

Memorandum

DBCT User Group

Comments on the Lally CAPM model

14 April 2004

Introduction

The purpose of this short paper is to comment on the approach suggested by Assoc Professor Martin Lally in his report to the QCA entitled *The Cost of Capital for Regulated Entities*. This note focuses on the version of the capital asset pricing model (CAPM) developed and propounded in that paper.

In essence, Lally's approach involves explicitly incorporating tax issues in the discount rate (that is the cost of capital) under the CAPM. There are three principal difficulties with this approach:

- there is an absence of empirical support for the model;
- it is fundamentally inconsistent with the normal characterisation of the CAPM model; and
- it requires unrealistic assumptions to be made in order to make the approach possible.

In this note, we deal with these issues in turn. This is followed by a brief consideration of the policy implications of this issue in the context of the draft undertaking submitted by Prime Infrastructure (DBCT) Management Pty Ltd.

Empirical evidence

It is acknowledged that it is theoretically possible to incorporate taxes into the CAPM framework. Indeed, there have been several attempts over time to incorporate differential tax impacts into the consideration of the cost of capital. As Lally recognises, one of the first attempts to do so was Brennan's model (which requires

dividend certainty and operates in a single period model during which trade cannot occur).¹

However, in the 30 years since this article was published there has been an absence of empirical evidence to support its application. The position is summarised in a leading textbook as follows:²

financial theory indicates that the expected return on a security should be related to its dividend yield. Although this issue has been researched thoroughly, the empirical results are not generally consistent with each other. On the one hand, Brennan as well as Litzenberger and Ramaswamy find a positive association between expected pre-tax returns and dividend yield. In particular, Litzenberger and Ramaswamy find that a 1% increase in dividend-yield requires an extra 23% [should be 0.23%] in expected returns. On the other hand, both Black and Scholes and Miller and Scholes find no relationship between expected pretax returns and dividend yield. It is surprising that the results of such high quality research can be so contradictory. One can only hope that the ambiguities will be cleared in the future.

There have been several attempts over the intervening years to resolve this ambiguity. More recently, Naranjo, Nimelendran and Ryngaert (1998) investigated US data between 1964 and 1994 and concluded that:³

Using implied tax rates from the bond market, we find that the size of the yield effect appears unrelated to the level of the implied tax rate, and hence the potential for tax penalty from receiving taxable dividend income. We also examine shocks to the implied tax series. To the extent that it is costly for high yield firms to

¹ See Brennan M (1970) "Taxes, Market Valuation and Corporate Financial Policy," National Tax Policy, 23 December, 417-427 and Brennan (1971), "Capital Market Equilibrium with Divergent Borrowing and Lending Rates," Journal of Financial and Quantitative Analysis, December, 1197-1205.

² Ross, S., R. Westerfield, and J. Jaffe, 1999, Corporate Finance, 5th ed., New York, NY, Irwin McGraw-Hill. See also Black, F. and M. Scholes, 1974, "The Effects of Dividend-Yield and Dividend Policy on Common Stock Prices and Returns," Journal of Financial Economics 1(1), 1-22; Miller, M. and M. Scholes, 1982, "Dividends and Taxes: Empirical Evidence," Journal of Political Economy 90(4), 1118-1141 and Litzenberger, R. and K. Ramaswamy, 1982, "The Effects of Dividends on Common Stock Prices: Tax Effects or Information Effects?" Journal of Finance 37(2), 429-443.

³ Naranjo A., Nimelendran M. and Ryngaert M. (1998) "Stock Returns, Dividend Yields, and Taxes", The Journal of Finance, vol 53, No 6, pp 2029-2057 (at 2054). See also, Allen F, and Michealy R (2002), "Payout Policy", Wharton Financial Institution Center, Working Paper 01-21-B, pp 22-36; available at <http://fic.wharton.upenn.edu/fic/papers/01/p0121.html>

change dividend policy, we would expect that an unanticipated increase in the implied tax rate would lead to worse performance for higher yielding stocks. We find no such result.

The fact that such a relationship cannot be established is all the more compelling when considering the relevance of this evidence to Australian conditions. This is because the US operates under a classical taxation system (essentially involving the double taxation that imputation in Australia avoids). In such an environment, one would expect that tax effects would be more pronounced than in Australia (if such a relationship could in fact be established). It is also noted that Dr Lally has not supplied any empirical support for the model that he has recommended to the Authority.

Traditional characterisation of CAPM

Traditionally, the CAPM has been applied to realised returns on a post corporate but pre-personal tax basis.⁴ This means that the application of the CAPM and the estimation of the relevant parameters of the model can be conducted in a manner which is indifferent to the composition of returns between dividends and capital gains. It is also consistent with the tax position underpinning almost all capital market transactions.

Because the CAPM model is specified in after corporate but pre personal tax terms, it can be applied throughout the world and, within that context, has proven to be a relatively simple and reliable means of estimating the expected cost of capital. It has been applied to a range of tax environments in different jurisdictions.

Moreover, the specification of the parameters under the CAPM framework and the generality of its application are not affected by changes in tax positions over time (such as where there is a change to the rate at which capital gains tax is assessed for shareholders).

However, this is not the case under the approach proposed by Dr Lally. We do not observe transactions that provide a proper basis for estimating the parameters necessary for the application of the approach advocated by Dr Lally. This is why Dr Lally *must* make the assumption of the tax position of the average shareholder being the relevant criterion for assessing capital market returns and impacts, an issue to which we now turn.

⁴ Hence, the adjustment for imputation credits (which represent a prepayment of personal taxes at the corporate level) in the version of the CAPM that is currently applied by the Authority.

Assumptions

It is well known that one of the assumptions underpinning the original formulation of the CAPM is the existence of perfect capital markets. One of the defining characteristics of a perfect capital market is the absence of taxes – a condition that no version of the CAPM can meet. This is complicated by the fact that differing taxes apply to the various components of a realised return (namely dividends and capital gains).

The informational difficulties that arise under the approach proposed by Dr Lally requires the adoption of assumptions that are not consistent with the theory of price formation in capital markets. Specifically, Dr Lally's approach assumes that the price in the market is established by the average rather than the marginal investor.⁵

This assumption breaches the fundamental tenet that prices are determined by the marginal investor rather than the “average” investor. The significance of this assumption cannot be overstated – the importance of the marginal investor or user setting the price for a commodity in economics has formed a cornerstone of economic analysis ever since Jevon's first recognised the issue in 1860 when he wrote:⁶

The common law is that demand and supply of labour and capital determine the division between wages and profits. But I shall show that the whole capital employed can only be paid for at the same rate as the *last portion* added; hence it is the increase of produce or advantage, which this last addition gives, that determines the interest of the whole.

In other words, Lally's approach elevates infra-marginal impacts to the status of marginal (and hence price determinative) effects. Lally's assumption will only be satisfied where the investors in a particular firm exhibit a homogenous tax position – a situation that is most unlikely in practice.

In so doing, Dr Lally ignores the critical consideration that an efficient allocation of resources in an economy requires the calibration of the marginal rates of substitution – it is only through this process that the price will clear the market. Calibrating average rates of substitution will not yield an efficient allocation of resources.

⁵ Page 18. A related assumption is the segmentation of capital markets.

⁶ Letters and Journals of W Stanley Jevons, Edited by his wife, p155 quoted in Young, A (1912), “Jevons theory of Political Economy”, *American Economic Review* Vol 2 No 3 pp 576-589 (emphasis in original).

Finally, applying the Lally approach to valuation issues introduces circularity, as recognised by Bowman and Marsden:⁷

The market value of a company's equity is used in determining the term [dj] (dividend yield) in the cost of equity calculation and hence the determination of WACC. The market value of equity is also used in determining the market value of the company. This circularity cannot be avoided by assuming a constant (target) leverage ratio.

Implications for the assessment of tax for the Terminal

It is well known that the tax efficiency of financing and corporate structures is a significant competitive dimension in asset sales processes. The QCA's Statement of Regulatory Principles developed in conjunction with the leasing of the Dalrymple Bay Coal Terminal (the Terminal) contained explicit guidance as to the QCA's intended approach to the treatment of taxation in subsequent regulatory processes. The Statement indicated that the Authority would adopt a 50:50 sharing of tax benefits between Users and the lessee of the Terminal.

The QCA's approach seems to have intended that Users would partially benefit from the tax savings enabled by the privatisation process, whilst recognising that the retention of one half of the benefits from the adoption of a tax efficient structure would be retained by the successful bidder. This provided the bidders with sufficient incentive to pursue tax efficient structures.

In turn, it could reasonably be expected that the retention of tax benefits would have been capitalised into the purchase price for the lease of the Terminal (at least to a substantial degree). This is the inevitable outcome of the competitive bidding process through which the lease was effected.

In other words, all other things being the same, the prospect of the retention of one half of these tax benefits would have resulted in a potentially significant premium being paid for the asset (the lease of the Terminal) when compared against, for example, a valuation based on the depreciated optimised replacement cost (DORC) of the Terminal. The issue therefore arises as to how the benefits from the tax efficient financing structure adopted by Prime ought to be addressed in practice for regulatory purposes.

⁷ Bowman R and Marsden A, (1996), "Cost of Capital under Imputation: An Analysis of Comparative Models", New Zealand Investment Analysis, pp27-32.

It is understood that the structure that has been adopted by Prime involves investors securing a stapled security involving units in a trust (99% of the investment) as well as a share in a company (1% of investment). It is understood that the trust does not earn taxable income – and as such no corporate tax is payable at this level (although in time, personal taxes may be payable on capital gains arising from the income stream created through distributions from the trust). It is understood that profits from the company are subject to tax and dividend imputation in the normal way. As such, this would appear to provide Prime with some discretion over the incidence of taxation.

A key point that emerges from the above outline of the structure is that the revenue earned by the trust will *not* be subject to *corporate* tax. It is recognised that investors in the trust may become subject to capital gains tax over time, but such taxes are *personal* taxes as opposed to *corporate* taxes. Accordingly, under the traditional CAPM model, such taxes are not relevant for consideration – to all intents and purposes, for the application of the traditional CAPM model discussed above, the trust is a tax exempt entity for so long as it is not subject to the incidence of corporate tax.

In light of this structure, it is suggested that in order to achieve a true 50:50 sharing of tax benefits, the following considerations are relevant:

- the sharing should be based on the net present value of the tax savings since the Terminal was leased – so that the Users should benefit from the tax benefits already secured. This would extend to any tax benefits earned in foreign jurisdictions from either the tax efficient structures adopted by Prime or any subsequent transactions undertaken. These could be passed to Users through a one-off adjustment to the opening asset valuation for the Terminal from 1 July 2004 based on the then current value of the savings (ie increased with the discount rate for the period in which they have been retained);
- the approach should take account of the most efficient reasonable application of the tax savings available to the lessee of the Terminal in the future. In other words, it is a legitimate expectation that the trust will continue to provide the vehicle for the distribution of returns to unitholders and that as such no corporate tax will be payable by the trust; and
- the basis of comparison from which prospective savings would be assessed should be the tax position of an investor in the Terminal without such a structure (ie one in which corporate tax is payable on taxable income after accounting for the impact of dividend imputation).

The difference between these latter two positions should then be shared equally between Prime and the Users. In practice this suggests that the appropriate tax rate to be applied to the regulation of the Terminal for regulatory purposes will be one half of the tax rate that would otherwise be applied under the Authority's processes (after allowing for the effects of imputation).

Concluding comment

Dr Lally's approach involves explicitly incorporating tax arrangements into the assessment of the cost of capital. Its adoption requires the application of largely unobservable parameters into a model that has never been demonstrated to exhibit superior performance to the accepted application of the CAPM and which requires the adoption of untenable assumptions to be valid.

The finance community has never accepted that there is a level of improved performance in these models sufficiently to justify the difficulties and data deficiencies its adoption would entail. As such, there does not appear to be any merit in its adoption - a situation which would require the displacement of a generally applied and well accepted model.