

Appendix C

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Report on “Asset Beta and Cost of Capital for Australia Post”

Prepared for the ACCC by

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This report reviews the information provided by the ACCC and Australia Post relating to the weighted average cost of capital for Australia Post and provides comments, as requested, on the choice of asset beta, and other relevant factors. In preparing this report I have had access to the following documents provided by the ACCC:

1. Submission by Australia Post to ACCC “Revised Australia Post Draft Notification of change in pricing” 28/05/2002 <http://www.accc.gov.au/fs-transport.htm>
2. “Weighted Average Cost of Capital” confidential document setting out Australia Post’s approach to determination of a cost of capital. This document refers to parameters chosen on the advice of PWC, but gives relatively limited information regarding the basis for the choice of those parameters.

I have also drawn on other sources of publicly available information as documented in this report.

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1 Background

Because Australia Post is a government owned entity without listed share capital, several complications (additional to those normally encountered) arise in estimating its cost of capital. These include

- (a) absence of stock market return history which could be used for a direct estimation of systematic risk (beta)
- (b) appropriate treatment of imputation credits
- (c) appropriate capital structure
- (d) determination of the cost of debt

2 WACC Formula

Before considering the specific issues related to Australia Post, it is relevant to examine the assumptions made in their document about more general market parameters and cost of capital estimation.

The ACCC has outlined the inputs to the post tax nominal WACC in its Post Tax Revenue Model Handbook and Spreadsheet (available at <http://www.accc.gov.au/gas/fs-gas.htm>).

Under a system of dividend imputation the formula which has been used in practice for calculating the WACC is one originally derived by Professor R Officer which incorporates the effect of imputation credit valuation ().

$$WACC = \frac{E}{D+E} K_e \left[\frac{1-t_c}{1-t_c(1-g)} \right] + \frac{D}{D+E} K_d(1-t_c) \quad [1]$$

I note that Australia Post state that they use a post tax WACC formula of the form

$$WACC = \frac{E}{D+E} K_e + \frac{D}{D+E} K_d(1-t_c) \quad [2]$$

which implicitly assumes $g=0$, although they indicate an assumed value for the value of imputation credits of $g=0.3$. Using their assumed values, the following Table confirms that their estimate of a post tax WACC of 9% is one assuming zero value for

imputation credits. If imputation credits are valued at $\tau = 0.3$, the post tax WACC estimate using Australia Post assumptions and equation [1] above is 8.2%.¹

Several of the assumptions made by Australia Post are at variance with those which have become conventional in the regulatory approach used in Australia in recent years. Specifically, they assume a market risk premium of 7% compared to 6% or lower, and a value of imputation credits of $\tau = 0.3$, compared to $\tau = 0.5$ or higher. I have separately, in previous work for the ACCC, provided evidence and references that support use of a MRP estimate of 6% or lower and a τ estimate of 0.5 or higher.

Their assumption of gearing $[D/(D+E)]$ of 30% is lower than that applied to other utilities, but as discussed below does not seem unreasonable. (I note that given the assumption that there is a tax shield arising from interest payments on debt (due to assuming $\tau < 1$) the lower gearing reduces the WACC estimate). Similarly, the use of the 10 year bond rate as the risk free rate does not seem unreasonable given the time between this and the previous price adjustment.

I note also that Australia Post appear “back out” a debt beta estimate from the CAPM model using $\beta_d = [r_d - r_f] / \text{MRP}$, where r_d is the yield to maturity on debt. This is not appropriate (although commonly done) since the CAPM refers to expected returns. However, alternative assumptions about the size of the debt beta tend to get “washed out” in the overall WACC calculation due to offsetting implications for the size of the equity beta given an assumed asset beta. Hence it is not an issue which is material.

Using conventional assumptions for the MRP (of 6%) and τ (of 0.5) gives a post tax WACC of 7.33%.

¹ The two estimates of the equity beta are derived from the asset beta using the alternative formulae of $\beta_e = \beta_a + (\beta_a - \beta_d) \{1 - [r_d / (1+r_d)](1 - \tau)\} D/E$ and $\beta_e = \beta_a [1 + (1 - \tau)(1 - \beta_d) (D/E)] - \beta_d (D/V)$

There is little difference between the alternative leverage adjustments.

Table 1: WACC Estimates

| | Australia Post | Source | Conventional Assumptions |
|---|----------------|------------|--------------------------|
| Risk Free Rate | 6.00% | Assumed | 6.00% |
| Market Risk Premium | 7.00% | Assumed | 6.00% |
| Asset Beta | 0.55 | Assumed | 0.55 |
| Debt Beta | 0.04 | Calculated | 0.05 |
| Equity Beta (a) | 0.72 | Calculated | 0.74 |
| Equity Beta (b) | 0.76 | Calculated | 0.76 |
| Cost of Equity (re) | 11.06% | Calculated | 10.41% |
| %Equity (E/V) | 0.7 | Assumed | 0.7 |
| Cost of Debt (rd) | 6.30% | Assumed | 6.30% |
| % Debt (D/V) | 0.3 | Assumed | 0.3 |
| Gamma (γ) | 0.30 | Assumed | 0.50 |
| Tax Rate (T) | 0.30 | Assumed | 0.30 |
| <i>WACC components</i> | | | |
| $re \left[\frac{(1-T)}{(1-T(1-\gamma))} \right] [E/V]$ | 0.069 | Calculated | 0.060 |
| $rd[1-T][D/V]$ | 0.013 | Calculated | 0.013 |
| WACC (Officer formula) | 8.19% | Calculated | 7.33% |
| WACC (Classical formula) | 9.07% | Calculated | 8.61% |

3 Techniques for Estimating the Cost of Capital

The cost of capital is the rate of return which financial stakeholders in the entity require to compensate for the risk associated with their investment. A principle of modern finance theory is that only non-diversifiable (or systematic) risk is reflected in the cost of capital, since investors cannot expect to be compensated for risks which can be costlessly avoided by diversification.

Because the cost of capital cannot be directly observed, it is necessary to utilise various techniques, none of them without fault, to estimate it. In practice, the weighted average cost of capital (WACC), which combines required returns of all providers of finance to the business, is the focus of attention. Generally, this is calculated by first estimating the required rate of return for each type of investor and then taking an appropriate weighted average. Although there may be many types of hybrid instruments used in modern financing structures, the common approach is to focus on straight debt and equity financing and take a weighted average of those two items.

Estimating the Cost of Equity

In a competitive market, the average return provided to investors should, in the long run, equal the cost of equity capital. This suggests that observing achieved accounting

rates of return in an industry over some reasonably long period might provide guidance to required returns. Unfortunately, it is well known that (a) accounting rates of return do not provide reliable estimates of economic rates of return – even as long term averages, and (b) that required rates of return vary through time.

Since required rates of return are “market based” figures, it is typical to extract cost of equity estimates from financial market prices. This requires some theory of required returns. Commonly the Capital Asset Pricing Model is used, and the cost of equity capital derived from the relationship:

$$R_i = R_f + \beta_i \text{ MRP}$$

Where:

R_i is the cost of equity capital for stock i

R_f is the risk free rate of interest

β_i is the estimate of the systematic risk (beta) of stock I

MRP is the *market risk premium* (the expected return on risky assets in excess of the risk free rate).

In this framework, it is clear that there are three parameters (R_f , MRP, and β_i) requiring estimation. Since the risk free rate and MRP parameters have been discussed above, the focus in the following will be upon determination of β_i .

Beta estimation

Where historical data on stock returns are available, the historical beta of a stock can be estimated directly using the statistical technique of regression analysis. However, because such an estimate is historical, rather than forward looking, it can reflect trends and peculiarities of the historical period and stock concerned, as well as significant measurement error. Also betas do change over time. Hence this approach is typically eschewed in favour of deriving a beta estimate from a portfolio of comparable companies – where those effects are likely to be somewhat muted. This assumes that the “comparable companies” chosen will have similar risk characteristics.

One difficulty with this approach is that companies engaged in comparable activities may have quite different financial structures, such that the risk characteristics of their

equity might differ as a result. Consequently it is necessary to adjust equity beta estimates from comparable companies for the effect of leverage. Typically this is achieved by calculating an *asset beta*, which is an estimate of systematic risk applicable if the company were operating on an unlevered basis.

Australia Post have adopted, on the advice of PWC, an asset beta of 0.55. It would appear that this estimate is based on using electricity, gas and water utilities as comparable companies, and the suggestion is given that UK data was seen as particularly relevant (rather than that of the US).

The rationale for the choice of these utilities as appropriate comparators is not outlined in the documents available. However, such a choice could be based on observed similarities in the relevant fundamentals of the industries, including *inter alia* such characteristics as: operating leverage, covariance of industry demand with aggregate demand or stock market returns, longevity of assets and forecast cash flow patterns, applicable regulation, growth opportunities. In essence, this fundamental approach suggests that the beta for any activity can be expressed as some stable function of such characteristics, such that industries similar in terms of these characteristics will have similar systematic risk. Several studies have demonstrated that, under specific assumptions, such an approach can be justified.²

Note, however, that beta relates to market based returns and the influence of these factors is via their effects on stock market price movements. Thus, the similarity relates ultimately to high covariance in investors' expectations of future cash flows across the industries (as might arise if all had demand similarly responsive to aggregate economic activity), or in discount rates applied to those expected cash flows.

Australia Post suggest that there are reasons for believing that the asset beta might be somewhat higher than this estimate. One reason given is the volatility of the advertising market, where it is suggested that the beta of any industry dependent upon it will be higher. This argument appears to equate volatility and systematic risk, whereas the latter is determined by covariance with market returns rather than volatility *per se*. It is difficult to assess this argument without further information.

² A recent study of this type is R Lord and W Bernaek "Operating Characteristics and Operating Risk: Additional Empirical Evidence" *Quarterly Journal of Business and Economics*, 38,3, Summer 1999, 41-50.

Unfortunately, there is not a large group of listed companies available whose activities closely resemble that of Australia Post and which could thus be used as comparators. Nevertheless, it is possible to identify some such companies, as well as derive some relevant information from other sources. Here, the difficulty arises that the activities of such companies, and that of Australia Post, span several business segments. To the extent that there is no systematic risk difference across those segments, use of a company level beta estimate is appropriate. However, if there are significant differences across business segments, it would be appropriate (if feasible) to estimate separate betas for each segment.

Table 2 provides relevant, but imperfect, information on a number of companies which might be thought comparable, to some degree, to Australia Post. There are, to my knowledge, only two listed companies internationally which resemble Australia Post as companies involved in the reserved business of letters and postage stamps (which is the segment being addressed here) as well as other transport and logistics activities. One is Deutsche Post AG (ticker code DPW) listed after an IPO in 2001. The directly estimated equity beta is therefore, because of the short historical data available, of limited reliability. The other is TPG (Netherlands) which was initially privatised in 1989 and shares in TPG were listed in June 1998.

Other companies which conduct business which could be regarded as, to some degree comparable, include UPS and FedEx – both listed in the USA. Cosignia, in the UK would appear to be comparable, but currently is a government owned entity. Nevertheless there have been assessments of its systematic risk by third parties for the regulator PostCom. US Post which conducts similar business is also government owned, and while there is substantial information available about the business on the regulator's web site <http://www.prc.gov>, there are no attempts that I am aware of to calculate a cost of equity capital for the business.

The data in Table 2 is, at best, indicative. The equity betas, particularly for TP and DPW have not been verified directly. The gearing figures use book value data rather than market value. The delevering formula used is a simple one ignoring tax effects and using book data (given the imprecision of other parameters and the possibility of using several alternative approaches). The estimate of Cosignia's asset beta is taken directly from a report for PostCom by Professor Anthony Steele which quotes a prior estimate by Andersen consulting.

Table 2: Indicative Asset Beta Estimates^a

| Company | Equity Beta | Gearing | Asset Beta |
|---------------------|------------------|---------|--------------------|
| UPS ^b | 0.64 | 0.32 | 0.43 |
| Fed Ex ^c | 1.04 | 0.26 | 0.77 |
| TP ^d | 0.8 ^e | 0.42 | 0.46 |
| DPW | 0.6 ^e | 0.3 | 0.42 |
| Consignia | | | 0.842 ^f |

a. The asset betas presented here are derived from the equity betas using a simple delevering formula ignoring tax effects.

b. Data source. <http://www.shareholder.com/ups/marketguide.cfm>

c. Data source. <http://www.fedex.com>, <http://quote.bloomberg.com/>

d. Data source. <http://www.tpg.com>

e. Data source.

<http://www.postcomm.gov.uk/documents/competition/Andersen%20report%20-%20RESPONSE%20-%20final.pdf>

f. Data source.

http://www.postcomm.gov.uk/documents/competition/OXERA_letter.pdf

On the basis of this, admittedly, highly imperfect information, the assumption of an asset beta of 0.55 made by Australia Post does not appear to be unreasonable.

Gearing

Estimates of an appropriate gearing ratio may be influenced by that seen elsewhere.

For Deutsche Post, there are difficulties in accurately assessing the gearing ratio, since current liabilities from financial services and receivables from financial services dwarf longer term balance sheet numbers. However, the ratio of financial liabilities / (financial liabilities plus equity) provides a “ball park” estimate of gearing ($D/(D+E)$). At December 2001 this ratio was $(2308/(2308+5353)) = 30\%$.

For TPG (Netherlands) the ratio of long term liabilities / (long term liabilities plus equity) also provides a “ball park” estimate of gearing ($D/(D+E)$). At December 2001 this ratio was $(1789/(1789+2499)) = 42\%$.

For UPS (USA) the book value of Long Term Debt/ Equity = 0.46, giving $D/(D+E) = 0.32$

For FedEx, Long Term Debt = 2.1 bill, Equity 5.9 bill, both measured as book values, giving, Long Term Debt/ Equity = 0.36, Gearing ($D/(D+E)$) = 0.26

These comparisons, as approximate as they are, suggest that Australia Post's assumption of a gearing of 30% may not be unreasonable, nor out of line with similar organizations internationally.

4 Conclusions

- Australia Post's specific assumptions for gearing (of 30%) and an asset beta of 0.55 do not appear to be unreasonable on the available evidence.
- Their assumptions about the MRP and value of franking credits do not appear to be warranted.
- The WACC formula used by Australia Post appears to ignore the value of franking credits completely.
- Using "conventional" values for the MRP and and Australia Post's gearing and asset beta values and the commonly used WACC formula gives a post tax WACC estimate of around 7.3% rather than the 9% provided in their report.

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