of each individual investment varies in direct proportion to that investment's beta. It provides a formula for defining this relationship for all investments:

$$R_i = R_f + \beta_i (R_m - R_f) \qquad \text{(A1)}$$

where R_i = the required rate of return on a particular investment;
R_f = the risk-free rate of return;
β_i = the tendency of the investment's returns to change with changes in the returns on the market portfolio; and

R_m = the rate of return on the full market portfolio.

The required return on an investment comprises a risk-free return plus a premium for risk which is the product of the beta and the risk premium for the market as a whole.

The CAPM can be applied to a firm to calculate the required rate of return on an enterprise's total assets (funded by debt plus equity), expressed as:

$$R_a = R_f + \beta_a (R_m - R_f) \quad \text{(A2)}$$

where β_a measures the tendency of the returns on the enterprise's total assets to move with changes in the returns on the overall market portfolio, R_m.

Alternatively, the required returns to the enterprise's equity and debt can be expressed separately:

$$R_e = R_f + \beta_e (R_m - R_f) \quad \text{(A3)}$$

$$R_d = R_f + \beta_d (R_m - R_f) \quad \text{(A4)}$$

where β_e and β_d are the enterprise's equity and debt betas respectively. The debt beta is the firm-specific adjustment for riskiness of the security held by the debt-holders; the lower the perceived risk, the lower the beta.

Where β_d is not available it is recommended that debt be split into short- and long-term debt and weighted by their respective costs of debt. That is:

$$R_d = r_{d1}\frac{d1}{D} r_{d2}\frac{d2}{D} \quad \text{(A5)}$$

where
- r_{d1} the borrowing rate on long-term debt;
- d1 long-term debt;
- r_{d2} the borrowing rate on short-term debt;
- d2 short-term debt; and
- D the total market value of debt.[1]

[1] In practice, R_d is estimated using market interest rates and the book value of debt rather than market value.

The enterprise's cost of capital can then be expressed as the weighted average of the required return on equity and debt. This is known as the weighted average cost of capital (WACC) and can be expressed as:

$$R = R_e \frac{E}{V} R_d \frac{D}{V} \qquad \text{(A6)}$$

where E = the market value of equity;
D = the market value of debt; and,
V = D + E

Equations (A2) and (A6) are equivalent. They both measure:

- the required rate of return on total assets; and
- the cost of capital that a firm must pay.

Alternatively, substituting R_e and R_d from equations (A3) and (A4) into Equation (A6) yields:

$$R = R_f + \beta_a \frac{E}{V} \beta_d \frac{D}{V} (R_m - R_f) \qquad \text{(A7)}$$

Comparing equations (A2) and (A7) shows the relationship between β_a, β_e and β_d:

$$\beta_a = \beta_d \frac{D}{V} \beta_e \frac{E}{V} \qquad \text{(A8)}$$

Using the above methodology the required return on total assets can be obtained in either of two ways:

1. Using the cost of capital approach (A6), drawing on equations (A3) and (A4) which require estimates of the enterprise's equity and debt betas respectively. When the debt beta is not available Equation (A5) can be used in place of (A4).
2. Using Equation (A2) directly with an estimate of the enterprise's asset beta.

As noted, the above methodology excludes taxation implications. However, under full imputation the asset beta remains largely independent of the enterprise's debt-to-equity ratio (for reasonably commercial capital structures).

Consequently the conclusions remain unchanged: there are two methods of estimating the required rate of return on total assets.

The Steering Committee recommends use of the WACC expressed as Equation (A6) because of its simplicity and wide recognition.

A.2 Return on equity

Equity returns come in the form of dividends and capital gain, encompassing not only an enterprise's performance but also investor expectations.

For estimation using the CAPM, the return on equity can be seen as three distinct components: the risk-free rate of return, the equity beta, and the market risk premium:

- The risk-free rate of return, proxied by the long-term (10-year) government nominal bond rate, is included in the required return on equity because investors would not invest in risky equity stock if the return was less than that for a safe alternative investment.
- The equity beta is the measure of the investment's risk relative to the average risk in the market as a whole. If the equity beta is 1 then the enterprise's equity stock is considered to be equivalent to the average market risk; if the equity beta is less than 1 then the enterprise's risk is less than that for the average market. Further discussion on beta estimation is provided at Appendix C.
- The third component is the market risk premium ($R_m - R_f$). The market risk premium is defined as the difference between the required rate of return on a total market portfolio (R_m) less the risk-free rate of return (R_f). In practice, the market portfolio is proxied by the return on equities in the share market.

A.2.1 Risk-free rate of return (R_f)

The long-term (10-year) government bond rate is the appropriate benchmark or minimum expected rate of return from a GTE. It is reported daily in financial papers.

A.2.2 Estimating the market risk premium ($R_m - R_f$)

Due to the volatility of annual equity returns, reliable measures of the market risk premium need to be averaged over a long time horizon. In Australia there

have been several studies using long data series designed to empirically estimate the market risk premium, which is assumed to be reasonably stable in the medium term. Estimates of premia include:

6.0 per cent	Irvine (1991);
6.0 per cent	Department of Finance (1991);
8.0 per cent	Bowers and Ball (1988);
7.0–8.0 per cent	Department of Finance (1987); and
7.9 per cent	Officer (1985).

The inability to confidently use short data series to estimate the market risk premium poses problems because of the recent changes to the Australian taxation system. The above historical estimates are all derived from data without an allowance for the introduction of dividend imputation in 1987. On the other hand, the 1985 capital gains tax imposed on the value of income retained in the company may have off-set this somewhat.

Recent research by Associate Professor Neville Hathaway of the Melbourne Business School Finance Research Group indicates that equity risk premia are set on world capital markets. This is consistent with the notion of open capital markets throughout the world. The research indicates that the best long-term estimate for the Australian expected risk premium is 7 per cent.

A.2.3 Effect of capital gains taxation and imputation on the market risk premium

The required return on equity takes into account not only dividends but also capital growth. Prior to 1985, when capital gains were often not taxed, there was an incentive for enterprises to retain earnings and thereby offer shareholders appreciation in the capital value of their shares in lieu of dividends. This favoured tax payers on the highest marginal rates. Thus, capital gains taxation has reduced the advantages of this approach on post-1985 equity investment.

Intuitively, the announcement of a removal of a layer of taxation through imputation should have resulted in a one-off increase in share prices, representing the increased value to shareholders of the cash flow stream. But not all investors have fully benefited from imputation. Institutions with a zero statutory marginal tax rate cannot use imputation credits, superannuation funds may even receive tax credits in excess of their total tax payable, and foreign investors are only eligible to receive exemption from dividend withholding tax.

If imputation has been effective in raising the after-tax cash flow returned to investors from equity investments, then some new projects previously considered unprofitable at the corporate level would have become profitable. Bowers and Ball (1988) argue that this will result in riskier projects being undertaken. This would tend to cause the market risk premium to rise (similarly for the enterprise's debt and equity betas) but the magnitude of any adjustment attributable to risky projects is dependent on the elasticity of demand of these projects (how likely they are to be taken up). No evidence exists as to the exact elasticity of demand of risky assets, but it is assumed not to be perfectly inelastic resulting in some pressure on the market risk premium (at the margin).

Conversely, if the addition of a capital gains tax captures more taxable income (reduced avoidance) at the investor level than is reduced from the removal of the double taxation of dividends, the overall tax burden will be higher, risky investment projects will decline and the net influence on the market risk premium would be expected to be negative (that is, a reduction).

Finally, the classical tax system was claimed to discriminate against the use of equity capital in favour of debt. On this basis, the introduction of imputation is expected to cause a restructuring of company capital away from debt. If most companies had reduced relative debt levels, then the market risk premium should have fallen as the likelihood of bankruptcy declined.

Data quoted in the Industry Commission's inquiry into the availability of capital suggest that the tax system favoured investment in companies which retained earnings, implying a marginal incentive to invest in equity. Since equity investors historically tend to be in the top marginal tax brackets, it is not surprising that there has been no significant movement away from debt financing. Depending on the measure used, debt financing may actually have increased and no impact upon the risk premium can be assumed.

The net result of this discussion is that without empirical evidence it is difficult to identify, with confidence, the exact effect of capital gains taxation and imputation on the risk premium. Since reliable empirical data are unlikely to be available for another 20 to 30 years, historical data estimates of the market risk premium provide the best estimate at this stage. Further, the impact of changes in taxes in the local market would not be expected to have a material influence on expected returns (which are set internationally).

To summarise, for this paper a risk premium of 7 per cent is appropriate. This risk premium is added to the risk-free rate of return (R_f) to calculate the market rate of return (R_m).

A.2.4 Return on debt

When calculating the required rate of return on debt all explicit and implicit interest burdens should be included. Explicit interest burdens can be identified as the interest rate demanded by the providers of the debt capital. However, goods and services which are extended to an enterprise on credit also contain an interest burden. This implicit interest burden is included in the cost structure of a supplier to compensate for the period of credit extended. Trade credits, as well as revenue received in advance, form part of the Non-Interest Bearing Liabilities (NIBLs) of an enterprise. Since the implicit interest payments contained in NIBLs need to be covered by the revenue generated from assets, these additional costs must also be included in the calculation of a cost of capital target.

An enterprise's balance sheet also contains other non-interest bearing debt, such as provisions for long-service leave. Since it is difficult to estimate cost adjustments for such provisions, they are better regarded for the purposes of rate of return calculations as equivalent to reserves and treated as part of the equity in the enterprise.

A.2.5 Calculating appropriate debt premiums

For private sector firms, the required rate of return on debt is directly observable in the market from interest rates demanded by lenders. For many GTEs, however, no market observations exist because they do not issue bonds in the open market. Moreover, those that do trade bonds on the open market may have an implicit government guarantee that necessarily limits the market's perception of risk associated with the debt issued. Thus the observable interest rate is not a true indication of the risk inherent in the particular enterprise and will need to be adjusted for use in the WACC.

For longer-term debt, required rates of return can be estimated from the traded bonds of similar organisations. Such information can be gained from capital markets and will have the advantage of excluding the effect of government guarantees. However, most GTEs would need to employ a financial consultant to obtain an accurate estimate.

Where it is not possible to access the capital markets for this information, a method similar to that used by the Commonwealth Government to determine appropriate borrowing margins on Commonwealth debt owed by GTEs may be appropriate. Under this method, a margin of around 0.8 per cent (depending on the gearing) is added to the long-term bond rate. This does not include a guarantee fee.

For short-dated debt a broader range of market data already exists. From these observations the 180-day bank bill rate may be appropriate. But, as with long-term debt, many GTEs would need to employ a financial consultant to obtain an accurate estimate of the required rate of return on short-term debt.[2] More readily available information on the appropriate risk weightings and the calculation of issue margins will be easier where GTEs make bond placements.

A.3 Effects of taxation

In theory, private individuals base their investment decisions on post-all-tax economic income, taking account of risk. However, income tax drives a distorting wedge between pre-tax income and post-company tax returns to equity, and between post-company and post-personal tax returns to equity. This section addresses practical problems associated with setting targets given the current distortions of the taxation system.

Since the effective company tax rate is not directly observable, it must be estimated. The best available approximation appears to be the statutory corporate tax rate. Due to non-neutralities of the income tax system, different taxation levels (for example, personal tax, company tax) impact differently upon investor decisions. Since private investors base their investment decisions on economic income after all relevant taxes have been paid, and after taking account of risk, it would be ideal to set targets on a post-tax basis. Under the previous classical tax system, it was possible to use stock market data, which are expressed in post-company tax rates of return, to estimate rates of return after all taxes had been paid.

With the introduction of dividend imputation, this traditional relationship no longer holds. If it was assumed that dividend imputation had little effect on investor decision making then the classical system would prevail and targets could continue to be set in post-tax terms. On the other hand, if dividend imputation is assumed to work perfectly (full imputation), the tax rate paid by any individual on income distributed by a company (dividends) becomes equivalent to that individual's marginal tax rate. In this case, it would be appropriate to set targets in before-company tax terms. In practice, dividend imputation affects investor decisions somewhere between these two extreme cases, since not all investors have equal tax status with regard to imputation

[2] Such GTEs can appear to have an ERR target that is below the long term government bond rate. However, this unusual situation may be allowed for by measuring the market risk premium on equity at the short end of the yield curve. This recognises the high risk borne by the equity holder, and thus provides a sensible target.

credits and not all companies fully frank their dividends. Nonetheless, the Steering Committee's view is that full imputation is a reasonable working assumption given that any dividend paid to the shareholder by the GTE is not subject to any further tax liability.

A.3.1 Dividend imputation system of company taxation

Under a system of full dividend imputation for companies, as now applies in Australia, private shareholders are allowed credit (called franking credits) for taxes paid at the company level upon distribution of company income. The amount of franking credits depends on the effective rate of company tax paid by companies. The effective tax rate can vary from the statutory tax rate because of tax provisions, such as accelerated depreciation, which cause the amount of taxable income to differ from economic income.

A company which has a relatively high effective tax rate would be expected to 'frank' its dividends to the greatest extent possible. The attached franking credits may be used by shareholders to reduce personal income tax payments to a greater extent than would occur if the company had a low effective tax rate.

A.3.2 Cost of capital targets under dividend imputation

Under certain assumptions, full imputation means that the total tax rate (personal and company) imposed on income derived from companies equals shareholders' marginal tax rates and so is unaffected by the effective company tax rate. The important implication of this result is that pre-company tax rates differ from post-all-tax rates (which are the determinants of investment decisions) only by shareholders' marginal rates and not by the taxation characteristics of the company. Hence, setting cost of capital targets for GTEs under full imputation is conceptually sound and is consistent with setting targets pre-tax.

The assumptions required for setting targets on this basis are as follows:

- all company income is ultimately distributed as income;
- capital gains are fully offset by corresponding capital losses for income tax purposes;[3] and
- all franking credits are used to offset personal tax liability.[4]

[3] See Bowers and Ball (1988) for a description of the conditions under which this assumption holds.

While these assumptions may not hold perfectly in practice, refinements to relax them would be complex and open to significant error. For example, it would be difficult to estimate the amount of franking credits that are not fully used to offset personal income tax (for example, because they are derived by non-resident shareholders).

[4] The presence of clientele effects may mean that most, or all, franking credits are fully utilised. Clientele effects occur where shareholders who cannot benefit from franking credits hold shares in companies which have lower effective tax rates.

B ALTERNATIVE CAPM APPROACHES TO DETERMINING THE REQUIRED RATE OF RETURN ON ASSETS

This appendix examines alternatives for developing required rates of return on assets.

In its most common application, the CAPM provides an estimate of the required after-company tax return on investments in respect of the equity (or shareholders' funds) invested rather than the returns on equity plus debt. The return on debt can be obtained directly from the capital markets. The enterprise's cost of capital can then be expressed as the weighted average of the required return on equity and debt. This is known as the weighted average cost of capital (WACC).

The CAPM demonstrates that in a competitive market the expected market risk premium of each individual investment varies in direct proportion to that investment's beta.

$$R_i = R_f + \beta_i (R_m - R_f) \quad \text{(B1)}$$

where R_i = the required return;
R_f = a risk-free return;
β_i = the tendency of a security's returns to change with changes in the returns on a market portfolio; and
R_m = the return from a full market portfolio.

This methodology can then be applied to a firm where the required rate of return on an enterprise's total assets (funded by debt plus equity) can be expressed as:

$$R_a = R_f + \beta_a (R_m - R_f) \quad \text{(B2)}$$

where β_a = the tendency of the returns on the enterprise's total assets to move with changes in the returns on the overall market portfolio, R_m.

There are a number of difficulties with the return on assets–CAPM approach:

- it is not widely used, as firms generally set targets at a point for a period and ignore changes which may impact on the equity beta (unless they are of major significance);
- asset betas are not observed in the market;
- asset betas are not totally independent of financing decisions;
- asset betas can only be derived from equity betas in the first place;
- the relationship between equity and asset betas is not as clear as that implied by the widely used delevering formulas (this issue is addressed in more detail below); and
- there is no benchmark for developing a beta for a GTE unless this is done by referencing the market.

Alternatively, the required returns to the enterprise's equity and debt can be expressed separately:

$$R_e = R_f + \beta_e (R_m - R_f) \quad \text{(B3)}$$

$$R_d = R_f + \beta_d (R_m - R_f) \quad \text{(B4)}$$

where β_e and β_d = the enterprise's equity and debt betas, respectively.

The debt beta is the firm-specific adjustment for riskiness; the lower the perceived risk, the lower the beta.

Or, where β_d is not available:

$$R_d = r_{d1}\frac{d1}{D} + r_{d2}\frac{d2}{D} \quad \text{(B5)}$$

where
- r_{d1} = the borrowing rate on long-term debt;
- d1 = long-term debt;
- r_{d2} = the borrowing rate on short-term debt;
- d2 = short-term debt; and
- D = the total market value of debt

Discussed below are three alternatives for estimating the required rate of return on assets:

- weighting the enterprise's required returns to debt and equity (WACC) — this is the most common approach and the one recommended by the Steering Committee;
- weighting the enterprise's debt and equity betas by their debt-to-equity ratios to determine an asset beta, and then utilising the CAPM to derive ERR; and
- delevering the equity beta to produce an asset beta and substituting in the CAPM.

Weighted average cost of capital approach

The enterprise's cost of capital can be expressed as the weighted average of the required return on equity and debt. This is known as the weighted average cost of capital (WACC) and can be expressed:

$$R = R_e \left(\frac{E}{V}\right) R_d \left(\frac{D}{V}\right) \qquad \text{(B6)}$$

where E = the market value of equity;
D = the market value of debt; and
V = (D + E).

The steps in using the WACC approach are as follows:

- Step 1 Determine R_e using Equation (B3)
- Step 2 Determine R_d using Equation (B5)
- Step 3 Determine R (required rate of return on assets) by using Equation (B6).

Weighted debt and equity beta approach

Substituting R_e and R_d from Equations (B3) and (B4) into Equation (B6) yields:

$$R = R_f + \left(\frac{E}{V}\right) \beta_d \left(\frac{D}{V}\right) (R_m - R_f) \qquad \text{(B7)}$$

Comparing equations (B2) and (B7) shows the relationship between β_a, β_e and β_d:

$$\beta_a = \beta_d \frac{D}{V} \beta_e \frac{E}{V} \quad \text{(B8)}$$

The difficulty with this approach is that debt betas are not readily observable.

Alternatively, where β_d is not available R_d can be estimated using Equation (B5). Rearranging Equation (B4) and substituting R_d from Equation (B5) yields β_d

$$\beta_d = \frac{R_d - R_f}{R_m - R_f} \quad \text{(B9)}$$

The steps in using the weighted debt and equity beta approach are as follows:

- Step 1 Determine R_d using Equation (B5)
- Step 2 Determine β_d using Equation (B9)
- Step 3 Determine β_a using Equation (B8)
- Step 4 Determine R_a using Equation (B2)

Delevering the equity beta approach

Another method is to work back from an observed equity beta (incorporating financial risk) to an asset beta by excluding the impact of leverage.

At the outset it should be noted that asset betas only appear more stable than equity betas because we can more easily observe equity betas owing to the high visibility of trades in equities. While asset betas, equity betas and debt betas logically are very strongly related, it is a measurement difficulty that causes asset betas to appear more stable.

This relationship can be derived from the WACC. See Equation (B6).

Substituting for each return as a risk-free rate plus a risk premium yields:

$$R_f + \beta_a (R_m - R_f) = \frac{E}{V} (R_f + \beta_e (R_m - R_f)) + \frac{D}{V} (R_f + \beta_d (R_m - R_f)) \quad \text{(B10)}$$

Cancelling out the risk-free rates yields:

$$\beta_a = \beta_e \frac{E}{V} \beta_d \frac{D}{V} \quad \text{(B11)}$$

Under the assumption that β_d equals zero the equation becomes,

$$\beta_a = \frac{\beta_e \times E_L}{V_L} \quad \text{(B12)}$$

where V_L = the corporate value of the levered firm; and
E_L = the equity value of the levered firm.

This is the standard approach to delevering equity betas. The approach was developed by Hamada (1969) and assumes that the only impact which debt has on the value of the firm arises out of the tax deductibility of debt interest expense (that is, β_d is zero). This assumption is open to serious question, but the notion that increased reliance on debt financing increases equity betas is not. However, the relationship described by the above formula implies an unrealistically precise nature of the relationship. Nonetheless, delevering equity betas using this approach is widely used and accepted.

The steps in using the delevered equity beta approach are as follows:

- Step 1 Select the appropriate β_e
- Step 2 Determine β_a using Equation (B12)
- Step 3 Determine R_a using Equation (B2)

Equations (B2) and (B6) are equivalent:

- the return required on total assets; and
- the cost of capital that a firm must pay.

Using the above methodology the required return on total assets can be obtained in either of two ways:

1. Using the cost of capital approach (B6), drawing on equations (B3) and (B4) which require estimates of the enterprise's equity and debt betas respectively. When the debt beta is not available, Equation (B5) can be used, in place of (B4).
2. Using Equation (B2) directly with an estimate of the enterprise's asset beta.

It is clear from an examination of the equations that in each approach, a major factor is the role of debt and equity. None of the above approaches excludes a weighting between debt and equity.

The Steering Committee recommends method (1) — the cost of capital approach (B6) — because of its simplicity and wide recognition, and the difficulties in observing asset betas.

C ESTIMATING EQUITY BETAS FOR GTES

Only companies listed on the stock exchange have observable equity betas. The observable beta represents a measure of the risk faced by those investors prepared to purchase equity in the company. It also represents an aggregate of risk estimates made by investors in that stock.

For entities with no traded equity base (for example, GTEs and non-listed companies), it is necessary to form a judgement on the appropriate beta. However, the associated increase in subjectivity which results does not lessen the fact that the cost of capital represents the rate of return required by the *shareholder*. An important principle in setting cost of capital targets of GTEs is that the estimated equity beta should reflect the investor's (that is, owner Government's) perception of risk; not the GTE's or some other third party's.

This appendix describes a number of information sources and models which can be drawn together as part of a comprehensive risk assessment of the GTE. It also includes an alternative approach to developing equity betas which assumes a commercial capital structure for the GTE and that the WACC is invariant to the capital structure. The choice of method depends on the degree of confidence analysts have in, and their understanding of, the process. Inclusion of this alternative approach allows analysts to test their beta estimations.

Which particular method is used to estimate the betas for particular GTEs will very much depend on the quality of the information available. For example, if there exists a listed company which is strongly comparable, in relevant ways, to a particular GTE, it may be reasonable to use its equity beta, with appropriate adjustments, as an estimate for the GTE's beta. In general, however, comparable, observable equity betas will need to be supplemented with other information.

The need for judgement when estimating equity betas for GTEs is not a reason for rejecting the target-setting framework recommended in the paper, especially as a similar approach is used in the private sector for non-listed companies. Moreover, the impact of the beta estimate on the cost of capital is often over-emphasised. Dividend imputation, changes in the risk-free rate, assumptions regarding the size of the market risk premium and the rounding of targets, can all have a greater impact on the estimation of the cost of capital than a minor adjustment to the equity beta. Nevertheless, the Steering Committee recommends that the process for estimating betas should be as rigorous as possible. It also sees considerable benefit from undertaking a risk assessment

(the estimation *process* rather than the estimate itself) of GTEs, in that it improves the shareholder's understanding of the influence of risk, and of how this relates to the performance and business decisions made by the boards and managements of GTEs.

The following discussion covers a number of issues which should be considered as part of a GTE's risk assessment. As noted above, not all these will be necessarily be relevant in all cases. The second section of this appendix contains a worked example of the development of an equity beta for a Commonwealth GTE.

C.1 Stages of estimating equity betas for GTEs

Developing an equity beta for a GTE requires a risk assessment which accounts for at least some of the following processes:

- identify the business segments comprising the GTE's operations;
- assess the variability of its cash flows;
- assess factors which will impact on the variability of the future cash flows;
- assess factors which will impact on the asset risk of the GTE;
- identify comparable companies' equity betas (if applicable);
- adjust the comparable companies' equity betas (if appropriate);
- take into account betas for other GTEs, particularly those with similar assets; and
- draw together the components of the analysis and interpret the impacts on risk.

It should be emphasised that only factors relating to market risk have an impact on the beta of a GTE. Characteristics of a GTE which relate to its unique risk are of no consequence in the process of estimating betas and care must be taken to ensure adjustments are not made on this basis. Unique risk factors will be reflected in the measurement of performance and, as discussed in Chapter 6, should be accounted for in the assessment of performance. This is not to indicate that unique risk is unimportant but rather that it is inappropriate to include it in the beta and therefore in the cost of capital. Other mechanisms, such as the corporate planning process, provide a sounder avenue for dealing with unique risk factors.

C.1.1 Identify business segments comprising the GTE's operations

Identify the business segments of the GTE and then calculate the percentage of the revenue streams from the different segments when compared to the total revenue.

It is necessary to identify the business segments of a GTE because the degree of market risk inherent in an asset of a GTE will be reflected in the variability of the cash flows produced by that asset. To isolate the variability of cost and revenue it may be appropriate to identify the business segments of the GTE and calculate relative size and variability of the cash flows produced by each segment.

C.1.2 Assess variability of cash flows

The following factors will have an impact on the variability of a GTE's cash flows.

Demand risk

This relates to the degree of the GTE's exposure to changes in demand, as affected by general economic conditions.

Elements of demand risk may include customer profile, the type of service offered and the ability to pass on price increases. For example, a GTE with a considerable portion of its revenue base locked into long-term contracts, with little provision for price variation, would be expected to have a low beta, other things being equal.

Similarly, as a general statement, electricity and water GTEs would be expected to have low betas (depending on how their charging basis relates their revenues to economic fluctuations), given that the product is of an 'essential' nature and demand variations tend to be small compared with changes in the general level of economic activity.

Charging regime

The charging basis of an organisation is readily observable and gives a good indication of how its revenue might fluctuate according to changes in economic conditions. For example, a water GTE might change its charging basis from fixed charge regardless of water usage (up to a point) to one of variable pricing which reflects water consumption.

Under the fixed charging regime changes in economic conditions will have a limited impact on revenue earned by the organisation, whereas under variable pricing, economic conditions will have a larger impact on the level of revenue earned by the organisation as consumers change their consumption pattern to reflect changes in economic conditions.

Size and experience

A well-established and large enterprise may have less variable cash flows than a smaller firm. Accumulated goodwill and assured customers may give its revenues the stability that a newer entrant lacks.

Level of competition or substitution

An increase in the level of competition faced by an enterprise will enhance the likelihood of its failing. This will be reflected in its level of unique risk and to a degree in its market risk. However, high levels of competition *per se* will not lead to higher betas. This will only occur if the increase in competition results in the enterprise investing in new areas in which the cash flows are expected to be more variable due to an increased riskiness of the asset base (that is, if the enterprise's market risk is affected).

Market risk in related industries

The revenue of some GTEs flows heavily from one or two sectors. For example, cash flows of the FAC and port authorities would be expected to vary in some type of relationship to the performance of the airline and shipping industries, respectively.

Financial leverage of the GTE

The GTE's gearing level (that is, its debt to equity ratio) will affect its equity beta. That is, as the GTE's level of debt increases the return expected by its equity holders increases to compensate for the increase in risk associated with higher levels of debt (such as bankruptcy cost). This does not impact on the cost of capital target (within the bounds on a normal capital structure and under the assumption of full imputation) but it does affect the relationship between the risk to equity and debt holders.

C.1.3 Identify comparable companies' equity betas

A first-cut estimate of a GTE's equity beta may be obtained by averaging betas for traded companies in similar business sectors. However, given that the

majority of GTEs in Australia are unique, companies directly comparable with the GTE may not be available. Hence, it is usually necessary to use either or all of the following methods:

- Benchmark against listed companies that are most similar to the different business segments of the GTE. For example, if a GTE's revenue comprises aeronautical and retail streams, it would be necessary to identify equity betas for companies that operate in these two industries. The equity beta for the selected GTE needs to be a composite of the weighting of betas for its different revenue streams (refer to the worked example below for more detail).
- Benchmark against overseas companies that operate in the same sector in their economy as the GTE. This method should be treated with caution as the equity betas for the overseas companies will be influenced by the economy in which they operate and hence not be based on Australian economic conditions. Overseas companies' betas will have to be adjusted for differences in economic conditions and country-specific risk factors.
- When selecting benchmark betas it is useful to select those from comparable firms with similar capital structures. This reduces the need for delevering and relevering betas (the deficiencies in the delevering approach are discussed below).

C.1.4 Adjust the comparable companies' equity betas

Considerable care and knowledge of the organisation are necessary in selecting representative values of an equity beta as it is affected by both its business risk and financial risk. Hence, adjustments are needed for:

- Difference in financial risk (gearing) between the GTE and comparable companies — usually, companies with a similar business employ different leverage from that used by the GTE. To account for this, it is necessary to 'delever' the betas of the comparable companies to obtain their business risk (that is, asset beta) and then average the betas to obtain the GTE's asset beta. The example below illustrates this point further.
- Difference in business risk between the GTE and comparable companies. For example, if the revenue stream of a GTE is less sensitive to economic changes (for example, business cycles, fiscal policy, interest rates, prices of inputs) than the revenue streams of comparable companies then the GTE's asset beta will be lower than the selected companies' betas. To obtain the GTE's equity beta relever its asset beta using the capital

structure of the GTE. The formula used to 'delever' and 'relever' a beta is given below.

C.2 Worked example: how to average betas and weight betas

Assume that a GTE has two business segments, a rail passenger service and property. Assuming no directly comparable companies exist, select companies listed on the stock exchange that can be compared with either of the business segments. For illustrative purposes, assume there are four comparable companies for the rail passenger service and one for property.

C.2.1 Averaging betas

The process for averaging betas is displayed in Table C.2.1.

Table C.2.1 **Averaging betas of comparable companies'**

Company	*Equity beta (with gearing)*	*Asset beta (delevered beta)*
Compared with rail passenger service		
A	1.20	1.00
B	0.85	0.70
C	0.75	0.55
D	0.97	0.82
GTE Asset beta (average of the four companies' asset betas)		**0.77**
Compared with property		
E	0.65	0.5
GTE Asset beta		**0.5**

Note: The figures in this table are for illustrative purposes only.

C.2.2 Weighting betas

Assuming that the GTE's total revenue comprises 75per cent from rail passenger services and 25per cent from property. Because of its mix of activities the beta for the GTE needs to be a composite of the weighting of betas for its two business segments. Hence, the asset beta for the GTE equals:

Asset beta for rail operations	0.75*0.77	= 0.58
Asset beta for property	0.25*0.5	= 0.13
Asset beta for the GTE	0.58 + 0.13	= 0.71

Note: in the above example the asset beta has not been changed for differences in business risk between the comparable companies and the GTE. That is, the

GTE asset beta of 0.71 has to be adjusted for any factors that may affect the variability of the GTE cash flows compared with that of the comparable companies.

C.3 Delevering and relevering betas

The formula below (Equation C1) is widely used to 'delever' observed equity betas to determine an asset beta. This allows company risk to be compared without the influence of the financial risk. However, there are limitations to the wider application of asset betas derived in this way for GTEs. This issue is discussed in more detail in Appendix B.

This approach assumes that corporate debt is risk-free (that is, $\beta_d=0$) and that a company's value increases due to company tax savings associated with company's debt. Since this assumption is open to serious question, so too is Equation C1. However, it is difficult to seriously question the notion that increased reliance on debt financing increases equity betas. The major issue is the precise nature of the relationship.

$$\beta_a = \frac{\beta_e}{\left[1+[1-t(1-\gamma)]\frac{D}{E}\right]} \qquad \text{(C1)}$$

Where: β_a is the asset beta (the delevered equity beta — a measure of the business risk of the GTE);
β_e is the equity beta of the selected company (levered beta);
t is the corporate marginal tax rate;
γ is the portion of imputation credits which can be used by shareholders; and
D/E is the debt to equity ratio of the comparable company, estimated in terms of market value.

Equation C1 could be rearranged to relever betas.

$$\beta_e = \beta_a\left[1+[1-t(1-\gamma)]\frac{D}{E}\right] \qquad \text{(C2)}$$

Where: β_e is the equity beta for the GTE;
β_a is the asset beta (a measure of the business risk of the GTE);
t is the corporate marginal tax rate of the GTE;
γ is the portion of imputation credits which can be used by shareholders; and
D/E is the debt to equity ratio of the GTE, estimated in terms of market value.

If imputation were considered to have the effect of totally eliminating corporate taxation — this would be the case for GTEs — then the tax terms in the equation disappear. For example, Equation C2 collapses to:

$$\beta_e = \beta_a\left(1+\frac{D}{E}\right) \qquad \text{(C3)}$$

Equation C3 is the preferred formula to use when relevering the asset beta for GTEs and is based on the assumption that full imputation is applicable to GTEs.

While the use of the above formulas can assist in developing betas, they should only be used as one part of a comprehensive risk assessment and generally not be used as the sole basis for the equity beta estimation.

C.4 Summary

In summary, the steps for estimating equity betas for GTEs are as follows:

1 Identify the GTE's business segments and calculate the percentage of revenue stream from different segments to the total revenue.

2 Assess the variability of the GTE's cash flows for demand risk, size and experience, market risk in related industries, etc.

3 Identify a sample of companies identical to the GTE or with business segments similar to the GTE.

4 Obtain the equity betas for each of these companies.

5 Adjust the equity betas for financial leverage to obtain the estimates of the companies' asset beta (use caution in the use of delevering formula).

6 Average and weight the asset betas of the selected companies to obtain the GTE's asset beta.

7 Adjust the GTE's asset beta if there are differences in business risk compared with the selected companies.

8 Estimate the equity beta of the GTE by adjusting the asset beta to reflect the financial leverage of the GTE (use caution in the use of relevering formula).

9 Draw together information and make an assessment of an appropriate equity beta.

C.5 Worked example: estimating an equity beta for the Federal Airports Corporation (FAC)

The information in this section is based on the beta estimation exercise undertaken for the Commonwealth Review of Financial Targets for the FAC, the Civil Aviation Authority (CAA) and Australian Maritime Safety Authority (AMSA). This exercise drew on *some* of the processes described above.

When determining the beta for FAC the working group examined FAC's operating environment and main operating variables as well as comparable industry betas (where appropriate).

Beta estimation is difficult where industry comparisons are lacking but the more information that is available regarding market risk the less difficult the task becomes. However, as noted above, a degree of subjectivity is inherent in the task of beta setting.

C.5.1 Background

The FAC became operational on 1 January 1988 with a charter to own, develop and operate federal airports on behalf of the Commonwealth as a commercially self-supporting business enterprise. The Corporation has powers to collect aeronautical charges at federal airports, arrange revenue-generating business concessions and make by-laws relating to federal airports. The FAC does not face competition at individual airports but it has no choice in its customer base as the usage of its facilities is, to a large extent, dictated by aircraft being allowed to land by the former CAA.

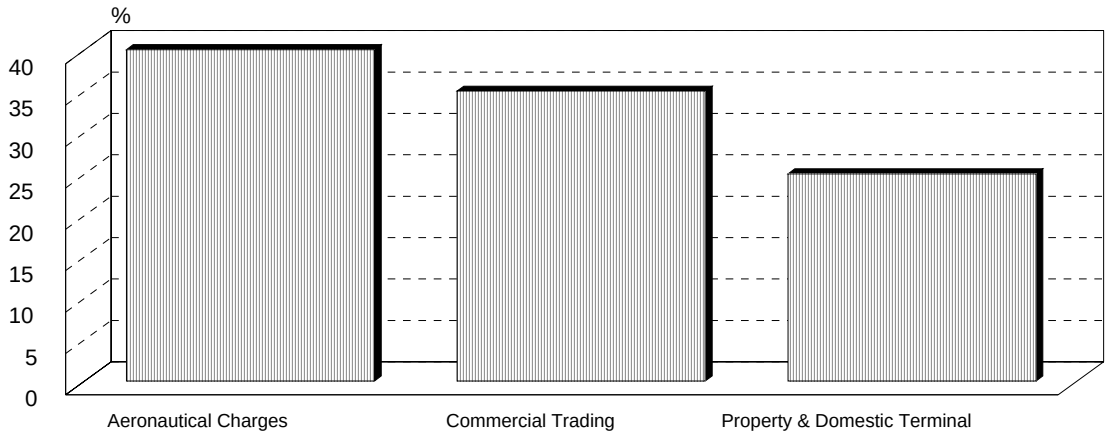
Business sectors in which FAC operates

Revenue is derived from three main sources (see Figure C.5.1):

- 40 per cent from aeronautical charges based on the use of airport services and facilities by aircraft.
- 35 per cent from commercial trading, with contributions coming from leases, licences and business trading rights. The Corporation's Act provides for the grant of a lease or licence or gives a person authority to use an area, a building or part of a building at a Corporation airport. Business activities include duty-free, news and gifts, food and beverage, car parking and car rental.
- 25 per cent from property, service recharges and other revenue. This includes domestic terminal leases, including building rentals on airports (terminals and hangars) and sites on which tenants can establish their own

facilities and rental and licence fees recovered by the Corporation for buildings, land aircraft, parking and trading rights.

Figure C.5.1 **FAC revenue streams 1992-93**



Variability of cash flows: charging basis

- Landing and departure charges: these include minimum landing charges, peak period charges and security charges to recover costs for providing a counter-terrorist first response presence. Section 56 of the FAC Act enabled the Corporation, subject to Ministerial approval, to make determinations fixing or varying aeronautical charges. The FAC was also required to give notice to the then Prices Surveillance Authority (PSA) of any proposed price increase. The PSA could endorse the increase, suggest a lower increase or recommend to the Minister that a public inquiry be held.
- Property leases: Market rentals and new leases are reviewed every two years. The Corporation's valuer assesses market value based on comparable sites or facilities both on and off the airport.
- Domestic terminal leases: Prior to the FAC start-up date, the Government granted to Australian and Ansett Airlines leases of up to 30 years over terminal areas and expansion land at each of the capital city airports, plus Coolangatta and Launceston. Domestic terminal leases provide for periodic rental review for leased areas on a CPI and building replacement cost basis. All business trading concessions existing within defined areas in the terminals were transferred from the Commonwealth to the airlines and the granting of future business trading concessions within their lease areas (subject to specific exemptions) is at the discretion of the airlines.

- Business trading concessions: Charges are based on negotiated contract. The Corporation takes into account the opportunity for a fair and equitable share of risk and return between the Corporation and its business partner.

As outlined above, the FAC derives revenue predominantly from aeronautical charges, commercial trading and property leases. These activities will produce a variable cash flow as passenger numbers and flight movements fluctuate in response to economic circumstances, though the pattern of earnings would be expected to be more stable than airline earnings. The FAC is, however, engaged in an extensive capital expenditure program to upgrade facilities and cater for expanding needs. It is also tied to infrastructure development through its lease commitments. It faces increased uncertainties following airline deregulation.

Partially offsetting these factors is the low level of debt which reduces the potential financial riskiness of investment in the FAC.

There has been an upward trend in FAC revenue since the Corporation commenced operations. Revenues such as aeronautical charges are affected by industry activity (for example, revenue for 1989–90, the year of the domestic pilots' dispute, remained almost at the 1988–89 level). Also the collapse of Compass in December 1991 had a major impact on FAC revenue, both in terms of non-recoverable debt and loss of future revenue.

To get some order of magnitude for the FAC's longer-term stability of earnings, the Working Group undertook some analysis of passenger numbers and flight movements (as a proxy for FAC revenues, where a long-term series does not exist) compared with airline revenues (that is, Qantas and Ansett). This work indicated that FAC revenues were likely to be only half (or even less) as variable as those of the airlines.

The following paragraphs discuss factors that which are expected to impact on the FAC's future operations.

Capital requirements

The FAC has established a substantial capital expenditure program which will total around $2.8 billion over the 1990s.

Domestic terminal leases

The Corporation is tied into infrastructure development, including aprons, taxiways, roadways and services on a timetable dictated by the domestic airlines' perceived needs. To meet the 'buy back' condition of the leases the

Corporation has commenced to make provision in its reserves. This limits the Corporation's flexibility to invest in other projects.

Comparable companies equity betas

The FAC does not have any directly comparable companies listed on the Australian Stock Exchange. Hence, it is necessary to benchmark against listed companies that are similar to the FAC's business segments. Because of its mix of activities the beta for the FAC needs to be a composite of the weightings of betas for its main business segments. The FAC considers its aeronautical operations should be grouped with trading and food operations because the latter will be closely correlated with the level of activity in aeronautical operations.

Table C.5.1 lists some of the comparable companies' betas for different business segments of the FAC. The companies were selected for the mix of assets they possessed and the comparability across the companies with FAC's assets. For the aeronautical segment the table lists some of the overseas listed companies. This is based on the assumption that the asset beta for international landing charges cannot be greater than the asset betas of international airlines.

Table C.5.1 **Averaging betas from comparable companies for different business segments of the FAC**

Company	*Market Debt:Equity (per cent)*	*Equity beta (levered beta)*	*Asset beta*
Aeronautical			
SIA	9.0	0.65	0.61
BA	61.7	1.05	0.47
KLM	80.3	1.05	0.27
United	69.5	1.25	0.52
Average beta		1.00	0.48
Retail			
Coles Myer	15.0	0.96	0.84
Brashs Holdings	60.1	0.49	0.31
Angus and Coote	65.8	1.20	0.72
Average beta		0.88	0.62
Property			
Westfield Trust	3.8	0.33	0.32
General Property Trust	0.0	0.44	0.44
Stockland Trust Group	1.9	0.44	0.43
Average beta		0.40	0.40

Source: ANZ McCaughan estimates

Note: The delevering of the above equity betas included adjustments for tax, which have not been included in the table.

C.5.2 Use of comparable companies' equity betas

In estimating FAC's equity beta the comparable companies' betas have to be adjusted for leverage. To estimate an indicative asset beta for the FAC the comparable companies' asset betas have to be averaged and applied to different business segments of the FAC.[5] Finally, the FAC asset beta is adjusted for any difference in market risk compared to the comparable companies' and is relevered (based on FAC's gearing ratio) to obtain FAC's equity beta.

[5] This process could have been undertaken at the company level rather than for each sector. In this particular exercise, however, it was considered that spread of assets across the companies did not warrant individual adjustements. A simple weighted average was viewed to be appropriate.

The comparable companies' equity betas have been adjusted for leverage to obtain their asset betas. The following conclusions can be drawn from the above table and the discussion above.

- The asset beta for FAC's international aeronautical charges cannot be greater than the average asset beta of international airlines. This is because landing charges in Australia are determined by mean take-off weight and are independent of passenger fares and loads. Also, international landing charges revenues at Australian airports will not be highly responsive to Australia's economic performance. The asset betas for domestic airlines will be higher, reflecting their greater reliance on economic conditions in their country of operations. In the absence of better information, a subjective assessment of the difference was necessary (discussed below).
- The asset beta for FAC's trading revenue would be generally around the average asset beta of comparable companies with suitable adjustments.
- The asset beta for FAC's property revenue would be generally around the average of comparable companies' asset beta of 0.4.

The proportion of revenue generated from these three segments is of the order of 40 per cent from aeronautical, 35 per cent from commercial trading and 25 per cent from property leases. Therefore, an indicative asset beta for FAC was obtained by weighting betas for the three different business segments:

Aeronautical	0.48*0.40	= 0.19
Trading	0.62*0.35	= 0.22
Property	0.40*0.25	= 0.10
Asset beta		= 0.51

At this point, information was brought together and judgement applied as part of an overall risk assessment. The FAC's indicative asset beta of 0.5 had to be adjusted for any differences in variability of cash flows compared to the comparable companies' betas. As indicated above, it was considered that FAC's aeronautical revenue is more stable than that of the benchmark companies, indicating a lower asset risk for this group of FAC assets. Trading benchmarks were considered reasonable benchmark, but with the possibility that the cash flows for such companies were slightly more variable than the FAC's (implying higher risk). Property was considered a good benchmark. In the absence of better information an assessment was made that a 0.05 downward adjustment was required to the indicative beta of 0.5 (calculated above), to account for the differences in the variability in the benchmark cash flows

compared to FAC's aeronautical and trading activities. This produced an asset beta for the FAC of 0.45. Once this is done the FAC asset beta is relevered to obtain its equity beta.

C.5.3 Summary and conclusion

After considering the mix of business activities, debt to equity ratios, industry stability, similarity of function and stability of income stream an overall equity beta of 0.65 (rounded) would appear appropriate for FAC (assuming a capital structure of 70 per cent equity). This figure is in line with recent work by consultants to the Working Group on the FAC's capital structure.

C.5.4 Alternative Approach

An alternative approach to developing equity betas is outlined below. It assumes that the GTE has a commercial capital structure and that its WACC is invariant to the capital structure. This may not be the case, particularly if it is highly geared.

The method, in outline, is as follows:

- Identify an appropriate equity beta for a company which is similar to the GTE. If no direct comparisons are available, select an appropriate industry sector;
- Calculate the WACC for this company, using its capital structure and cost of debt;
- Calculate the equity beta for the GTE consistent with the WACC for the typical firm. To do this use the GTE's capital structure and cost of debt.

The advantage of this approach is its relative simplicity. However, as with the approach outlined above, it may be difficult to find suitable firms upon which to base the development of an equity beta. Moreover, as with all similar methods, it needs to be applied with care and skill.

In the simple form described here, the method can be used as a 'back-of-the envelope' check on the validity and plausibility of estimates arrived at through other, more elaborate methods of estimating equity betas. It is particularly useful where the GTE is highly geared and, consequently, the assumption that the capital structure is invariant to the WACC is less likely to apply.

D THE DEPRIVAL VALUE APPROACH

Table D.1: **Summary of deprival valuation methodology**

Asset category	*Where service potential would be replaced if GTE were deprived of the asset*	*Where service potential would not be replaced if GTE were deprived of the asset*
Held for continued use:		
Land (including land under infrastructure)	Greater of (a) current market buying price, taking into account the nature of the parcel, the legal restrictions on use, the opportunities and impediments to development that are inherent to the specific parcel of land or other constraints that exist in respect of that land, or any special attributes that the land may possess (value in use); and (b) current market value (selling price) of its feasible alternative use taking into account the costs of achieving that potential.	Greater of Net Present Value (NPV) and current market value (selling price)
Heritage assets	Current market buying price, current replacement cost or current reproduction cost, as applicable, of the service potential by the GTE if the service potential would be otherwise acquired by the GTE.	Greater of NPV and current market value (selling price)
General assets • Assets where there is a secondary market for the asset (non-specialised assets)	Current market buying price of the gross service potential of the existing asset. Where new assets are normally acquired, new prices are relevant, and where second hand assets are normally acquired, second hand prices are relevant.	Greater of NPV and current market value (selling price)
• Assets where there is no secondary market for the asset (specialised assets)	Lower of (a) the current replacement cost or (b) current reproduction cost of the gross service potential or future economic benefit of the existing asset.	Greater of NPV and current market value (selling price)
Surplus assets		
All such assets	Not applicable	Market value (selling price)

Source: Steering Committee on National Performance Monitoring of Government Trading Enterprises (1994b).

E SOURCES OF INFORMATION FOR THE CALCULATION OF ERR

With the exception of the value of a GTE's CSOs, the information used to measure ERR is publicly available. The following section identifies the data and its source.

E.1 Earnings before interest and tax (EBIT)

EBIT comprises operating profit before tax (including abnormals) plus interest expense.

Operating profit before tax (including abnormals) is found in the GTE's annual report (in the profit and loss statement). While this figure should be inclusive of abnormals, which are items that are part of the GTE's ordinary operations and of a recurring nature, adjustments should also be made to include extraordinaries on a case by case basis (see Section 4.4.1). Information on extraordinaries is also found in the profit and loss statement.

Interest expense is found in the notes to the audited profit and loss statement.

E.2 Accounting depreciation and amortisation (Da)

Depreciation and amortisation can be taken directly from the notes to a GTE's profit and loss statement and represents the depreciation expense for the period.

E.3 Change in the value of the capital base

The capital base for a GTE is represented by the total book value of its assets. Boards of non-company GTEs are required to ensure that the assets under their control are valued in accordance with the guidelines provided by their owner government. GTEs incorporated as companies are subject to corporations law and accounting standards (which allow assets to be valued in a variety of ways). In the future, assets may be valued using the deprival value methodology recommended by the Steering Committee.

The changes in asset values for the ERR calculation can be determined as follows:

- The increase (or decrease) in the value of assets held during a period can be found by subtracting opening assets and net investments from closing assets.
- To calculate net investments, subtract from closing assets the value of opening assets and the change in the revaluation reserve (for example, between 1991 and 1992) and add accounting depreciation expense.

Information on opening and closing assets appears in the balance sheet and information on the revaluation reserve appears in the notes to the balance sheet.

Following the report of the Working Group, the ERR formula has been adjusted from that outlined in Treasury Economic Paper 14 (Commonwealth Treasury 1990). This is because of information constraints involved in determining an accurate value for within-year purchases of assets. In some jurisdictions GTEs are not required to provide information on purchases of assets within the reporting period. If GTEs do provide this information then more details could be included in the calculation.

E.4 Non interest-bearing liabilities (NIBLs)

There may be an indirect interest charge embodied in liabilities such as trade creditors and revenue received in advance. NIBLs include balance sheet items such as trade creditors, sundry creditors and prepaid revenue. The average prime overdraft rate for the year could be used for the interest rate.

The calculation of the implicit interest expense may not be warranted if the size of the balance sheet item is not material.

E.5 Financial leases

Interest on financial leases is usually included in the financial item interest expense, and would thus have been added back in the calculation of EBIT. Where this is not the case, it may appear as a separate item elsewhere in the notes to the GTE annual report as finance charges on finance leases. The repayment of financial lease principal may be ascertained from the funds statement or the cash flow statement.

The calculation of the interest expense on financial leases may not be warranted if it is not a material item.

E.6 Community service obligations (CSOs) and safety regulation

In practice, some parts of a GTE's operations may not be expected to contribute towards its target rate of return. Such operations may arise due to CSOs or other industry and/or international obligations. However, none should be excluded from the ERR calculation unless specified in an explicit agreement between a GTE and its owner government.

Where such an agreement does exist, the ERR calculation has to be adjusted to exclude all related assets, income and expenses. However, this may often prove difficult because of the existence of multiple use assets together with other problems such as apportioning administration costs.

Where CSO assets are not excluded from the asset base, some adjustment to economic income may be warranted. This will be the case when an owner government and a GTE have agreed to notionally fund CSOs through an adjustment in the measurement of performance. The adjustment made will be to impute a value to economic income corresponding to a CSO's net economic cost.

E.7 Net investments — for inclusion in the denominator

Because of information constraints an accurate value for within-year assets purchases is not always possible. An alternative approach which gives an approximate figure for the value of the asset base utilised through the period is to add half net investments to opening assets. Net investments should include asset purchases and sales. To calculate net investments, subtract opening assets and the change in the revaluation reserve (for example, between 1991 and 1992) from closing assets and add depreciation expense. Information on opening and closing assets appears in the balance sheet and information on the revaluation reserve appears in the notes to the balance sheet.

In many jurisdictions GTEs are not required to provide information on purchases of assets within the reporting period. If this information becomes available from GTEs then more details could be included in the calculation.

E.8 Interest during construction

Interest during construction is an item that needs to be included as a capital gain. It may be calculated as the change in the value of capital works in progress plus the value of any such assets commissioned during the year less

asset construction costs during the year. Information on these items appears in the notes to the balance sheet.

F MEASURING THE ERR PERFORMANCE OF THE FAC

As discussed in Chapter 4, the formula for estimating ERR performance is:

$$ERR = \frac{(EBIT + Da + NIBL + FL + CSO) + (A_e - A_b - NI)}{A_b + (NI / 2)}$$

where

	EBIT	=	earnings after abnormals and extraordinaries, but before interest and tax;
	Da	=	accounting depreciation and amortisation;
	NIBL	=	an adjustment for the implicit interest cost of non-interest bearing liabilities;
	FL	=	an adjustment for interest cost of assets under financial leases (only made if not already included from EBIT);
	CSO	=	an adjustment for the net economic cost of CSOs (if applicable);
	A_e	=	the end of period value of total assets;
	A_b	=	the beginning of period value of total assets; and
	NI	=	the value of net investments throughout the year.

Note that,

$$NI = A_e - A_b - AsRR_e - AsRR_b + Da$$

where

	$AsRR_e$	=	the end of period value of the asset revaluation reserve; and
	$AsRR_b$	=	the beginning of period value of the asset revaluation reserve.

It is recommended that ERR measurement be undertaken with publicly available figures. This was the approach taken by the Commonwealth Working Group.[6] The following tables provide:

- information taken directly from the 1992–93 and 1991–92 annual reports of the FAC;
- other information needed for ERR measurement;
- derivation of the variables for the measurement formula; and
- calculation of the components of ERR performance.

[6] The following calculations do not include an IDC element.

FEDERAL AIRPORTS CORPORATION	**1992–93** $'000	**1991–92** $'000
Information taken directly from the annual reports		
Operating Profit (*E*)	82 341	88 962
Interest (*In*)	71 235	62 345
Depreciation and Amortisation (*Da*)	104 768	80 282
Opening Assets (A_b)	2 019 001	173 6148
Closing Assets (A_e)	2 141 486	2 019 001
Opening Asset Revaluation Reserve ($AsRR_o$)	299 248	299 248
Closing Asset Revaluation Reserve ($AsRR_c$)	299 248	299 248
Non interest-bearing liabilities (*NIBL*)		
– Trade Creditors	48 170	8 635
– Other Creditors	0	42 484
– Prepaid Revenue	0	0
Financial Leases (*FL*)	0	0
CSOs (*C*)	0	0
Information from other sources:		
Interest rate (*Ir*): 12-month average of 13-week Treasury Notes (as a proxy for the Prime Overdraft rate.) *Source*: Treasury Roundup	5.50%	8.00%
Derived from the above:		
$EBIT = E + In$	153 576	151 307
Change in the Asset Revaluation Reserve ($\Delta AsRR$) = $AsRR_c - AsRR_o$	0	0
Net Investments (NI) = $A_e - A_b - \Delta AsRR + Da$	227 253	363 135
Adjustments for $NIBL$ — $NIBL \times Ir$	2 649	4 090

CALCULATION OF ECONOMIC RATE OF RETURN (ERR) AND ITS COMPONENTS:

	1992–93 $'000	**1991–92** $'000
Cash Flow:		
Earnings before interest and tax (*EBIT*)	153 576	151 307
Depreciation and Amortisation (*Da*)	104 768	80 282
Estimated Cash Flow	258 344	231 589
Adjustments for non-interest bearing liabilities (*NIBL*)	2 649	4 090
Adjustment for financial leases (*FL*)	0	0
Cash Component	260 993	235 679
Capital Component:		
Closing Assets (A_e)	2 141 486	2 019 001
less		
Opening Assets (A_b)	2 019 001	1 736 148
less		
Net Investments (*NI*)	227 253	363 135
Estimated Capital Component	– 104 768	– 80 282
Capital Base:		
Opening Assets (A_b)	2 019 001	1 736 148
plus		
Half of Net Investments (*NI*)/2	113 627	181 568
Estimated Capital Base	2 132 628	1 917 716

Economic Income:		**1992–93** $'000	**1991–92** $'000
Earnings before interest and tax (*EBIT*)		153 576	151 307
Depreciation and Amortisation (*Da*)		104 768	80 282
[7]		– 104 768	– 80 282
Adjustments for non-interest bearing liabilities (*NIBL*)		2 649	4 090
Adjustment for financial leases (*FL*)		0	0
Actual economic income		156 225	155 397
CSOs (*CSO*)		0	0
Imputed economic income		156 225	155 397
Income	Cash Component	260 993	235 679
Return	Capital Base	2 132 628	1 917 716
	Cash Return	**12.24%**	**12.29%**
Capital	Capital Component	– 104 768	– 80 282
Return	Capital Base	2 132 628	1 917 716
Economic	Economic Income	156 225	155 397
Rate of	Capital Base	2 132 628	1 917 716
Return			
	Economic Rate of Return	**7.33%**	**8.10%**
	Capital Return	**– 4.91%**	**– 4.19%**

[7] In this example the change in the capital base is explained completely by depreciation and amortisation expenses for the period. The effect is that the figures cancel each other out, implying that accounting depreciation had adequately approximated to economic depreciation. If there had been an asset revaluation in the period, the figure for the change in the capital base would differ from the depreciation and amortisation expense by an amount equal to the change in the asset revaluation reserve. For example, a positive asset revaluation of $50m. in 1992–93 would have made the 1992–93 entry for "change in capital base" read –$54 768; an asset devaluation of the same amount in the same year would make the entry read –$154 768. In both cases, the total of "actual economic income" would have been affected.

G ADJUSTING COST OF CAPITAL TARGETS AND MEASURED ERR FOR THE FAC

G.1 Adjusting Cost of capital targets for the FAC

There are three major steps required to adjust the cost of capital target for comparison with an averaged ERR.

G.1.1 Step 1: annual mean bond rate

Derive a geometric (compounding) mean of the long-term nominal bond rates during each of the three consecutive years for which performance is being assessed.

At the end of each year:

$$AveBR = -1 + \sqrt[12]{(1+BR_1)(1+BR_2)(1+BR_3)....(1+BR_{12})}$$

where AveBR = the geometric mean of 12 consecutive monthly bond rates; and

BR_1, BR_2, BR_3 ... BR_{12} = the long term bond rates as of the first of months 1, 2, 3 ... 12.

Example:

The nominal bond rates as of the 1st of each month in 1991–92 were:

Month		*Rate*
July	BR_1	11.07
August	BR_2	10.96
September	BR_3	10.72
October	BR_4	10.25
November	BR_5	9.85
December	BR_6	9.81
January	BR_7	9.38
February	BR_8	10.26
March	BR_9	10.06
April	BR_{10}	9.90
May	BR_{11}	9.39
June	BR_{12}	9.11

The geometric mean bond rate for 1991–92 is calculated as follows:

$$AveBR = -1 + \sqrt[12]{(1+BR_1)(1+BR_2)(1+BR_3)....(1+BR_{12})}$$

$$= -1 + \sqrt[12]{\begin{array}{l}(1+0.1107)(1+0.1096)(1+0.1072)(1+0.1025)(1+0.0985)(1+0.0981)\\(1+0.0938)(1+0.1026)(1+0.1006)(1+0.099)(1+0.0939)(1+0.0911)\end{array}}$$

$$= -1 + 1.1006$$

$$= 0.1006$$

$$= 10.06\%$$

The geometric mean bond rate for 1991–92 is therefore 10.06 per cent

G.1.2 Step 2: three-year mean bond rate

Derive a geometric mean of the three annual geometric means.

At the end of year 3:

$$GAveBR_3 = -1 + \sqrt[3]{(1+AveBR_1)(1+AveBR_2)(1+AveBR_3)}$$

where $GAveBR_3$ = the geometric mean of three annual geometric mean; and
$AveBR_1$, $AveBR_2$ and $AveBR_3$ = the geometric mean bond rates for years 1, 2 and 3 respectively.

Example:

The geometric mean bond rates for 1990–92 to 1992–93 were:

Year		*Mean bond rate (per cent)*
1990–91	$AveBR_1$	12.27
1991–92	$AveBR_2$	10.06
1992–93	$AveBR_3$	8.46

Note: Geometric mean bond rates for 1990–91 and 1992–93 are calculated as for 1991–92 in Step 1 above.

The geometric mean bond rate for the years 1990–91 to 1992–93 is calculated as follows:

$$GAveBR_3 = -1 + \sqrt[3]{(1 + AveBR_1)(1 + AveBR_2)(1 + AveBR_3)}$$

$$= -1 + \sqrt[3]{(1 + AveBR_{1990-91})(1 + AveBR_{1991-92})(1 + AveBR_{1992-93})}$$

$$= -1 + \sqrt[3]{(1 + 0.1227)(1 + 0.1006)(1 + 0.0846)}$$

$$= -1 + \sqrt[3]{1.340179}$$

$$= -1 + 1.1025$$

$$= 0.1025$$

$$= 10.25\%$$

The geometric mean bond rate for the years 1990–91 to 1992–93 is therefore 10.25 per cent.

G.1.3 Step 3: adjusted target

Replace the original risk-free component of the target set at the start of the year just ended (in this example, 1 July 1992) with the three-year geometric mean bond rate derived in step 2.

Example:

Adjusted cost of capital target is 13.15 per cent, comprising risk-free rate of 10.25 per cent and risk premium of 2.9 per cent.

Rounding upward yields a target of 13.2 per cent.

The adjusted cost of capital target to be used at the end of 1992–93 is 13.2 per cent.

G.2 Average economic performance of the FAC

To assess ERR performance, the geometric mean of three consecutive years of annual ERR (ERR_{ave}) is compared with the adjusted cost of capital target derived by the method at Section G.1 above.

At the end of each year:

$$ERR_{ave} = -1 + \sqrt[3]{(1 + ERR_1)(1 + ERR_2)(1 + ERR_3)}$$

where ERR_{ave} = the geometric mean of three annual ERR measures; and
ERR_1, ERR_2 and ERR_3 = the ERRs for years 1, 2 and 3 respectively.

Examples:

The individual ERRs for the years 1990–91 to 1992–93 were:

Year		*ERR*
1990–91	$ERR_{1990–91}$	27.77
1991–92	$ERR_{1991–92}$	8.10
1992–93	$ERR_{1992–93}$	7.33

The geometric mean of the individual ERRs for the years 1990–91 to 1992–93 is calculated as follows:

$$ERR_{ave} = -1 + \sqrt[3]{(1+ERR_1)(1+ERR_2)(1+ERR_3)}$$

$$= -1 + \sqrt[3]{(1+ERR_{1990-91})(1+ERR_{1991-92})(1+ERR_{1992-93})}$$

$$= -1 + \sqrt[3]{(1+0.2777)(1+0.0810)(1+0.0733)}$$

$$= -1 + \sqrt[3]{1.482435}$$

$$= -1 + 1.140229$$

$$= 0.140229$$

$$= 14.02\%$$

The geometric mean of the ERR for the years 1990–91 to 1992–93 is therefore 14.02 per cent.

This is the ERR measurement (*14.02 per cent*) *which is compared with the adjusted target derived in Section G.1.3 above* (*13.2 per cent*)*.*

G.3 Moving average

The averages for the target and measure should also be calculated on a moving average basis. That is, the mean moves forward as the next year's financial statements become available, dropping out the earliest year and including the latest year. This process is illustrated in Figure G.1 for the calculation of an average adjusted cost of capital target.

Figure G.1: **Calculation of average adjusted targets over time**

Year 1	*Year 2*	*Year 3*	*Year 4*
Mean bond rate Year 1	Mean bond rate Year 2	Mean bond rate Year 3	
		Mean three-year bond rate plus *Fixed risk margin*	
		Adjusted cost of capital target	
delete year	becomes new Year 1	becomes new Year 2	add year; becomes new Year 3
	Mean bond rate new Year 1	Mean bond rate new Year 2	Mean bond rate new Year 3
			Mean three-year bond rate plus *Fixed risk margin*
			Adjusted cost of capital target

When averaging the new measures and targets it is important to recall that this is a separate exercise to that undertaken for setting targets for expected performance.

The cost of capital target for the new year will still be set using the long-term bond rate applying at the start of the year. Cost of capital targets are forward-looking, encapsulating the expected required return on capital, while adjusted cost of capital targets take account of actual changes in the bond rate over a period to facilitate performance assessment after the event.

H DERIVING A COST OF CAPITAL TARGET FOR THE FAC

The key CAPM equation in estimating a target for equity-holders is Equation (H1), which gives the required rate of return on equity. Equation (H2) then gives the rate of return required by debt-holders. These equations are then used in Equation (H3) to calculate the return on assets for an enterprise (referred to as Weighted Average Cost of Capital or WACC):

$$R_e = R_f + \beta_e (R_m - R_f) \quad \text{(H1)}$$

where
- R_e = the expected rate of return on equity security *e*;
- R_f = the observed nominal risk-free rate;
- R_m = the expected return from the equity market portfolio;
- β_e = the market risk factor for equity security *e*; and
- R_p = the market risk premium, equal to $(R_m - R_f)$.

$$R_d = r_{d1}\left(\frac{d1}{D}\right) r_{d2}\left(\frac{d2}{D}\right) \quad \text{(H2)}$$

where
- R_d = the expected, annualised rate of return on debt instrument 1 and 2;
- r_{d1}, r_{d2} = the expected rate of return on debt instrument 1 and 2;
- d1, d2 = the market value of debt instrument 1 and 2; and
- D = the market value of all debt instruments (*that is, D = d*1 + *d*2).

$$R_a = R_e\left(\frac{E}{V}\right) R_d\left(\frac{D}{V}\right) \quad \text{(H3)}$$

where
- R_a = the expected rate of return on total assets (that is, cost of capital);
- R_e = the expected rate of return on equity (that is, cost of equity);
- R_d = the expected rate of return on debt (that is, the cost of debt);
- V = the market value of total assets;
- E = the market value of equity; and
- D = the market value of debt.

Equation (H3) gives the after-corporate-tax rate of return target. Estimation of R_d requires special consideration because GTEs either do not issue debt in the

open market or they issue debt with an explicit or implicit government guarantee.

For the FAC, the rate of return target is calculated separately although the following parameters are constant for all calculations:

- the risk-free rate of return (R_f) being the long-term (10 year) bond rate. The rate used for these calculations is 9.65 per cent (as at 30 June 1994); and
- the return on the market portfolio (R_m) is 16.65 per cent (the long-term bond rate plus a market risk premium of 7 per cent).

However, before estimating return on equity and debt, it is necessary to first establish the FAC's capital structure for use in Equation (3). Specific data are taken from the FAC's 1992–93 Annual Report.

H.1 Capital structure

As the FAC values its assets on a written-down replacement cost basis, the figure of total assets taken from the balance sheet can be used as an estimate of total assets (A).

The value of a FAC's debt can also be taken from the balance sheet and includes items such as borrowings, trade creditors, pre-payments, overdrafts and other creditors. Because of the relationship between variables of the capital structure (that is, A = E + D), once an estimate of total assets and debt has been determined the residual can be used as a measure of equity. The process for determining these variables for the FAC is shown below.

	$
Total Assets (A)	2 141 486 000
Debt (D)	838 170 000
– current borrowings	120 000 000
– non-current borrowings	670 000 000
– trade creditors	2 976 000
– other creditors	45 194 000
– pre-paid revenue	0
– other loans	0
Equity (E = A – D)	1 303 316 000

H.2 Estimating the required return on equity

An equity beta of 0.65 has been estimated for the FAC (see Appendix C). By substituting known parameters into Equation (H1) the FAC's required return on equity can be calculated:

$$R_e = R_f + \beta_e (R_m - R_f)$$

= 9.65 + 0.65 (16.65 – 9.65)
= **14.20 per cent**

H.3 Estimating the required return on debt

As discussed in Chapter 4, the return on debt includes the implicit interest payments attributable to non-interest bearing liabilities (NIBLs), such as trade creditors. Total debt is adjusted for differing maturity structures through the inclusion of short and longer-term interest rates.

	$m
Total Assets	2141.5
Debt and NIBLs	– 838.2
Shareholder's Funds	1303.3

	Debt	NIBLs	Total
Short-term	120	48.2	168.2
Long-term	670	0	670.0

Long-term interest rate (risk-free rate plus a margin)
= 9.65 + 0.8 = 10.45 per cent

Short-term interest rate (180-day Bank Bill SWAP rate plus a margin)
= 7.41 + 0.2 = 7.61 per cent

Therefore, the required return on debt (R_d) is:

$$R_d = r_{d1}\left(\frac{d1}{D}\right) r_{d2}\left(\frac{d2}{D}\right)$$

= 10.45 (670 / 838.2) + 7.61 (168.2 / 838.2)
= **9.88** per cent

H.4 Estimating the rate of return target

By substituting the required return on equity and debt into Equation (3), the rate of return target can be calculated:

$$R_a = R_e \left(\frac{E}{V}\right) R_d \left(\frac{D}{V}\right)$$

= 14.2 (1303.3 / 2141.5) + 9.88 (838.2 / 2141.5)
= **12.5** per cent

The premium above the long-term bond rate is **2.9** per cent when rounded to the nearest first decimal place.

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