Telstra’s Weighted Average Cost of Capital

Application to the USO
The Allen Consulting Group

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ACA Note:

Some information contained in the original report has been removed in this public version, in response to Telstra claims that this information is Telstra commercial-in-confidence information. Removed text is marked ‘c-i-c’. All of Appendix A is ‘c-i-c’.
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Risk, Return and the Cost of Capital
Chapter 1
Risk, Return and the Cost of Capital

Introduction

In this report estimates are presented for the cost of capital that should be used to assess the magnitude of losses incurred in providing the Universal Service Obligation (USO) in telecommunications services in 1997/98 and 1998/99. Because Telstra is the current universal service provider, the report is concerned specifically with the cost of Telstra’s capital in providing the USO. However, the methodology described in the report is not Telstra–specific, and would be applicable to any other carrier that became a universal service provider under the provisions of the *Telecommunications Act 1997* and associated regulations.

This is the Allen Consulting Group’s Final Report to the Australian Communications Authority following the Draft Report dated 17 February 1999. Comments on the Draft Report were received from Cable and Wireless Optus (CWO), the Network Economic Consulting Group (NECG), who are consultants to Telstra, Professor Bob Officer, who is a consultant to AAPT; Telstra; the USO Response Group (USORG, representing a number of carriers other than Telstra, CWO and Vodafone) and Vodafone. Throughout this Final Report, the comments by the above and responses to them are put in boxes. These can be found at the end of Chapter 2 and in the body of the text corresponding to the comments that are being addressed in Chapter 3.

The idea that regulated utilities should be allowed a reasonable rate of return on their assets, commensurate with the riskiness of the earnings associated with those assets, has been a staple of regulatory practice since the *Hope* case in the United States. In the *Hope* case the Supreme Court recognised that revenues must cover capital cost. The Court stated that

> From an investor or company point of view it is important that there be enough revenue not only for operating expenses but also for the capital costs of the business. These include service on the debt and dividends on the stock … By that standard the return to the equity owner should be commensurate with returns in other enterprises having corresponding risks. That return, moreover, should be sufficient to ensure confidence in the financial integrity of the enterprise, so as to maintain its credit and attract capital.

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1. A separate, but related, set of issues is how asset values, depreciation and the cost of capital interact in a regulated setting to ensure that no more (or no less) than the Net Present Value of an asset is returned to the asset owner. These issues are addressed in the Allen Consulting Group’s Draft Report of 19 March 1999, *The “Year 1” Cost Problem: Application to the USO and Proposed Solution*.
2. Cable & Wireless Optus, E-mail to ACA, 15 March 1999
7. Vodafone letter to ACA, 12 March 1999
The cost of capital is the compensation required by investors for postponing consumption and exposing their capital to risk. It is an opportunity cost, in that the cost of capital is essentially determined by the riskiness of that investment given other opportunities. If returns to an investment are less than those available in alternative investments with similar risks, capital will move to those alternatives. However, this begs the question of which risks should be rewarded with higher returns on capital and by how much. These issues are discussed at length in this report, in the context of the USO.

**The Weighted Average Cost of Capital (WACC)**

The term Weighted Average Cost of Capital (WACC) refers to the fact that firms use both equity and debt finance to purchase assets and the cost of each will generally be different. The cost of capital will be a weighted average of the cost of equity and debt, with the weights equal to the proportions of equity and debt in total capital, commonly known as the capital structure. Under certain restrictive conditions (particularly the absence of taxes) the WACC will be invariant to capital structure (the Modigliani–Miller theorem) but in reality this may not be so because of the different tax treatment of equity and debt finance. Moreover, in Australia, dividend imputation further complicates the estimation of the WACC (specifically the estimation of the cost of equity).

In this report, the WACC is calculated according to the formula below.\(^9\) This formula allows for the payment of company taxes and the receipt of franking credits by equity investors.

\[
\text{Post–Tax WACC} = \frac{(1 - T)R_e}{1 - T(1 - \gamma)} \frac{E}{V} + (1 - T)R_d \frac{D}{V}
\]

where

- \(R_e\) is the required rate of return on equity, after company tax
- \(R_d\) is the pre–tax average cost of debt
- \(T\) is the corporate tax rate
- \(\gamma\) is the value of franking credits or imputation factor
- \(E\) is the market value of equity
- \(D\) is the market value of debt
- \(V = D + E\) is the market value debt plus equity

The pre–tax WACC is found by ‘grossing up’ the post–tax WACC by a factor of \((1 - T)\)

\[
\text{Pre–Tax WACC} = \frac{R_e}{1 - T(1 - \gamma)} \frac{E}{V} + R_d \frac{D}{V}
\]

The effect of imputation is to lower both the post– and pre–tax return required by the investor, since the investor also receives the benefit of franking credits. To see this, consider the special case where $\gamma=0$, the “classical” tax system. This is the case where there are no franking credits i.e. profits are taxed twice, once via company tax and again when received by the investor as dividends. In this case the required pre–tax return on equity is $R_e \frac{1}{1-T}$ which is clearly larger than $R_e \frac{1}{1-T(1-\gamma)}$ in the Pre–Tax WACC formula above.

On the other hand, when $\gamma=1$ ("full integration"), the pre–tax return on equity required by investors is simply $R_e$, which is also the post–tax return. The pre– and post–tax returns coincide because in this case company tax is merely a withholding tax, and the only tax which is paid is personal income tax by investors.

As discussed in Chapter 3, in practice, the value of $\gamma$ will lie between 0 and 1.

**Estimation of the Return on Equity**

There are many ways to estimate the return on equity required by investors, all of which involve estimating the compensation that must be paid to investors for undertaking risky investments. Generally speaking, the greater the risk, the greater the return required by investors. The most important practical issues are which risks are compensated and by how much.

The most widely used model for estimating the return on an equity investment is the Capital Asset Pricing Model (CAPM). The conceptual basis for the CAPM is that investors hold a diversified portfolio of securities and that the risks associated with one investment are different than for the market as a whole. A security’s risk can be decomposed into those unique to the company in question (e.g. it will lose sales to a competitor) and market risk (e.g. it will lose sales due to a recession, which will also affect its competitors). The key point is that investors can eliminate company–specific risks by diversification (e.g. by investing in that company’s competitors) and so should not be rewarded for bearing this superfluous risk. However, they cannot eliminate non–diversifiable risk (risk associated with movements in the market as a whole) and so they should be rewarded for bearing this risk. The extent of this reward depends on the extent to which the company’s returns are correlated with the market as a whole. The larger this correlation, the greater the non–diversifiable risk faced by the investor and so the larger will be the required return on capital.

Conversely, investors in companies whose returns are relatively unrelated to those of the whole market face relatively little non–diversifiable risk, and so their opportunity cost of capital is relatively low. Investors in companies whose returns are guaranteed (except through default) face zero risk, and their investment can be likened to (say) a government bond. This does not mean that the operations of the company are risk free, in the common usage of the word risk e.g. the company’s operations could be affected by natural disasters. But these are diversifiable risks that an investor can eliminate by holding a wide portfolio of assets, and so are not rewarded by the market.

**Specification of the CAPM**

In the CAPM, the required equity return in a particular company is estimated as

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10 Other approaches include the Arbitrage Pricing Model, the Dividend Growth Model, and their variants.
\[ R_e = R_i + \beta_e (R_M - R_i) \]

where \( R_e \) is the required rate of return on equity, after company tax

\( R_i \) is the ‘risk free’ rate of return;

\( \beta_e \) is the equity beta, defined as the covariance between the market return and the return on the company’s equity, divided by the variance of the market return;

\( R_M - R_i \) is the market risk premium.

Points to note about the CAPM are:

- A distinction needs to be made between the “asset beta”, which refers to the riskiness of the returns to the asset per se, and the “equity beta” which refers to the riskiness of the returns to the equity holders. These are not the same because debt holders are assumed to be paid a constant amount out of asset returns with the remaining income paid to equity holders. The greater the gearing, the greater the risk faced by equity holders, hence for a given asset beta, the equity beta will increase as the level of gearing increases.

- Risk is synonymous with the variance of returns.

- CAPM assumes that investors construct portfolios on the basis of expected return and the variance of return only; i.e. security returns are normally distributed, which means they are symmetrically distributed around the expected return. CAPM does not allow for skewed returns.

- Only non–diversifiable risk affects the cost of capital. An asset whose returns are characterised by zero non–diversifiable risk will have an equity beta of zero and hence earn the risk–free rate of return on capital.

It should be noted that CAPM is by no means a perfect way of estimating the rate of return required by equity investors. One of its weaknesses is the assumption that returns are not skewed and investors would not care if they were, which may not be realistic. CAPM also assumes zero transactions costs. However, CAPM has been used extensively by regulators to estimate the required return on equity for regulated entities.\(^{11}\) CAPM has also been proposed by Telstra to estimate the required rate of equity return, and hence WACC, for USO costing.

It should also be noted that although CAPM appears to be a simple and indeed rather mechanical way of estimating the cost of capital, it would be a mistake to treat it in this way. The values of many of the parameters that make up the model are not known with certainty, albeit some are more uncertain than others. While the application of CAPM requires making full use of the available evidence, a good measure of sound judgment is also required. This is particularly so in the consideration of regulating Australian utilities, including Telstra, because they have only recently become privately owned (in full or part) and so long time series of the data necessary to estimate crucial CAPM parameters (particularly \( \beta \)) are not yet available.

Nonetheless, for regulatory purposes an estimate of Telstra’s cost of capital in providing USO services must still be made, and CAPM, carefully applied, is the best means available to do so. As discussed in the following chapters, CAPM is used in this report to estimate the cost of equity component of the USO WACC.

Nominal or Real WACCs?

The WACCs (both post- and pre-tax) and all of their components that are presented in this report are in nominal terms. That is, the WACCs are set at a level that will compensate the USO provider for the loss of spending power due to inflation, as well as the real opportunity cost of holding those funds.

A party that invests in an asset needs to be compensated for both the real opportunity cost of the funds invested, and also receive compensation for the fall in the purchasing power of his or her investment due to inflation. The inflation component can be compensated for either by providing a nominal rate of return (in which case the assets should be carried forward in historical cost terms), or by adjusting the value of the assets to take account of inflation in which case a real rate of return should be used. Thus, whether a nominal or a real WACC is used depends on the revenue determination framework.

Thus, it is assumed that the assets are treated in historical cost terms in this report.12

Consultation with carriers

In the course of writing this report, the consultants met with representatives of Telstra, Optus, Vodafone and AAPT. A list of pertinent issues was circulated to these three carriers, and each made submissions which were received in December 1998. The consultants also met with the Australian Competition and Consumer Commission.

The consultants also met with the firms Gibson Quai & Associates and Ovum, who wrote the draft report, ACA USO Forward Looking Technologies Study, for the Australian Communications Authority.

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12 It should be noted that the interaction of the tax system and inflation imply that the derivation of a real WACC is quite a complex task. In particular, it is not correct just to deduct the rate of inflation from the pre-tax nominal WACC. The true pre-tax real WACC would be lower than the rate derived through this process.
Effect of the USO Regime on the Cost of Supplying USO Services to Net Cost Areas
Chapter 2

Effect of the USO Regime on the Cost of Supplying USO Services to Net Cost Areas

Introduction

The purpose of this report is to advise on the WACC that should be used to determine the losses incurred by Telstra in complying with the telecommunications USO. In determining the WACC that is appropriate for this exercise, a critical factor is the effect of the USO regime itself.

This chapter discusses the USO regime, and draws implications for the degree of risk that is associated with the delivery of the USO in the loss making areas. It commences with a discussion of the USO regime, and then discusses the implications of the regime for the risk associated with the assets that are used in net cost areas. The chapter concludes with a discussion of the possible range of an equity beta for these cash flows, and a discussion of the relevance of the diversifiable (project) risks.

The view is advanced in the chapter that the effect of the USO regime is to reduce substantially the amount of risk that is faced by Telstra as the sole USO provider at this time.

The USO Regime

Introduction

The Universal Service Regime which is established under Part 7 of the Telecommunications Act 1997 (the Act) has the objective of ensuring that all people in Australia have reasonable access on an equitable basis to a minimum class of telecommunications services (referred to hereafter as the USO services), regardless of where they reside or carry on business. There are three main components to the regime, which are as follows:

- specifying the universal service obligation (the USO), which is to ensure that the USO services are reasonably accessible to all people in Australia on an equitable basis (and at prices which can be regulated);
- allocating the USO obligation to one or more carriers (the USO providers) and regulating their performance of this obligation (for example, through a requirement to produce and carry out universal service plans); and
- assessing the extent to which losses are incurred by the USO provider or providers, and creating a mechanism for sharing those losses among all carriers.

The Act prescribes the policy principles that underlay the regime which, in addition to the objective described above, include the following:

(b) the universal service obligation ... should be fulfilled as efficiently and economically as practicable;

(c) the losses resulting from supplying loss-making services in the course of fulfilling the universal service obligation should be shared among carriers.
The USO services at present include the supply of standard telephone services and the provision of payphones, although there is a capacity for other carriage services to be prescribed. It is important to note that the regime creates an obligation to provide the services to all areas in Australia, so the obligation does not just relate to the remote and rural areas. It is also important to note that the USO services are a subset of PSTN services, for example, excluding value-adding services (such as call waiting, call diversion, etc).

The Act permits different USO providers for different service areas, and specifically permits the Minister to determine a system by which different USO providers may be selected. However, Telstra currently is the sole USO provider for all of Australia, and there is no reason (at the time of writing) to believe that this situation is likely to change in the near future.

The most important components of the USO regime for this report are those that deal with the quantification of the losses that are incurred with performing the USO, and the sharing of those losses amongst carriers. These parts are discussed next.

**Determination of the Net Universal Service Cost**

There are three main steps involved in determining the Net Universal Service Cost (NUSC), which are as follows:

- to define the specific geographic areas for which the cost and revenues attributable to supplying the USO services will be assessed (these are the net cost areas);
- to assess the costs and revenues attributable to supplying the USO services in each of the individual net cost area, and hence the NUSC of supplying that area; and
- then summing the NUSC for each of the individual net cost areas in order to compute the total NUSC for Australia.

In the normal process, the net cost areas would be defined shortly after the start of the relevant financial year. The USO provider is required to propose the areas that it considers should be treated as net cost areas, and the ACA is provided with discretion as to whether these areas should be declared as net cost areas. The Act also permits the USO provider to propose more service areas as net cost areas up until 45 days after the end of the relevant financial year, although there are some restrictions on the ACA’s ability to declare net cost areas under this process.\(^{13}\)

In principle, this process could be quite important as the definition of the net cost areas would have an impact on the size of the NUSC. For example:

- if larger net cost areas are declared, then there is a greater likelihood that a profitable region will be combined with a loss making region. This would result in a lower NUSC than had the loss making region been declared as a separate net cost area (if all of Australia was to be declared as a single net cost area, then it would be unlikely that there would be a NUSC at all); and

\(^{13}\) This would amount to a special declaration, which the ACA is not permitted to make unless satisfied that

- the person has incurred, or is likely to incur, a substantial loss attributable to the supply by the person of services to the area during the financial year; and
- the loss is wholly the result of circumstances beyond the person’s control; and
- when the person became aware of those circumstances, the person took all reasonable steps to minimise the loss.

*Telecommunications Act 1997, s.181(6)*
• if a service area is not declared as a net cost area at the start of the year, but becomes unprofitable during the year, and the ACA does not declare the service area as a net cost area, then the USO provider will not get compensated for the losses incurred in supplying that area.

On the contrary, however, if a net cost area is declared at the start of the year but turns out to be profitable, that area is just dropped out of the analysis. Thus, there is no implicit penalty from having profitable areas declared as net cost areas.

It is understood that the geographic definitions of the net cost areas are associated with local exchanges. This scale makes sense from an economic perspective as areas are served on this basis and disaggregation into smaller net cost areas would raise intractable issues about the allocation of the costs of the exchange between the different net cost areas. In addition, it is understood that the ACA has taken a fairly light-handed approach to the declaration of net cost areas, having not rejected any area that has been proposed for declaration to date.

The formula for calculating the NUSC is set out in s.186 of the Act and can be summarised as follows:

\[
\text{NUSC} = \text{Avoidable cost} - \text{Revenue forgone}
\]

summed across all of the net cost areas, where avoidable cost means the amount by which:

• the total operating costs;
• the total allowances for depreciation of capital items; and
• the total opportunity cost of capital

for that financial year exceed what it is reasonable to expect that those costs would have been if the person had not supplied services to net cost areas during the financial year.\(^{14}\)

Revenue forgone means an amount of revenue that the USO provider would not have earned during that financial year if the person had not supplied services to net cost areas during that financial year.

The Minister has the discretion to formulate principles for determining whether the avoidable costs as presented are to be treated as excessive or principles for determining whether there is to be taken to be a shortfall in revenue forgone. The effect of treating costs as excessive, or revenue to be inadequate, would be to reduce the measured NUSC and so reduce the level of compensation payable to the USO provider. However, the principles must be determined in advance of a claim being made for a particular year.

There are two components to the opportunity cost of capital, which are:

• the assumed value of the assets in an alternative use; and
• the return that those assets could earn in that alternative use, adjusted for the different risks in those different uses.

This report is concerned solely with the second component of the opportunity cost of capital.

\(^{14}\) On 25 September 1998, the ACA made a determination under subsection 186(9) of the Act that specified the method of calculating ‘avoidable costs’ in the above formula. This determination applies for the 1997/98 year only and a new determination will be required for subsequent years.
**Operation of the Universal Service Fund**

The *Act* establishes a mechanism through which the losses that have been incurred in the course of fulfilling the USO are shared amongst the carriers. The mechanism has the effect of sharing the burden of the NUSC amongst carriers in proportion to the amount of revenue they receive from the telecommunications services (or parts of telecommunications services) the particular carrier provides (this revenue is referred to as the carrier’s eligible revenue). Therefore, the contribution of each carrier is defined as:

\[
\text{carrier, share of the NUSC} = \frac{\text{carrier, eligible revenue}}{\text{eligible revenue (all carriers)}}
\]

In this computation, the revenue that is derived from net cost areas (the revenue forgone) is counted as part of that carrier’s eligible revenue.

Each carrier pays into the fund the difference between its NUSC and its contribution. In 1997/98, preliminary analysis by the ACA indicates that Telstra’s contribution will be about 84 per cent of the NUSC, with the other carriers contributing the remaining 16 per cent. As Telstra is the sole USO provider, it receives all of the payment from the fund, and so receives a net payment (referred to as its levy credit balance) equivalent to the 16 per cent that was contributed by the other carriers.

**Economic Interpretation of the USO Regime**

*Efficient and economical provision of the USO*

The effect of the quantification of the NUSC and payments from the fund is to ensure that the USO provider at least recovers the avoidable cost of providing the USO in each service area. If the revenue from the market falls, the compensation from the fund covers the shortfall.

The effect of the regime can be interpreted as providing the USO provider with sufficient compensation that it would not choose to leave the industry (which is to supply USO services to net cost areas) if it had the freedom to do so. The use of the economic term ‘opportunity cost’ is consistent with this interpretation. An opportunity cost arises where some or all of the assets that are used to provide a service have a value in an alternative use and for which they would receive a return. Therefore, if the asset owner has the freedom to exit the industry and use those assets in that alternative use, then the return earned in their current use would have to be at least as high as the return in that alternative use (on a risk adjusted basis) in order for those assets to remain in the industry.

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15 That is, if a carrier provides all of a telecommunications service (originating access, transmission and terminating access), then all of the revenue received is part of its eligible revenue. However, where a carrier buys access from another carrier, it is able to deduct the access charges from its eligible revenue, and those charges are treated as part of the eligible revenue of the access provider: Regulation 35.

16 Arguably, the assumption that the firm has the freedom to exit the industry is essential for there to be a positive opportunity cost from supplying net cost areas. If the firm is not permitted to leave the industry—for example, because of government regulation, as appears to be the case here—then there is no alternative use for the assets and so no opportunity cost. It will be assumed in the report that the USO provider has the option of exiting from the industry, so there is an opportunity cost.
This interpretation appears to be consistent with the objects of Part 7 of the Act as described above. An important mechanism in modern public policy for ensuring that a program—such as the telecommunications USO—is delivered ‘efficiently and economically’ is to align the incentives of the program provider with the objectives of the relevant program. If successful, this reduces substantially the problems with monitoring and enforcing service delivery standards, and can improve substantially the quality of program delivery. The USO regime has adopted this approach by making it in the profit interest of the USO provider to supply the USO services in all parts of Australia, regardless of how unprofitable the areas otherwise would be.\(^{17}\)\(^{18}\)

**Losses should be shared among the carriers**

The objective of sharing the losses among the carriers assumes that the imposition of the USO levy leads to a long term burden on the carriers. As discussed below, it is likely to be the case that some or all of the burden will be shifted onto end–users, at least in the long term.

For the purposes of assessing the extent to which the losses are shared, economic theory would suggest that regard be had to the impact of the USO levy on the various indicators of the economic performance of the carriers. The most appropriate indicator in this case would be the effect on the carrier’s economic rate of return.

**The Net Cash flows from Supplying USO Services to Net Cost Areas**

**Introduction**

The normal objective when estimating the cost of capital for a project or a firm is to derive the discount rate that should be used to determine the value of the assets that generate those projected net cash flows. The appropriate cost of capital in a given circumstance then depends upon the specific characteristics of the projected net cash flows.

The objective when estimating the cost of capital for the purposes of determining the net cost of providing the USO service can be interpreted as a reversal of this common usage. Rather than beginning with projected net cash flows, the exercise begins with a value for the assets having been determined exogenously.\(^{19}\) The goal is then to determine the net cash flows that would be required to have induced the investment in those assets, which requires an assumption to be made about the return that an investor would require. Clearly, the return that the investor will require will depend on the risk profile of the net cash flows.

\(^{17}\) The effect of the USO levy requirements are not taken into account here, although it is concluded below that the USO arrangements should not affect the perceived profitability of investing in any area.

\(^{18}\) Telstra is also obliged to comply with its Universal Service Plan, which exists independently of these pecuniary incentives.

\(^{19}\) The estimation of the value of the assets that are to be used to provide USO services in the net cost areas is the subject of a consultancy by Gibson Quai & Associates and Ovum. The scope of this report is limited to advising on the return required on these assets.
As demonstrated in a staff paper by the Office of the Regulator–General, these different uses of the cost of capital are consistent. The necessary implication of this is that cost of capital that is used to determine the NUSC will depend on the specific characteristics of the projected net cash flow to the assets that are used to provide the USO services in net cost areas.

There are three issues that follow from this, which are:

- How should the service for which the cost of capital needs to be derived be defined?
- Should the operation of the USO fund be taken into account when assessing the cost of capital?
- If the operation of the USO fund is taken into account, what is the net effect of the fund, including both the disbursements from the fund, as well as payments into the USO fund through the USO levy?

Once these issues are addressed, the risks under the different options can be assessed, and implications drawn for the determinants of the cost of capital. These issues are discussed in turn.

**What is the Relevant Service?**

There are a number of different definitions of the service or project that could be used in order to assess the required rate of return. In the case of Telstra, the current (sole) USO provider, these include:

- the company as a whole;
- the PSTN business;
- the provision of USO services to the whole of Australia; or
- the provision of USO services to net cost areas.

Finance theory is quite clear that individual projects should be evaluated according to the own risk characteristics of their own projected net cash flows, and many finance experts counsel of the dangers of using company–wide costs of capital to evaluate specific projects. That said, however, it may be difficult to get reliable information about the likely risk of the projected net cash flow of an individual project and for this reason a cost of capital that is based on a more aggregated ‘project’, or a proxy cost of capital may be used in practice. Even so, the use of such a cost of capital will only be appropriate if the risk profile of the individual project is not expected to be significantly different, and more information should be used if available.
The task at hand is to determine the losses that arise from the supply of USO services to net cost areas. Accordingly, the relevant ‘project’ is the supply of USO services to net cost areas.\footnote{If the relevant service was USO service to the whole of Australia, the analysis of risks would be different, and so might the estimated WACC. This is because, as shown below, disbursements from the universal service levy have a profound effect on the risks of providing universal service, and these are made only in respect of net cost areas.} \(^2\). This view would also appear to be consistent with the \textit{Act}. It, in effect, defines the avoidable cost to include the increase in the opportunity cost of capital that arises from supplying services to net cost areas. Thus, it is the supply of services in net cost areas that is relevant. The issue of whether sufficient information can be obtained in order to make a reasonable assessment of the risk profile of the provision of the supply of USO services in net cost areas will be discussed below where appropriate.

\textbf{Should the flows from the USO Fund be taken into account?}

As discussed above, the problem at hand is to estimate the cost of capital that would be associated with the supply of USO services in net cost areas. Alternatively, the task can be expressed as to provide the USO provider would a sufficient net cash flow for its assets in net cost areas so that it would choose to retain its assets in the industry if it had the option of exiting. This, in turn, raises the issue of whether those net cash flows should include the payments from and into the USO fund.

From the point of view of financial economics, all of the components of the net cash flows (benefits as well as detriments) should be taken into account when assessing the value of a particular asset. This analysis should take account of the impact of company taxation and (as is discussed in more detail below), it should take account of the possible positive or negative impacts of the project specific risks on the projected cash flows. Similarly, as the operation of the USO fund has a significant effect on the projected net cash flows from providing USO services in net cost areas, this must be taken into account.

Taking account of the operation of the USO fund would also appear to be consistent with the interpretation of the objects of Part 7 of the \textit{Act} that was discussed above. That interpretation was that the USO regime is intended to provide the USO provider with sufficient compensation so that, if it was given the freedom to exit the industry (which is to provide USO services to net cost areas), that it would choose to retain its assets in the industry. The USO fund is the mechanism through which the USO provider would receive sufficient compensation to retain its assets in net cost areas in the industry. Thus, it clearly is contemplated that a USO provider would take account of the USO fund when (notionally) choosing whether to remain supplying net cost areas.\footnote{Furthermore, taking account of the operation of the USO fund is also consistent with the policy principle of s.134 of the \textit{Act} (c/f. the explanatory memorandum to the telecommunications bill), which is that the operation of the fund should not confer a competitive advantage or disadvantage on any of the carriers.}

Against this, Telstra has argued\footnote{Weighted Average Cost of Capital for USO Costing 1997–98, Telstra Submission to ACA, 22 December 1998} that the operation of the fund should not be taken into account when assessing the cost of providing USO services in net cost areas. Its arguments are that the determination of the USO cost is an independent exercise to the disbursement from the USO fund, and also because the introduction of the USO fund introduces complexities in the analysis. If this argument were to be accepted then, as discussed below, the risk profile of supplying USO services to net cost areas could be approximated by the risk profile of the PSTN business, and the determination of the cost of capital would be quite straight forward.
However, these arguments are not convincing. In particular, as discussed immediately below, the operation of the USO fund is expected to significantly reduce the non-diversifiable risk of providing USO services in net cost areas, and so to ignore the effect of the fund would be to significantly err in the determination of the cost of capital (in particular, to overstate the cost of capital significantly). Taking account of all of the influences on the risk of providing USO services in net cost areas would appear to be the only approach that is consistent with economic principles and the Act.

What are the projected net cash flows from supplying a USO service in a net cost area – when the effects of the USO fund are considered?

On the face of it, there are three components of the net cash flow that a USO provider would take into account when deciding whether to retain an asset in a net cost area. These are:

- the projected revenue from the market less its actual costs;
- the expected disbursements from the USO fund (equal to the projected allowed revenue from the market less benchmark costs); and
- its projected contributions to the USO fund.

The effects of the first two components of the net cash flow are straightforward to compute. The net effect of these imply that the net cash flow can be expressed as:

\[ \text{Net cash flow} = (\text{revenue} - \text{allowed revenue}) - (\text{cost} - \text{benchmark cost}) \]

It follows that if revenue and allowed revenue are identical, and the actual cost is equal to the benchmark cost, then the net cash flow from these sources to the assets that are used to provide USO services in net cost areas would be exactly zero in each year.\(^{25}\)

The effect of the contribution of the carrier to the USO fund, however, raises more complex issues.

On a simplistic analysis, the conclusion could be drawn that as the USO provider would contribute a certain proportion of the fund, this contribution should be subtracted in order to determine its expected net cash flow. In this case, if the USO provider’s proportional contribution to the fund is \(C\), the net cash flow (on the assumption that revenue is equal to allowed revenue and actual cost is equal to benchmark cost) could be expressed as:

\[ \text{Net cash flow} = C \times (\text{Revenue} - \text{Cost}) \]

On the assumption that \((\text{Revenue} - \text{Cost})\) covaries with movements in the market as a whole, this implies that the net cash flow for the asset also would covary with the market as a whole, but to a lesser extent than it would have but for the operation of the fund.

However, there are two arguments that suggest this simplistic analysis may not be correct.

First, this analysis of the fund assumes that the burden of the USO levy on a particular carrier can be taken to be its contribution to the USO fund, which in turn assumes that the carrier is unable to pass–on any of the burden to the end–users. This assumption is open to question.

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\(^{25}\) As the costs include a return on capital, this implies a situation of zero economic profit.
At one extreme—that of the competitive market—all imposts must eventually be passed on to end-users. In a competitive equilibrium, firms only earn normal profits (zero economic profit). Thus, any negative shock (such as the introduction of a new tax) will result in them earning negative economic returns. If new investment is to be attracted into the industry, then prices must rise to again provide normal economic profits. However, to the extent that there is a degree of market power in the industry (and economic rents being earned), then it may be possible for some or all of an additional impost to be borne before returns fall below an acceptable level. As a general rule, the extent to which the USO would be expected to be passed on to end-users depends upon the level of market power (and prevailing level of returns) in the markets whose products or services would be covered by the definition of eligible revenue (with a greater degree of competition implying that more of the USO is likely to be passed on).

It is very difficult to ascertain the extent to which the USO levy will be passed on to end-users and so not be borne by the carriers. While some of the markets whose products or services would be covered by the definition of eligible revenue would appear to be quite competitive, it could be argued that returns are significantly above competitive levels in other markets. However, a reasonable assumption is that part, although maybe not all, of the USO levy would be passed on.

Analytically, if the proportion of the USO levy that is passed on to end-users is P, then the net cash flow can be expressed as:

\[
\text{Net cash flow} = (1 - P) \times C \times (\text{Revenue} - \text{Cost})
\]

Thus, the net cash flow would still covary with movements in the market as a whole. However, the amount of covariance would be even less than the previous case where it was assumed that none of the USO cost could be passed on. Moreover, the more competition that there is in the telecommunications markets, the more of the USO levy that could be expected to be passed on, and the smaller the expected covariance with the returns to the market as a whole.

Secondly, however, there is a convincing argument that the payments by the USO provider into the fund are not relevant to this issue.

A reasonable assumption to make about the operation of the USO regime is that USO services will be provided to net cost areas, and the only issue is the identity of the USO provider. This appears to be clear from the objects as well as the specific provisions of the Act. Thus, it is reasonable to assume that the NUSC in the eyes of any potential or actual USO provider is fixed—as it would be determined by the Government’s USO policy and the economics of the individual net cost areas alone. 26 In addition, the decision of a carrier of whether to invest (or retain an investment) in a net cost area will not have a significant effect on its proportional contribution to the NUSC. 27 The necessary implication is that a carrier’s decision of whether to invest (or retain an investment) in a net cost area will not affect the size of its contribution to the USO fund. This is a fixed (sunk) cost that it will bear regardless of whether it invests in a particular net cost area.

26 Indeed, as benchmark costs are used to compute the NUSC, the replacement of an incumbent USO provider with a more efficient carrier will not reduce the NUSC.
27 The addition ‘revenue forgone’ from serving the net cost areas would be part of the carrier’s eligible revenue, and so lead to an increase in its rate of contribution. However, the total revenue forgone for all net cost areas in 1997/98 was only 4% of eligible revenue, and this was spread across about a large number of net cost areas.
This implies that a USO provider’s decision to invest (or retain an investment) in a net cost area should be unaffected by its projected contribution to the USO fund. The project should be evaluated according to the incremental costs and revenues consequent on that investment, which could not include the payment into the USO fund. Similarly, when ascertaining the net cash flow for the purposes of assessing the cost of capital associated with the supply of USO services in net cost areas, the payments into the USO fund should not be treated as part of the net cash flow for that project.

The implication of this line of reasoning is that the net cash flow for assets in net cost areas would be exactly zero in each year, and so not covary with returns to the market as a whole. This conclusion is considered to be the most logical interpretation of the effect of the USO regime.

**Implications for the risk of providing the USO service to net cost areas**

There are a number of different risks that investors in these types of assets will face. However, as discussed in Chapter 1 above, if the framework of CAPM is adhered to, then only the risk that is related to movements in the market as a whole require compensation through the WACC. The other risks can be eliminated costlessly (through the investor holding a wide portfolio of assets) and so are not compensated in a competitive market. However, in the context of determining the opportunity cost of retaining assets in net cost areas, these risks could be important if they are not symmetric.

This first class of risks—the non-diversifiable or beta risks—will be discussed first. The second class—the diversifiable or project risks—will be discussed next.

**Beta (Non-Diversifiable) Risks**

In the discussion above, four possible interpretations of the variability of the net cash flow for assets that are used to provide USO services in net cost areas were outlined.

First, if the effects of the USO fund are ignored (which is considered would lead to significant errors), then the best approximation of the risk profile for supplying USO services in net cost areas is the risk profile of supplying USO services overall. In turn, the risk profile of the PSTN business is likely to be a fairly good proxy for the risk profile of business of supplying USO services.

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28 Again, this assumes that revenue equals allowed revenue and cost is equal to the benchmark cost, the implications of which are discussed further below.

29 It is clear that there is (non-diversifiable) market risk associated with the sale of USO services to net cost areas. The conclusion stated above does not dispute this. What is implied, however, is that the operation of the USO fund has the effect of transferring this market risk from the USO provider to the contributors to the USO fund—which includes the USO provider, as well as all of the other carriers—as if they were the providers of the service. This will have the effects of changing the risk of the fund contributors. However, the effect of the USO contribution formula is that the effect on the cost of capital of the contributors should be roughly the same.

30 It is important to note that the investors are the shareholders of the entity, not the management. This proposition is not asserting that businesses themselves will hold portfolios of assets to eliminate these risks, but that their shareholders have that option to do so.

31 If anything, one would expect the supply of USO services to be less risky than the PSTN business overall given the more essential nature of the USO services.
TELSTRA’S USO WACC

As Telstra’s PSTN business is not separately listed, and indeed, Telstra has not been listed for very long itself, it is impossible to calculate an equity beta directly for the PSTN business. However, the ACCC undertook a detailed study of the equity betas of firms in like situations, and concluded that an equity beta within the range of 0.50 to 0.80 would be appropriate for the PSTN business (for a 10.1% level of gearing), and which are accepted as reasonable estimates for the present analysis.22

If the effects of the USO fund are ignored (which is considered to be incorrect), the equity beta would be in the range of 0.50 to 0.80, for a 10.1% level of gearing.

Secondly, if the effects of the USO fund is taken into account, but it is considered that the USO provider would deduct the contribution it makes to the USO fund when determining the net cash flow from investing in net cost areas (and would not expect to recover that contribution from the market—the simplistic analysis), then the net cash flow associated with assets in net cost areas can be expressed as:

\[ \text{Net cash flow} = C^* (\text{Revenue} - \text{Cost}) \]

where C is the USO provider’s proportional contribution to the NUSC, implying covariance of returns with the market as a whole, but lower than if the effects of the fund are ignored. The net cash flow (Revenue – Costs) is the net cash flow of the supply of the USO service in net cost areas (if the effect of the USO fund excluded). If it is again assumed that the equity beta for the PSTN business is a reasonable approximation for the equity beta for sales of USO services to net cost areas (with the effects of the fund excluded), then an approximation of the relevant equity beta is:

\[ \beta_{\text{Net Cost Areas}} = \frac{C^* \beta_{\text{PSTN}}}{1 - P} \]

Adopting the ACCC range for the equity beta of between 0.50 and 0.80 (at 10.1% gearing) and using Telstra’s share of the NUSC in 1997–98 of 84.4%, implies a range for the equity beta of between 0.42 and 0.68.

If the effects of the USO fund are taken into account, then on a simplistic analysis, the range for the equity beta would fall to between 0.42 and 0.68, with a mid–point of 0.55 for a 10.1% level of gearing.

Thirdly, if the effects of the USO fund is taken into account and the USO provider takes account of its contribution when assessing an investment in a net cost area, but expects to pass on some or all of the contribution to end–users, then the net cash flow can be expressed as:

\[ \text{Net cash flow} = (1 - P)^* C^* (\text{Revenue} - \text{Cost}) \]

where P is the portion of the levy that Telstra considers that it can pass–on. Adopting the same assumptions as above, this implies that the equity beta for the supply of USO services to net cost areas can be approximated by:

\[ \beta_{\text{Net Cost Areas}} = (1 - P)^* C^* \beta_{\text{PSTN}} \]

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33 This follows because an equity beta is defined as: \( \beta = \frac{\text{cov}(i,m)}{\text{var}(m)} \) and as \( \text{cov}(a^*i,m) = a^* \text{cov}(i,m) \).
Thus, the equity beta will depend upon the extent to which Telstra expects to pass on the effects of the USO levy to end-users, which is very difficult to predict. It is interesting to note, however, that the more competitive that one views the telecommunications markets, the more likely it is that the USO levy will be passed on to end-users, and the lower will be the equity beta (with the equity beta being zero in the limiting case where all of the USO levy is passed on to end-users). As an example, if Telstra considers that it can pass-on half of the levy to end-users (which does not appear unreasonable), then the relevant equity beta would have an approximate range of between 0.21 and 0.34 for a gearing level of 10.1%.

If the effects of the USO fund are taken into account, but Telstra expects to pass on some or all of the USO levy to end-users (through higher prices), then the equity beta will fall. For example, if Telstra considers that it can pass-on half of the levy to end-users, the equity beta would be between 0.21 and 0.34 for a gearing level of 10.1%.

Lastly, as discussed above, the most plausible interpretation of the effects of the USO fund is that the USO provider includes the full subsidy from the fund as part of the net cash flow to assets in net cost areas, but considers that its contribution to the fund is a fixed cost which is unaffected by an additional investment in a net cost area.

On this interpretation, the projected net cash flow for an asset in a net cost area is zero in every year. This implies that there is no variability in the net cash flow, in turn implying an equity beta of zero.

The most plausible interpretation of the effect of the USO fund is that the USO provider interprets its contributions to the fund as a fixed cost that is unaffected by whether or not it invests in a net cost area. This would imply that the equity beta is zero.

Project (Diversifiable) Risks

There are a number of project-specific or diversifiable risks that would be faced by an investor in net cost areas. In theory, these risks should not affect the cost of capital as they can be eliminated costlessly by the investor.

However, the WACC for a project is the return that the project should earn on average (the expected return). Therefore, it is essential that the definition of the net cash flows represent an unbiased estimate of the expected net cash flows from that project. This in turn requires that the expected value of all of the events which are not are not taken into account in the definition of the net cash flow must be zero—i.e. that the positive surprises and negative surprises offset each other. To the extent that these do not cancel each out, and an adjustment is not made to the net cash flow,\(^{34}\) then an adjustment to the WACC may be necessary to ensure that the true WACC is earned on average.

There are a number of diversifiable risks that may give rise to negative surprises, which include the following:

- **regulatory risk**—the ACA has the ability to refuse to declare certain net cost areas, and the Minister has the power to declare costs as excess or revenues as inadequate (though the Minister cannot retrospectively alter the types of revenues and costs that are counted); and

\(^{34}\) In the context of determining the cost of the USO, an adjustment to the net cash flow would imply an increase or decrease in the assumed operating expenses of supplying net cost areas.
• operating risk—for example, earthquakes or floods may cause damage to equipment, the repair of which may not be included in the costing formula.

In addition, there are a number of diversifiable risks that may give rise to positive or negative surprises, which include the following:

• costing formula—as this is based on benchmark costs rather than actual costs, it may be systematically biased upwards (e.g. it may assume that assets are replaced far more often than actually is the case) or downwards (e.g. if costs are based on best practice, then inefficient costs could not be recovered)

On the other hand, there are a number of diversifiable risks that may give rise to positive surprises, including:

• value of brand recognition—Telstra’s universal presence may deliver benefits to other parts of the organisation that should be taken into account when assessing the opportunity cost of supplying USO services in net cost areas.

A further negative risk that is often discussed is stranded asset risk (i.e. where a major shift in the market may reduce the market value of the relevant assets to below the depreciated value of that asset). This risk is analysed separately in chapter 3.

The theoretically correct treatment of these types of risks is to obtain an actuarially fair value of the risks, and make an adjustment to the net cash flow. However, these sorts of risks are, by their very nature, very difficult to quantify. The practice that has developed amongst regulators in Australia has been to respond by these risks by erring on the conservative (higher) side when deriving the equity beta and WACC.

In the current matter, it is not clear a priori whether these risks are significant, nor whether the negatives outweigh the positives, or vice versa. However, consistent with emerging regulatory practice, it is considered that an upward adjustment to the equity beta above what otherwise would have been chosen may be justified.

Corporate finance theory indicates that investors require compensation through the cost of capital for systematic risk only. However, a number of submissions pointed to the established practice of including some allowance in the cost of capital for non-systematic or diversifiable risks (such as regulatory risk and the risk of major infrastructure dislocations) which cannot be readily quantified and included in the cash flows, as the theory would require. The beta selected by the Office therefore consciously overcompensates investors for systematic risk, to recognise the existence of such diversifiable (or insurable) risks.

Office of the Regulator General, Access Arrangements: Multinet, Westar and Stratus
Final Decision, October 1998, p75

Conclusion

Based on the above analysis, the equity beta lies in the range of 0 to 0.55, with the lower end of the range considered more plausible on theoretical grounds. However, it is considered that some erring upward within the feasible range for beta be made to address the possibility that the expected value of the diversifiable risks that are not impounded in the cash flows may be negative.

In chapter 3, WACCs are calculated for betas at both ends of the range, and a WACC that falls within the middle of the range is recommended.

55 Note, however, that an upwards adjustment is only justified where the negatives outweigh the positives, which is not always the case.

56 It is noted, however, that there is no evidence to suggest that the expected value of these risks is negative—they may be positive.
The methodology for calculating the USO beta described in this chapter and the conclusions reached have been criticised by Telstra and its consultants, NECG. In particular, both Telstra and NECG claim that the operation of the USO Levy fund does not eliminate (or even significantly reduce) non-diversifiable risk associated with the USO cash flows. The major issues that they raise are discussed below.

**Circularity**

Telstra claims (p13) that

“...ACG have included the receipts from the USO Levy Fund as a positive cash flow. However, it is not appropriate to include as relevant those cashflows which are dependent upon the size of the gap of the “gap”. This introduces a circularity into the exercise as those receipts can only be determined as part of the costing exercise (which is the purpose at hand).

The notional choice that the carrier has is not whether or not to continue to be the USO provider recognising the contributions towards the USO cost from other carriers and itself. The notional decision concerns whether or not the USO provider would provide service to these areas on a purely commercial basis. On this basis the cashflows occasioned by the USO regime have no bearing on the notional decision and hence are not part of the relevant cashflows. This approach is consistent with the concept of filing.”

This claim is incorrect. To include some cashflows but not others in the investment calculus is wrong as a matter of elementary financial economics, as it is inconsistent with the concept of opportunity cost. To see why, consider the case of a hypothetical specialist regional/rural telecommunications carrier whose only business is the provision of USO services in Net Cost Areas. Such a carrier will be entirely dependent on disbursements from the USO Levy Fund to make a (normal) profit because, by definition, it will lose money from its USO operations. According to Telstra, potential shareholders in this company should only consider “purely commercial” cashflows in deciding whether or not to invest in the company. But if investment decisions were made on this basis, no one would invest in the company.

On the other hand, if investors (correctly) include cashflows from the USO Levy fund, they might invest in the company. If these USO Levy cash flows exactly offset the company’s commercial losses and so provide a fixed return, investors will realise that non-diversifiable risk has been eliminated and so will require a relatively low rate of return. If the USO Levy fund works only imperfectly to offset commercial losses (sometimes returning more, sometimes less) then investors will demand a higher rate of return. Whatever the case, the important point is that rational investors will consider all cashflows that are associated with an investment when deciding the rate of return that they require to make that investment.

Telstra seems to be asserting that the WACC that discounts the cash flows cannot be determined until the precise size of the cash flows is determined. Hence Telstra’s claims about circularity. However, it is the volatility of the cash flows relative to the market, not their absolute size, which determines the cost of capital. In every regulated utility setting, the WACC is determined prior to the regulated cash flows being determined. Claims of circularity do not appear to have influenced those decisions.

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37 Such as McLeod USA Communications, a specialist (and successful) rural telecommunications company operating in the US North West.
The Burden on Telstra

On pages 15 and 16 of its report NECG argues that the USO places a larger burden on Telstra than the other carriers. The argument appears to be that the Bellcore methodology—which has been agreed by Telstra, Optus and Vodafone—mismeasures the NUSC. In particular it overstates revenue foregone, because if another carrier became the USO provider in some of the existing net cost areas, Telstra would compete for STD and IDD calls into, out of within those areas and so would retain some or all of the revenues associated with these services. Moreover, according to NECG, this measurement error represents an undiversifiable risk and hence affects the cost of capital.

It is possible that NUSC is measured with error using the Bellcore model, as it would be using any other model, but it is difficult to see what the practical alternative is. What NECG seems to be proposing is the Bellcore model augmented by estimates of what would happen to revenues in net cost areas if Telstra were to voluntarily stay and compete, once another carrier had become the USO provider. Presumably Telstra’s decision would be made on an area–by–area basis, with Telstra continuing to offer STD and IDD services in the most commercially prospective markets.

The Bellcore model is, essentially, a big calculator that uses as inputs actual revenues earned and benchmark costs incurred. The task of augmenting it to include the effects of business strategies which might or might not be implemented, and whose effects would be uncertain if they were implemented, would be very difficult. (Not only Telstra’s strategies, but the reactions of the other carriers to Telstra’s strategies, would have to be modelled.) Obtaining an industry consensus that this augmented model accurately reflected the outcomes of hypothetical scenarios would seem to be particularly problematic. It is not even clear whether the outcome of this model would yield an aggregate NUSC that is larger than that estimated by the Bellcore model, let alone by how much.

In any case, NECG’s claim that any measurement error in the Bellcore model represents significant non–diversifiable risk is undeveloped, to say the least. NECG provides no estimate of the likely size of this error and no estimate of its likely correlation with that of the rural economy, which it claims is the source of the systematic risk. Thus NECG’s implicit claim that this error adds significantly to the USO beta is purely speculative.

Risk Analysis

NECG presents a formal model that purports to analyse the risk that Telstra, as a whole, faces due to the provision of USO services in net cost areas. The discussion of the model suggests that the risk being measured is the risk to Telstra from raising its contribution to the USO fund. According to NECG, there is risk attached to raising this contribution as it has to be derived from other telecommunications markets and income from these other markets has significant risk associated with it.

In terms of its logic, the formal model begins by assuming that the risk that is associated with making a payment into the USO fund (referred to as P by NECG) is the risk associated with raising this contribution in other telecommunications markets. The model then proceeds to establish a relationship between P and the net cash flows attributable to the provision of the USO services in net cost areas, and hence establish a relationship between the risk of USO service provision with the risk associated with telecommunications services in general.
However, the opening premise of the model would appear to be incorrect. The size of the required payment by any carrier into the USO fund depends on the aggregate NUSC for that year, and each carrier’s proportionate contribution into the fund. Thus, provided the latter remains constant, the risk of making a payment into the fund must be directly related to the (unsubsidised) risk of providing USO services in net cost areas, and not to the risk of raising the payment in other markets. This would appear to follow from the model as presented by NECG on page 17 of its report. Using $F$ to denote the net cash flows to Telstra from provision of the USO service in net cost areas, $R$ to denote the revenue from these areas (net of operating costs), $S$ the sunk costs of service provision, $U$ the payments from the USO fund to Telstra, and $P$ as Telstra’s payments into the fund, NECG make the assumption that:

$$U = S - R \quad \text{(1)}$$

In addition, NECG notes (page 19), that as Telstra currently contributes 84% of the fund:

$$P = 0.84*U \quad \text{(2)}$$

$$U = 1.2*P \quad \text{(3)}$$

Combining (1) and (2) gives:

$$P = 0.84*(S - R) \quad \text{(4)}$$

This shows that the payment that Telstra makes into the USO fund is related to its rate of contribution to the fund and the size of the NUSC in any year. It therefore follows that the risk associated with the fund payment is related to the risk of providing USO services and not the risk associated with other telecommunications markets as assumed by NECG. Given the error in the initial premise of the NECG analysis, the results and intuitive analysis presented by NECG essentially are meaningless.

However, as NECG comments, it is true that the effect of requiring Telstra to contribute to the USO fund is to make Telstra when considered as a whole bear some of the market risk associated with the provision of USO services in net cost areas. Clearly, as demonstrated in the analytical example above, the payment that is required to be made into the fund is dependent on the net cash flows associated with the provision of the USO service in net cost areas, and so the payee into the fund effectively bears some of the market risk associated with the provision of this service. More precisely, the imposition of an additional cost on the carrier that is inversely related to movements in the market will increase the risk of the business as a whole.

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58 NECG expressed this as $U = R - S$, which is probably a simple error.
59 NECG expressed this as $U = 0.2*P$ (page 19) which appears to be another simple error. Note, however, that this error is continued through the analysis.
60 In addition, the NECG model contains a number of other logical errors. For example, on page 19 NECG makes an independent assumption about the size of Cov ($R-S, P$); however, the identities that are defined by NECG imply that the magnitude of this covariance is already defined as $1.2*Var (P)$. To make a separate assumption about this variable is inconsistent with the model presented. Similarly, NECG assumes (p18) there are “perfect pair–wise correlations between $U, P, R$ and $S$.” However, again, the identities defined by NECG imply that these correlations are defined already.
61 This was fully recognised in the Draft Report in footnote 22.
However, all carriers are required to make payments into the USO fund (in proportion to their eligible revenue) and so the riskiness of all of their businesses as a whole will rise. Hence, all carriers—not just the remainder of Telstra—bear a share of the market risk that is associated with the provision of USO services in net cost areas. The relevant question is whether the USO provider—or even Telstra in particular—bears a greater share of this risk. The answer is that, in a competitive industry (i.e. one where risk-adjusted profit rates are the same for all firms), the effect on the beta (and hence cost of capital) for all of the payees into the fund is likely to be approximately the same as a result of the methodology that is adopted for apportioning the burden between the carriers. Regardless, if there is a difference in the risk that is borne by the carriers (for example, if the rate of profit on eligible revenue is differs between the carriers), then such a difference would be independent of the identity of the USO provider. Hence, there is no further opportunity cost associated with being the USO provider.

**Marginal contribution to the fund**

On page 16 of its report, NECG argues that, as the revenue that a USO provider derives from the net cost areas is counted as part of eligible revenue (for the purposes of determining the contributions to the fund), it is therefore not correct to assume that a USO provider would treat its payments to the fund as a fixed obligation (and hence independent of whether it is the USO provider) as the provision of USO services in net cost areas would lead to this additional contribution.

The fact that the revenue from net cost areas is counted as eligible revenue and that the decision to provide USO services in these areas would increase a carrier’s contribution to the USO fund was noted in the Draft Report (footnote 20). However, the influence of this contribution was deemed to be likely to be insignificant. In particular, in terms of the model above, if the USO provider’s decision is taken to be whether it should supply all of the net cost areas or none at all, then the incremental fund contribution (C in the model) is 4 per cent. Hence:

\[
\text{Net cash flow} = 0.04 \times (\text{Revenue} - \text{Cost})
\]

This implies an equity beta of about 0.026 (=.65*.04), which is insignificant. If the USO provider’s decision is taken to be whether it should supply any individual net cost area (which appears to be the more appropriate formulation), then the effect of the additional contribution would be smaller still. And it would be even smaller than that if Telstra ceased to be the USO carrier but

“would contest STD and IDD traffic to, from and in these areas. As a result, quite independently of whether it provided the USO, Telstra would obtain significant STD and IDD revenues from these areas”

as NECG suggests in another part of its report.

Hence, the assumption that a USO provider would treat its payments to the fund as a fixed obligation when deciding whether or not to invest or retain its assets in a net cost area is reasonable.
Estimation of Telstra’s USO WACC
Chapter 3

Estimation of Telstra’s USO WACC

Estimates of the USO WACC for 1997/98 and a forecast of the WACC for 1998/99\(^2\) are presented in this chapter. Each of the parameters making up the WACC is discussed in turn. Much of the discussion draws on the document by the Australian Competition and Consumer Commission, *Assessment of Telstra’s Undertaking for PSTN Originating and Terminating Access*, January 1999 (hereafter referred to as ACCC) which estimates the WACC for 1997/98 and 1998/99 for the PSTN.\(^3\)

**Gearing Ratio (D/V)**

As noted by ACCC, the options for determining the level of gearing are to use the book value, Telstra’s target value, or an optimal (WACC minimising) capital structure. In the absence of knowledge of what an optimal capital structure for Telstra would be, ACCC chooses a level of gearing of 0.101 in its estimation of the PSTN WACC. There would appear to be no reason to depart from this view.

Several comments argue that the assumed level of gearing (10.1\%) is too low. CWO writes that:

“...an assumed gearing ratio of 40–50\% ought to be applied to the WACC calculation to replicate optimal capital efficiency”

while USORG argues that

“... a gearing ratio of 0.1 is very conservative and is not consistent with a mature business, such as Telstra, operating in a vast range of business activities in a rapid growth industry” (p6).

Professor Officer writes

“... the gearing level...does seem to be abnormally low even though it might be accepted by the ACCC. A higher gearing is likely to lower the estimate of the cost of capital” (p4).

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\(^2\) The methodology outlined in this Chapter uses the interest rates that actually prevailed over the period as the relevant risk free rate. Therefore, the final WACC for 1998/99 would need to be determined after the end of this financial year when the interest rates that prevail from now until then are known.

\(^3\) For several parameters (gearing, risk free rate, market risk premium), the values chosen are the same as that by ACCC in its analysis of the cost of capital for the PSTN. The differences between the PSTN business and the USO business do not impact on these parameters. They do impact on non-diversifiable risk and this is reflected in the value of beta, as discussed in Chapter 2.
It is true that a higher level of gearing would significantly lower the WACC, other things being equal, because the cost of debt is less than the cost of equity. However, it would be incorrect to keep all other things equal if a higher level of gearing were assumed. This is because, following ACCC, the equity beta (or more specifically, the upper end of the range for the equity beta) is derived from an asset beta of 0.6, assuming a gearing level of 10.1%. Given the asset beta a higher level of gearing would imply a higher equity beta, and this would almost offset the effect on the WACC of relatively more debt in the capital structure. (In the absence of taxes, the two effects would offset each other exactly.) For example, suppose the optimal capital structure for Telstra was judged to 20.2% (double that used in the Draft Report). This would reduce the WACC for 1997/98 by just 10 basis points, from 9.0% to 8.9 per cent.

But this presumes that 20.2% is known to be the optimal capital structure for Telstra. In practice, this optimum is unknown, at least to date. It is difficult to disagree with ACCC (p5):

“…in the absence of a rigorous study of the optimal capital structure for a firm like Telstra, it is not unreasonable to regard Telstra’s target future gearing ratio as the best estimate of such an optimum.”

Thus, there is no reason to depart from the gearing ratio used in the draft report, 10.1%, which is used by ACCC. (Furthermore, since Telstra raises capital on a corporate basis, the capital structure for Telstra’s USO business is that for Telstra as a whole.)

**Conclusion: In estimating the USO WACC, a level of gearing of 0.101 should be used**

**Risk Free Rate**

Typically, the risk free rate is proxied by the rate of return on Commonwealth Government bonds.\(^44\) One important question is the choice of maturity of the bonds. This question is not resolvable by the theory of the CAPM, since it is a static (one period) model.

When the CAPM is used for regulatory pricing decisions, one argument is that the bond length should match the length of the regulatory pricing review.\(^45\) For example, Telstra’s Undertakings for PSTN Originating and Terminating Access are to last for three years, hence it could be argued that a three year bond should be used in calculating the WACC in that context. However, while the telecommunications USO cost is calculated on a year–by–year basis, there is no sense in which an annual pricing review takes place. Moreover, the premise of the argument is not universally accepted with the alternative view put that the length of the bond should closely approximate the economic life of the asset in question.\(^46\)

\(^{44}\) ACCC, p6.


However, a more practical requirement for the choice of the risk free rate is that it be consistent with the market risk premium that is being used. If a short term risk free rate is used, then the measure of the market risk premium will be correspondingly higher (assuming an upward sloping yield curve, as is the norm). In contrast, a long term risk free rate will give rise to a lower measured market risk premium. As most of the empirical work on market risk premia in Australia and overseas are based on long dated government securities (in the range of 10 years), consistency suggests that the yield to maturity on a government bond of around 10 years should be used.

ACCC adopted the Commonwealth 10 year bond rate as the appropriate risk free rate for estimating the WACC for the PSTN, and there would appear to be no good reason to depart from that practice in estimating the WACC for the supply of USO services to net cost areas.

A further issue is whether a forward looking bond rate or an historical average should be used. The argument for a forward looking bond rate is that, assuming that financial markets efficiently process all information relevant to the determination of financial prices, the best forecast for the bond rate which will prevail in the future is the bond rate which prevails today.

Thus, the best forecast on 1 July 1997 of the average bond rate for 1997/98 would be the 10 year bond rate which prevailed on that day. This would be the best estimate given the information available at that time. However, given that the Act requires the NUSC to be calculated after the year has ended, then more information is available — there is no need to forecast the average 10 year bond rate for 1997/98 as that is now known with certainty. The most accurate representation of the risk free rate for 1997/98 is the average 10 year bond rate which actually prevailed over that year.

This is the approach taken by ACCC for its historically (1997/98) determined WACC for the PSTN.

According to Professor Officer,

“[t]he Risk Free rate and the method of estimating it appears to be consistent with accepted methodology …”

However, this view is not shared by Telstra. In particular, Telstra argues that the risk free rate for 1997/98 should be the 10 year bond rate on 1 July 1997, not the average rate over the year.

Telstra’s argument (p5) is that:

“The rationale for inclusion of the WACC in the costing of the USO is to calculate the opportunity costs of having particular assets devoted to delivering the USO. The opportunity cost is the next best return that could have been achieved if the particular project under consideration (the USO project) did not proceed. This opportunity cost will be governed by the locus of alternative projects available on the "day" that an irrevocable decision to proceed with the USO is made. That is, on 1 July each year the USO provider has a notional decision as to which areas would be serviced on a purely commercial basis and which would not. The latter group of areas are known as the USO areas (or potential net cost areas). Therefore, the USO provider can either invest in the USO project on 1 July or some other project available on that date. Once a decision is made to proceed with the USO project the other best available project is foregone and this delineates the opportunity cost of the USO project. If other alternative projects become available through the year they do not affect the opportunity cost of the USO project because they were not valid alternatives on the “lock-in” or "decision" date. In this sense there is no opportunity cost of later projects.”

Telstra’s argument, in essence, is that decisions to purchase capital equipment for the “USO project” are made on 1 July; these decisions are irrevocable for exactly one year; and so the only alternative return that matters is that which can be obtained for a bond on 1 July. The problem with this argument is that while decisions made on 1 July by Telstra’s managers might be irrevocable, decisions made by Telstra’s shareholders, or potential shareholders, are not, and it is the rates of return which affect the decisions of investors—not those of the managers—which are relevant to calculating the WACC in the CAPM framework. Telstra shareholders can buy or sell Telstra shares and/or government bonds every day of the working week. Thus, the risk free rate which was available to investors in 1997/98 was the average bond rate over the year.

**Conclusion:** For 1997/98, the risk free rate was the average 10 year Commonwealth bond rate for that year. This was 6.0 per cent.

A final risk free rate for 1998/99 cannot be determined at this stage because, at the time of writing (March 1999), only just over the half of this year’s bond rate is known with certainty.

The best forecast for the risk free rate for this financial year is the weighted average bond rate that prevailed between July 1998 and February 1999, and a forecast for March 1999 to June 1999, with the best forecast of that period being the rate prevailing at the end of February 1999. However, when the NUSC is determined for 1998/99, an average of the actual interest rates for the year should be used.

**Conclusion:** A forecast of the risk free rate for 1998/99 is 5.4 per cent (using actual interest rates until the end of February 1999, and a forecast for the remainder of the year). However, the actual interest rates (the yield to maturity on the 10 year Commonwealth bond) for the full year should be used when the NUSC is determined after the end of the financial year.48

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48 The Draft Report estimated the risk free rate for 1998/99 to be 5.1%. However, increases in bond rates in February 1999 have led to a revised estimate of the risk free rate to 5.4%.
Market Risk Premium

The market risk premium (MRP) represents the excess over the risk free rate of return required by equity investors to invest in a diversified Australian equity portfolio. The ex ante market risk premium is difficult to estimate, so historical MRPs have traditionally been used as an estimate of the forward-looking MRP. However, if the MRP is estimated using only relatively recent data, which should be more relevant to the present (and future), the estimate tends to be imprecise (i.e. the standard error of the estimate is large). Conversely, if the MRP is estimated using data that extend long into the past, the standard error is small, but the estimate itself could be contaminated by irrelevant data.

Notwithstanding these caveats, estimates have to be made for regulatory and other purposes. Some recent estimates are shown in Table 3.1.

As Table 3.1 shows, the consensus of recent professional opinion in Australia appears to be that the market risk premium is 6.0 per cent. It should be noted, however, that a respectable body of opinion argues that the equity risk premium around the world has fallen; under these circumstances, for example, the sharemarket in the United States is not overvalued to the extent consistent with a 6% market risk premium.

Despite the evidence that the MRP has fallen, the view expressed in ACCC is that 6 per cent is still the best estimate. This is a conservative viewpoint but probably justified until a consensus emerges about a new value for the MRP.

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Table 3.1

<table>
<thead>
<tr>
<th>Author</th>
<th>Market Risk Premium %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Officer (1989) (Based on 1882–1987)</td>
<td>7.0</td>
</tr>
<tr>
<td>Officer et. al. (1991) (Based on 1882–1991)</td>
<td>7.9</td>
</tr>
<tr>
<td>Officer et. al. (1991) (Based on 1945–1991)</td>
<td>7.5</td>
</tr>
<tr>
<td>Prudential Bache Securities Australia (1998)</td>
<td>6.0</td>
</tr>
<tr>
<td>ABN–AMRO (1998)</td>
<td>6.0</td>
</tr>
<tr>
<td>ACCC (Gas Final Decision) (1998)</td>
<td>6.0</td>
</tr>
<tr>
<td>Office of the Regulator General (1998)</td>
<td>6.0</td>
</tr>
<tr>
<td>Credit Suisse First Boston (1998)</td>
<td>6.5</td>
</tr>
<tr>
<td>Officer (according to ORG) (1998)</td>
<td>6.0</td>
</tr>
<tr>
<td>Davis (1998)</td>
<td>6.0</td>
</tr>
</tbody>
</table>

Source: ACCC p20. (Full original references in this source.)

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50 Techniques—such as the dividend growth model—can be used to obtain an ex ante estimate of the MRP. However, this model requires unbiased and accurate forecasts of dividend growth, which are notoriously difficult to obtain for any reasonable period.


52 “Welcome to bull country”, The Economist, July 18th 1998. Damodaran, op cit estimates that the implied risk premium on U.S. equities in 1996 was less than 3 per cent.

53 Linda Richardson and Marion McCutcheon, “Telstra’s Weighted Average Cost of Capital for PSTN and USO Services”, DCITA Communications Research Unit, January 1999.
According to Professor Officer, the method of estimating the market risk premium in the draft report is “consistent with accepted methodology.” Telstra, however, comments (p2) that：“Although the market risk premium recommended by the ACG is within the range of traditional estimates, there is evidence that the forward-looking, contemporary MRP would be significantly higher than historical evidence would suggest.”

Telstra’s preferred MRP is \( c - i - c \) per cent.

The evidence that Telstra refers to is summarised in a series of papers by Professor Robert G. Bowman of the University of Auckland, who is a consultant to Telstra. These papers are: “Estimating the Market Risk Premium: The Difficulty with Historical Evidence and an Alternative Approach” (February 1999, Bowman 1999a); “Market Risk Premium and Interest Rates” (with Dr J.B. Chay, February 1999); and “Assessment of Telstra’s Undertaking for PSTN Originating and Terminating Access: Cost of Capital” (March 1999, Bowman 1999b).

In Bowman 1999b, Professor Bowman (p7) concedes that: “The generally accepted range [for the MRP] among corporate finance professionals is 5 to 7%.”

However, Professor Bowman apparently believes this professional consensus to be wrong. His view is that the MRP is in the range 6.5% to 9.5%. This range is based on the view that, because capital flows into and out of Australia are unrestricted by law, the Australian MRP equals the United States’ MRP plus a premium for country risk.

The problem with this argument is that the absence of legal restrictions on capital flows does not necessarily mean that different countries’ capital markets are perfectly integrated. Indeed, the well-known positive correlation between investment and saving rates of individual countries suggests that they are not. Professor Bowman’s conclusion that “Australian equity markets are now part of an international market place” and thus the Australian MRP is firmly anchored by the world (or US) MRP requires significantly more supporting evidence than currently exists before it can become the basis of regulatory decisions.

A further argument by Professor Bowman is that there are a number of theoretical reasons to believe that the MRP is inversely related to interest rates. When interest rates are low (as they are currently, though they were higher in 1997/98) the MRP is high. These theories are interesting but unfortunately are not confirmed by the data, certainly not for Australia. Indeed, according to Bowman and Gray (p11):

“I do not believe it is possible to use Australian historical data to meaningfully assess the time-varying properties of MRP or, more specifically, the relationship between MRP and interest rates.”

As noted in the draft report, and contrary to Professor Bowman, evidence is emerging that the MRP is shrinking. In their comments on the Draft Report, CWO state:

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“...the issue of market premium is dealt with by consensus and an acknowledgement of conservatism rather than accepting more recent evidence (accepted elsewhere in the world) that the premium is lower than previously calculated.”

CWO’s view is shared by the Independent Pricing and Regulatory Tribunal of NSW (IPART) and others. In its report of March 1999, *Final Arrangement—Access Arrangement Great Southern Energy Gas Networks Pty Limited*, IPART states:

“Having undertaken further review of the available evidence, the Tribunal is of the view that more recent studies suggest that the market risk premium has a downward trend. Having regard to this and regard to earlier studies of the market risk premium, the Tribunal considers that a range of 5–6 percent should be used in establishing the WACC range” (p55).

Offwat, the UK water regulator, has claimed that the MRP in the UK is between 2.75% and 3.75%. (Offwat, *Prospects for Prices*, October 1998).

According to a recent article in the *Economist* (“Choosing the right mixture”, February 27th 1999), the investment bank J.P. Morgan estimates that MRP in the United States at the end of 1998 was about 3%, down from the historic MRP of just over 5%. According to the article,

“Nobody knows why the premium has narrowed. Yet one big reason is probably inflation, and the big fluctuations it produces in interest rates, and hence in bond prices. Investors expect a higher return from shares than bonds because shares have tended to be more volatile. But in the past few decades that volatility gap has narrowed: at times bonds have even become as volatile as shares.”

The article goes on to speculate that in the future, modest deflation might cause the equity premium to return to its former levels. But then again, it might not. It is possible that the MRP will settle at a value different from its historical value, but with the current state of knowledge, it is impossible to predict the direction of any change, much less the magnitude. At this point in time, there is no reason to depart from the professional consensus of 6% for Australian MRP.

**Conclusion:** *The market risk premium for estimating the USO WACC in both 1997/98 and 1998/99 is 6 per cent.*

**Risk and Equity Beta (β)**

As discussed in Chapters 1 and 2 the equity β represents the degree of non-diversifiable risk faced by the equity investor, i.e. the covariance between the return on the equity investment in question and the return on a diversified market portfolio. Estimation of β is difficult at the best of times but is particularly difficult in the absence of data.

As discussed in Chapter 2, the estimation of β in the case of the USO (specifically the USO associated with the net cost areas) is complex and depends on the details of the USO scheme, including the financing mechanism, as set out in Part 7 of the *Telecommunications Act 1997* and the incidence of the USO levy on end users. Given that ACCC estimated that the range for the equity β for the PSTN is 0.5 to 0.8, and assuming the level of gearing as in *ACCC*, a reasonable range for the equity β of the USO WACC is 0 to 0.55, where:

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• 0.55=0.84*0.65;
• 0.84 is Telstra’s share of eligible revenue; and
• 0.65 is the mid–point of ACCC’s range for the equity $\beta$ for the PSTN

The lower end of the range 0.0 to 0.55 would be correct if (a) the USO provider’s contribution to the NUSC was treated as a fixed cost (and so irrelevant when evaluating a project at the margin) or (b) the contribution is relevant, but the full incidence of the USO levy falls onto end users, which would occur if telecommunications markets are highly competitive. The upper end would be correct if the financing is relevant and the full incidence of the levy falls onto the shareholders of the telecommunications carriers, including the USO provider, which would occur if telecommunications markets are not competitive. As discussed in Chapter 2 option (a) is theoretically the most plausible, implying a value of zero for beta, though a somewhat higher value cannot be ruled out.

Both Telstra and NECG, on behalf of Telstra, dispute the analysis of beta. In particular they claim that the USO levy does not lessen (much less eliminate) non–diversifiable risk. Their claims are dealt with at the conclusion of Chapter 2 of this report and are found to be either incorrect or unsubstantiated.

Conclusion: The equity $\beta$ used to estimate the USO WACC lies in the range 0 to 0.55.

Cost of Debt

ACCC estimates the cost of debt as a premium on the risk free rate, which is a standard approach. This premium reflects debt risk specific to the firm in question. As argued in ACCC, it should rise with the level of gearing and fall with the credit rating of the borrowing company. Since Telstra has both low gearing and a high rating, its debt premium should be small.

ACCC chose a debt premium for Telstra of 0.5 per cent. This implies a cost of debt for 1997/98 of 6.5 per cent, and for 1998/99 of 5.9 per cent.

Telstra argues that since the risk free rate has been chosen as an average value, over the year, then so should the debt premium. This seems to be a reasonable argument. The average debt premium for 1997/98 was (according to Telstra) $[c-i-c]$%. Debt margins appear to have risen slightly in 1998/99 and a figure of $[c-i-c]$ % is used in this report. This figure will need to be rechecked when the USO costing for 1998/99 is finally done.

Conclusion: Telstra’s cost of debt in 1997/98 was 6.6 per cent and in 1998/99 is forecast to be 6.1 per cent.

Corporate Tax Rate

The issue here is whether to use the statutory tax rate (36%) or whether an effective tax rate should be used in order to determine the required pre–tax WACC.

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55 Based on a risk free rate of 5.4% in 1998/99.
The relevant 'target' when deriving a WACC is to provide sufficient cash flow so that after taxes and interest costs are deducted, the desired post–tax return on equity is provided. This suggests that, to the extent possible, more accurate estimates of the actual tax paid (and hence the effective tax rate) are preferable.

The case for using an effective tax rate is that the owner of a long–lived asset will be able to claim a higher tax deduction early in an asset’s life in exchange for a lower tax deduction later on. This means that early in the asset’s life, the effective tax rate will be less than the statutory rate. The practical difficulty is in estimating the effective tax rate and a much cleaner method is to use the statutory tax rate in estimating the cost of capital while putting tax payments in the cash flows.

ACCC estimates an effective tax rate of 33 per cent, based on taxes actually paid by Telstra in 1997/98. However, this is not convincing, as Telstra’s income and taxes include services which fall outside the PSTN and which certainly fall outside the scope of services provided to net cost areas within the USO. The effective tax rate for Telstra as a corporate entity is therefore not necessarily the relevant effective tax rate for calculating the USO WACC.

Telstra agrees with the use of the statutory tax rate in the draft report. However, according to USORG (p6):

“ACG has used the statutory tax rate of 36%, which is above Telstra’s current tax rate. It is also likely to be well above the effective tax rate of any efficient competitor to Telstra.”

A similar view is put by Vodafone, while Professor Officer writes (p3)

“The corporate tax rate is assumed to be the statutory rate. I believe this is too high because of accelerated depreciation and similar tax advantages usually credited to heavy capital users such as Telstra. To determine a more reasonable rate one would have to analyze the cash flow in some detail and work out the distinction between economic depreciation and tax depreciation. I have no a priori knowledge other than the statutory rate would be the upper bound of such an estimate.”

In theory, Professor Officer is correct. But as noted in the Draft Report, estimating the effective tax rate is very difficult in practice. Significantly, no carrier has submitted any estimates of the effective tax rates that would apply to USO income flows given the tax treatment that applies to the types of assets used in the provision of USO services. Presumably, this is due to the difficulty of undertaking such an exercise.

In the absence of better information, the statutory tax rate remains as the preferred tax rate to be used in the calculation of the WACC. It is acknowledged that doing so does impart an upward bias to the estimated WACC.

Conclusion: In estimating the USO WACC, the statutory tax rate of 36% should be used.

Imputation factor (γ)

The WACC estimate needs to reflect the returns to private shareholders from franked dividends. Under the imputation system applying in Australia, a proportion of the tax paid at the company level is effectively personal income tax that has been withheld. The imputation factor γ lies between zero and one and in turn reflects

• the extent to which companies can pay franked dividends; and
• the value of franked dividends in the hands of the investors.

In the absence of dividend imputation (a “classical” tax system) \( \gamma \) has a value of zero. When all dividends are paid fully franked and fully valued by investors, \( \gamma \) takes on a value of one. The details of Australian tax law mean that the value of \( \gamma \) will be less than one.

The measurement of \( \gamma \) is in practice very imprecise because of the difficulty in measuring the two factors above. Market studies conducted by the Melbourne Business School indicate a value of \( \gamma \) about 0.5.

\textit{ACCC} states a preference for a range for \( \gamma \) of 0.5 to 0.8. According to \textit{ACCC}, this is consistent with recent estimates. However, the upper end of this range seems to be too high. The Office of the Regulator General, in its \textit{Final Decision} of October 1998 assumed a value of \( \gamma \) of 0.5, based on the assumption that 70 per cent of franking credits are distributed on average (and by implication that they are valued by investors at 70c in the dollar.) Since \( \gamma \) is the product of the payout ratio and the valuation ratio, it is difficult to see how \( \gamma \) could be as high as 0.8, since this would imply values for each ratio of about 0.9.

It is also important to note that the value of franking credits once distributed should be determined in the market and not be firm–specific, so restrictions on the level of foreign ownership of Telstra, for example, are not relevant. To see why, suppose it were the case that a firm had a very high proportion of foreign shareholders (who cannot claim franking credits) and \( \gamma \) for that firm was low, implying a high cost of capital and a low share price. This will then result in domestic investors, who can claim franking benefits, buying the stock with the share price rising until an equilibrium is reached where the equity cost of capital for that firm is equal to the equity cost of capital of firms with similar risk. The national composition of the shareholders is irrelevant.

According to Professor Officer (p3), “[t]he imputation credit factor of 0.5 is reasonable.” However, according to Telstra (p7), “an imputation factor of \([\text{i-c}]\% \) is more appropriate.” This figure is derived under the following assumptions:

- \([\text{i-c}]\% \) of franking credits are distributed; and
- the utilisation value by investors of the distributed portion is \([\text{i-c}]\% \) to \([\text{i-c}]\% \), and of the undistributed portion is \([\text{i-c}]\% \) to \([\text{i-c}]\% \);

The imputation factor (\( \gamma \)) is then calculated as the weighted sum of the product of the distribution ratio and its utilisation value, and the product of the non–distribution ratio and its utilisation value. The value of \( \gamma \) so derived is \([\text{i-c}]\% \).

This methodology utilises a Telstra–specific payout ratio and a Telstra–specific utilisation value to arrive at a Telstra–specific value of franking credits once distributed. In contrast, the draft report argued that arbitrage in the capital market will lead to a market–wide value of \( \gamma \). A value of \( \gamma \) which is below the market average will lead to undervaluation of the stock relative to others with the same risk characteristics, and marginal investors will consequently buy the stock until equilibrium is restored, with \( \gamma \) at the market–wide value.

Telstra appears to be accept the logic of this argument but nevertheless argues that

“However, there are a variety of rational reasons why investors would hold Telstra shares, some of these would be unrelated to ability to utilise imputation credits … Telstra has not undertaken an analysis of its share registry at this stage. However, given that Telstra has the second largest number of private shareholders there is a potential for greater representation of those who cannot fully utilise imputation credits, especially asset-rich but income-poor investors. Consequently, a market-wide estimate may overstate the true ability of shareholders to utilise imputation credits and hence the imputation factor relevant to Telstra (or the USO)” (pp 9–10).

In the absence of supporting evidence it is difficult to know what to make of this claim. It is certainly not clear why Telstra’s “asset-rich but income-poor” investors don’t sell their shares to investors who could make full use of franking credits.

Moreover, Telstra’s argument sits strangely alongside the Telstra’s Board’s recent decision to limit its dividend payout to the dividends in its franking account. According to the *Australian Financial Review* on 23 March 1999 (“Out telcos lag behind US rise”, p22), one fund manager was quoted as saying “It is a pretty odd policy that a company lets its franking account drive its dividend policy.”

Odd or not, this dividend policy would suggest that Telstra’s shareholders care a great deal about franking benefits, contrary to Telstra’s argument above.

There appears to be no compelling reason to alter the value of $\gamma$ (0.5) recommended in the draft report.

**Conclusion:** In estimating the USO WACC, a value of franking credits ($\gamma$) of 0.5 should be used.

**Adjustment for Other Factors**

As discussed in Chapter 2, the WACC for a project is the return that the project should earn on average (the expected return). For this to be true, the definition of net cash flows should represent an unbiased definition of net cash flows for that project; otherwise, the WACC will not be equal to the expected return—it could be more, or less.

Consider for example, “stranded asset risk.” In the context of the USO, this would be the risk that, if Telstra were no longer the USO carrier, it would be left with assets that had been used to provide USO services, but were now of zero economic value. It is argued that an upward adjustment to the WACC estimated via the CAPM should be made to compensate for this risk.

In response it could be argued that:

- the problem of “stranded asset risk”, if it exists, is really a problem of faster-than-expected depreciation (a project-specific, or diversifiable, risk) and as such, should be handled as an operating expenses in the cash flows; and
- in any case, even in the unlikely event that Telstra were to lose the “USO business”, the decline in the value of the assets may not be significant
  - either because they could be sold or leased to the new USO carrier; or
  - because Telstra would stay in the market and compete with the new USO carrier for basic telephony business.
However, as argued in Chapter 2, while in theory all diversifiable risks should be handled by making appropriate adjustments to the definitions of cash flows, in practice this might not happen, because the significance or even net direction of such risks are unknown, *a priori*. In practice, contemporary regulators take a conservative view and tend to make a small upward adjustment to the equity beta to account for these risks. The extent of this upward adjustment is a matter of judgment, and depends on the particulars of the case at hand.

**Stranding of Assets**

Both Telstra and the NECG (on behalf of Telstra) provided a lengthy discussion of the ‘stranded asset’ risk that a USO provider is likely to bear as a result of providing USO services in net cost areas. The conclusion reached by each is that these risks are significant, and that these risks should be compensated for through a higher WACC.

The issue of how the most appropriate mechanism for addressing these risks is discussed first and then followed by the issue of the likely magnitude of these risks.

*Compensation for ‘Stranded Asset’ Risk*

It is clear that there are two economic costs of capital associated with the provision of the USO services in net cost areas over a period, which are:

- the opportunity cost of the funds that are tied up in the assets for that period; and
- the change in the market value of those assets over that period.

The first cost is the cost of capital, and the second cost is economic depreciation. The term ‘stranded asset’ risk is then normally used to refer to the risk that the market value at the end of the period is different to the value that was projected, with the use of the term ‘stranded’ implying that the value of the assets at the end of the period is more likely to be lower than projected, rather than higher. It follows that the risk of having ‘stranded’ assets is the risk that the depreciation allowance is less than economic depreciation.

The implicit assumption that was adopted in the Draft Report was that the costing of the USO would include an allowance for depreciation that reflects the economic depreciation of assets. That is, the depreciation allowance would reflect the fall in the cost of replacing the ‘optimised’ network that resulted from changes in technology over the period, and would also reflect any reduction in the implied value of the assets that arises from a reduction in demand. The adoption of this principle for depreciation would imply that the effect of the USO fund would be to compensate the USO provider for the change in the market value of those assets over the period and so remove any ‘stranded asset’ risk from the USO provider. For example, if the introduction of a new technology leads to a reduction in the ‘value’ of the assets and this difference in value is treated as a cost of providing the USO service in net cost areas, then all of the costs of providing the USO service in net cost areas would be counted.

There are a number of additional points that are relevant in this regard.
First, the change in the market value of the assets in net cost areas is almost completely determined by how the assets are valued for the purposes of determining the NUSC. Other than those arising from regulatory decisions by the ACA, the only other source of change to the value of the assets would be where another carrier duplicated the relevant assets in the net cost area and took a substantial market share. However, the fact that net cost areas are loss making by definition, coupled with the economies of scale and scope and significance of sunk costs that are embodied in the provision of these services suggest that this risk is small.

Secondly, as the cost of providing the USO in net cost areas is assessed on an ex post basis, it has been assumed that the depreciation allowance would reflect the actual change in the value of the assets (as used by the ACA in the NUSC calculation) rather than an estimate of economic depreciation.\(^57\) To the extent that the NUSC is determined for a number of years on the basis of indexation factors, then it has been assumed that a correction at the end of the period should be used to adjust for any differences between forecast and actual economic depreciation.\(^58\) This would have the effect of insulating the USO provider from potential errors in the estimation of economic depreciation, and so eliminate even forecast error as a source of risk. The practical effect of this would be that the value of notional ‘new’ assets would be determined as at the beginning of the year 1997–98,\(^59\) and then this value would be returned to the USO provider through depreciation allowances over the economic life of the ‘new’ assets. In turn, this implies that the new estimates of asset values over time that are based on the ‘best in use’ technology would be used as a tool for guiding the quantification of depreciation.

The premise behind the above discussion is that there is little to be gained by calculating the NUSC in a way that leads to the USO provider bearing the risk associated with the forecast of economic depreciation. There would appear to be little benefit in terms of economic efficiency for requiring this risk to be borne by the USO provider. The risk is not related to any sort of market risk—it is just the product of the USO costing exercise. In contrast, if the USO provider does bear this risk then it may arguably that the bearing of this risk would require compensation (if the forecast error is associated with market wide movements in returns); however, the required level of compensation would be extremely difficult to quantify. It is noted that the Victorian Office of the Regulator–General has questioned the logic of designing a regulatory regime that leads to regulated entities bearing risks where such an allocation of risks provides no clear benefits to end–users. Indeed, in its recent decision on the access arrangements for the Victorian gas distribution businesses, the Office committed to not attempt the identify and remove ‘stranded’ asset when resetting price caps at the next two reviews. Recent consultation papers from the Office suggest that this logic will be applied also to the electricity industry.

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\(^{57}\) Note that if the depreciation allowance reflects a forecast of economic depreciation, then there is no a priori reason to conclude that there is an asymmetry associated with asset stranding. Instead the relevant risk would be risk associated with the forecast of economic depreciation, against which the ex post value could be higher or lower. Hence, stranded asset risk may be better characterised as a subset of ‘incorrect forecast of economic depreciation’ risk.

\(^{58}\) This approach is outlined in the Allen Consulting Group’s Draft Report of 19 March 1999, The “Year 1” Cost Problem: Application to the USO and Proposed Solution

\(^{59}\) The effect would be to value the existing assets at their Depreciated Optimised Replacement Cost (DORC). Other utility industries (such as electricity and gas) have used the DORC methodology to set an upper limit on asset valuations, as the value for some assets (most recently, two of the three Victorian gas distributors, the Victorian gas transmission pipeline and the Wagga Wagga gas distribution system) have been set at values below that provided by the DORC valuation.
It is clear from the above discussion, however, that if the depreciation allowance is based on an arbitrary allocation of costs over the projected life of the assets, with no regard for the changes in the asset value used in NUSC calculation (which in turn would be affected by technological change and demand movements), then the depreciation allowance may be less than economic depreciation. This would have the effect of understating the cost of providing the USO service. However, the correct response to this problem is to address the depreciation allowance that is used in the cost estimate. Indeed, as discussed above, the ‘stranded asset’ risk is, in reality, the risk that the depreciation allowance is less than economic depreciation. Thus, it is impossible to quantify any ‘stranded asset’ risk without making an assumption about the magnitude of economic depreciation and hence the difference between this and the depreciation allowance that is used in the USO costing exercise. Given this, there would appear to be little logic in the argument that it is easier or more appropriate to adjust the WACC to account for ‘stranded asset’ risk rather than to correct the depreciation allowance.

Magnitude of the ‘Stranded Asset’ Risk

NECG has also provided a lengthy discussion of aggregate population trends in rural areas and made the casual observation that this leads to the USO provider in net cost areas facing significant stranded asset risk. NECG has not, however, provided any analysis of the relationship between these aggregate population trends in rural areas and the ‘optimised’ cost providing the USO service in net cost areas.

In network industries, it is commonly the case that large changes in the aggregate demand for a service will have far less than a proportionate effect on the ‘optimised’ cost of providing the service. This is the outcome of the presence of significant economies of scale and scope in the provision of these services. This would suggest that the relationship between the ‘optimised’ cost of providing USO services in net cost areas and the aggregate population trends, which are presented as key drivers of economic depreciation, does require careful analysis.

For example, in relation to the cost required to serve a particular rural centre, provided that the centre remains in existence, then it is likely that the assets that make up the local exchange would still be required in the optimised network, and which would be of similar cost (due to the significance of fixed costs in these costs). Similarly, the ‘optimised’ number of public telephones would probably be required also. Lastly, the copper wire from the local exchange to the individual houses would continue to be required provided that any members of the household remain there and continue to take a service (which, given the isolation of country areas, any household would continue). Following this logic, it is possible that even a significant movement in aggregate demand may have only a small effect on the optimised cost of providing the service.

It is clear, however, that if there are houses in rural areas and indeed whole rural areas that are being left unoccupied, then the population movements in these areas will affect the ‘optimised cost’ of providing the USO services in net cost areas. And, as discussed above, this is economic depreciation that needs to be factored into the depreciation allowance that is used in the calculation of the NUSC. However, if actual changes in the asset values are used to establish the depreciation allowance, then any debates about the magnitude of economic depreciation (and the drivers of this) become less significant.
TELSTRA’S USO WACC

Adjustment of the WACC

Thus, allowances for economic depreciation, which can be calculated on an *ex post* basis, should obviate the need to also adjust the WACC. However, as recommended in the Draft Report, emerging regulatory practice is to make an upward adjustment to the WACC to account for diversifiable risks (which would include the risk associated with the forecast of economic depreciation) which have not been captured in the cash flows. The difficult issue is how large should be this adjustment. The Draft Report ultimately recommended that, to account for non-quantifiable diversifiable risks, a WACC of 9% for 1997/98 be adopted, 1.8% above the theoretically preferred WACC of 7.2%.

This approach was criticised by Professor Officer, according to whom (p3):

“There is some discussion of stranded asset risk and where it should be taken into account. In general, this is more appropriately taken into account in the cash flows and not in the cost of capital. However if it is taken into account in the cost of capital it should not be an ad hoc judgement. It should be estimated through the cash flows and the cost of capital adjusted. Insofar as stranded asset risk is not related to systematic risk, it is inappropriate to adjust beta.”

According to Telstra, one theoretically sound (i.e. not *ad hoc*) way of estimating the margin that should be added to WACC to account for diversifiable risks is via a model which estimates the option value of delaying investment, which may be significant if there are significant down-side asymmetric risks. This “real option” model estimates the actuarially fair insurance premium to account for this risk, as an equivalent premium on WACC.

According to Telstra, the margin relevant for the PSTN is 18% i.e. the WACC should be multiplied by 1.18. This implies that the WACC for 1997/98 should be $1.18 \times 7.2\% = 8.5\%$, which is 50 basis points below the WACC recommended in the Draft Report of 9%.

The estimated premium of 18% is for the PSTN, not the USO. Telstra goes on to claim (p22) that

“…given the broad similarities between the USO and the PSTN, it is likely that a similar magnitude adjustment would be required in the USO context. The greater operating leverage in the USO context may even suggest a higher ratio.”

By “greater operating leverage”, Telstra presumably is saying that fixed costs are a higher proportion of total costs in the provision of USO services than in the PSTN taken as a whole. This assertion might be true but is unsupported by any facts in Telstra’s comments. Assuming it is true, however, the implied premium that would multiply the theoretically preferred WACC of 7.2% to the recommended WACC of 9% is 25%. This is more than one-third greater than Telstra’s estimated premium of 18% for asymmetric risks associated with the PSTN, and it should amply account for any differences in operating leverage, or other relevant factors. The Draft Report described the upward adjustment of the WACC of 1.8% as taking a conservative view. The fact that ‘stranded asset’ risk can be accounted for *ex post* in allowances for economic depreciation coupled with the evidence provided by Telstra’s real options model, confirms this view as conservative.

However, as pointed out in Chapter 1, estimation of the WACC for the USO requires a good deal of sound judgment, especially since many of the parameters are not known with certainty. As such, upward adjustment of the WACC by as much as 1.8% is prudent and justified.
Conclusion: While, in principle, no adjustment to the equity beta needs be made to the WACC to allow for “stranded asset” risk, or other diversifiable risks, it may be prudent to adjust the equity beta to allow for the miscellaneous project risks in the provision of USO services whose actuarial cost has not been captured in the cash flows.

Telstra’s USO WACC for 1997/98 and 1998/99

Table 3.2 shows the parameter values and the implied post– and pre– tax WACC.

### Table 3.2
CAPM Parameters and WACC for the USO

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Gearing Ratio</td>
<td>0.101</td>
<td>0.101</td>
</tr>
<tr>
<td>Risk Free Rate</td>
<td>6.0%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Market Risk Premium</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Equity Beta ($\beta$)</td>
<td>0.0–0.55</td>
<td>0.0–0.55</td>
</tr>
<tr>
<td>Cost of Debt</td>
<td>6.6%</td>
<td>6.1%</td>
</tr>
<tr>
<td>Corporate Tax Rate</td>
<td>36%</td>
<td>36%</td>
</tr>
<tr>
<td>Imputation Factor ($\gamma$)</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Post Tax WACC</td>
<td>4.6%—6.9%</td>
<td>4.2%—6.5%</td>
</tr>
<tr>
<td>Pre Tax WACC</td>
<td>7.2%—10.8%</td>
<td>6.6%—10.1%</td>
</tr>
</tbody>
</table>

Source: Allen Consulting Group analysis

The range for $\beta$ defines the range for the WACC. As discussed in chapter 2, the range for $\beta$ will depend on how the effect of the USO regime on investments in net cost areas is interpreted, and under one scenario, on the level of competition in telecommunications markets. In particular, if it is considered that the USO provider is likely to interpret its contribution to the USO fund as a fixed cost, then a beta towards the low end on the range is appropriate. In addition, even if it is not treated as a fixed obligation, then the final beta will depend on the level of competition in the telecommunications markets—with more competitive markets justifying a lower beta. In practice, the overall extent of competition in telecommunications is difficult to judge; some markets appear to be reasonably competitive (e.g. for ISPs), while others are not.

The case for choosing value of the equity $\beta$ towards the low end of the range appears to be stronger than towards the high end. However, as discussed earlier, an upward adjustment to $\beta$ to allow for diversifiable risks that are not in fact captured in the cash flows, as well as other miscellaneous factors not captured in the analysis, is consistent with contemporary regulatory practice. It seems reasonable to take a mid–point of the WACC ranges, implying a pre tax WACC of 9.0% in 1997/98 and 8.3% in 1998/99.

Conclusion: The Pre Tax WACC relevant to calculating the cost of the USO was 9.0% in 1997/98 and is 8.3% in 1998/99.

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60 Not all such factors will lead to an underestimation of the WACC. Some will tend to overestimate it. These include the use of the statutory corporate tax rate in the WACC formula and the absence of any accounting for the marketing benefits that Telstra receives from being the USO provider.
NECG also claimed that the independent Victorian regulator, the Office of the Regulator–General, has allowed higher rates of return to electricity distribution businesses in country areas. This, it is claimed, provides precedent that country areas are more risky than urban areas.

NECG’s claims have no basis in fact. The Victorian Office of the Regulator–General had no role in the determination of the current price controls for the Victorian electricity distribution businesses. Rather, the existing price controls were determined by the Victorian Treasury in the context of the sale of those assets. In addition, as the Office’s recent decision on the price controls for the gas distributors reduced the target rate of return that was proposed by the Victorian Treasury from 10.16% (in real, pre tax terms) to 7.75%, it would appear that the views of the Victorian Treasury are not a reliable indicator of the views of the regulator. Indeed, in a recent consultation paper for the electricity distribution price review, the Office noted that it “intends to view the basis for such differentials” suggesting that it would appear to question the logic of having a higher rate of return for country areas.61

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Appendix A

Critique of Telstra’s WACC Estimates

ACA Note:

Appendix A has been removed from this report in response to Telstra claims that it contains Telstra commercial-in-confidence information. Four pages of analysis have been removed.
Appendix B

Overseas Practice

As far as the consultants are aware, no telecommunications regulator overseas has calculated the cost of capital in evaluating the cost of universal service. As documented by Richardson and McCutcheon, telecommunications regulators have begun to use the CAPM framework more extensively to evaluate the cost of capital for telecommunications generally.

The United Kingdom

In a consultative document in 1995, Oftel derived ranges for BT’s cost of capital using CAPM. These ranges were 9.2%–13.4% for the pre–tax nominal WACC and 7.5%–11.0% for the post–taxs nominal WACC. Oftel has since refined its methods and its estimates but the principle of using CAPM seems to be entrenched.

Canada

In a 1998 decision, the CRTC, using CAPM, estimated a pre–tax, nominal equity cost of 11.0 per cent as the benchmark rate for the cost of equity, and limited the average common equity base to a maximum of 55% for carriers’ utility segments.

United States

Traditionally, regulators in the United States have preferred DCF methods to CAPM in estimating the cost of equity. However, in 1995 the FCC determined that it would not be prescriptive in determining how the cost of equity for the LEC’s interstate services should be determined. In October 1998, the FCC sought comment on the use of DCF and CAPM methods for estimating LEC’s cost of equity, and on the methods to estimate the parameters in each model.

\[^{62}\text{Op cit, pp5–9.}\]