VALUATION AND THE COST OF CAPITAL

by

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Capital cost estimates based on the capital asset pricing model and their usefulness in financial evaluations are widely accepted in the Australian securities industry. This short article reports on the increasing acceptance outside the industry of market derived capital cost estimates and some of the problems encountered with their use.

INTRODUCTION

Estimates of the cost of equity capital based upon the concept of systematic risk or beta are familiar to securities analysts and most practitioners in the industry. Beta estimates are readily available from data files maintained by institutions such as the Australian Graduate School of Management and other universities and will shortly be available from the Stock Exchange. Such estimates, when combined with estimates of the risk-free rate of return and the market risk premium within the capital asset pricing framework, provide a useful, market based indication of the cost of equity.

This approach to measuring capital cost is now attracting more attention beyond the securities industry. Since March 1982, beta based estimates of the cost of equity for major sectors of the Australian market have regularly been published in the Australian Financial Review. The feedback received suggests that there is a keen interest in the concept among financial managers in industry and to cater for this, a number of one-day seminars have been held on project valuation and the cost of capital.

The seminars have proved to be a useful learning exercise in the discussion and justification of the validity of quite complex ideas to those who often have had no formal background in finance. It is possible to see how people outside the securities industry tackle financial evaluation problems and the kinds of errors that sometimes occur.

MARKET VALUE

In principle, if market based estimates of capital costs are used to discount reasonably expected cashflows, then the values obtained should correspond to market values. In fixed interest markets, for example, the market value of a bond is exactly equal to the present value of the cash inflows associated with that bond, discounted at its redemption yield. The same result should be expected in equity markets but calculated present values often seem to bear no relationship to market values.

Several explanations would seem possible:

(i) the cash flows are wrong
(ii) the market is wrong
(iii) the discount rate is wrong.

Obviously, valuations based on wildly optimistic or pessimistic cashflow projections will be meaningless. While future cash flows are uncertain, they should at least be consistent with reasonable assumptions about the likely movement of future costs, prices and revenues. Further, the many cash streams that make up a project should be internally consistent. It would be very unlikely that, say, revenues could increase indefinitely without corresponding increases in costs.

Provided cashflow estimates are based on reasonable and widely-held expectations of future outcomes, cashflow forecasting errors cannot adequately explain differences between calculated present values and market values, as the market’s valuation is based on similar expected cashflows.

Is the market wrong? The market is unlikely to be systematically wrong but it may be wrong if it does not have accurate information. If a calculated present value incorporates information that is not yet widely known, then the market valuation cannot be expected to be correct. The point here is that an analyst without inside information is no more likely to get the sums right than the market.

This leaves the discount rate problem. Because the discount rate is based on market information — beta — calculated present values incorporating market consensus cashflow expectations should measure market value. As this often does not happen in practice, the discount rate is either incorrect or has been misapplied.

A fundamental problem with measuring beta is that history is being relied upon as a guide to an uncertain future. While increasing the number of observations of market data will increase the statistical significance of the beta estimate, the phenomenon that is being measured — beta — is likely to shift as companies progress through their individual life cycles and the structure of the economy changes over time.

As long as historical data only is used to estimate beta, the best measurement techniques used today are
unlikely to improve the accuracy of beta measurements. The next major step will come from the incorporation of current accounting and market information into Australian beta estimates. While accurate measurement of beta is still problematical, the beta concept still provides the best method of gauging capital costs with any degree of accuracy.

But valuation errors are just as likely to result from misapplication of capital cost estimates as errors in the estimates themselves. This is usually because most capital cost estimates are equity estimates which reflect the historical gearing policies of the companies used as data to estimate beta. Such estimates can only be used to value companies or projects with the same levels of gearing as the companies on which the estimates were originally based. It would be incorrect, for example, to use cost of capital estimates based on share market data to value all equity financed projects. Share market data can only provide estimates of equity risks rather than firm or project risks.

When a project is all equity financed, the problem is straight forward enough; after-tax cashflows should be discounted at the after-tax cost of equity capital which reflects the risks of holding “ung geared” equity. If the project is partly financed by debt, then the net operating income from the project is split into two cashflow streams — one to equity participants and the other to debt participants. Each cashflow stream can be discounted at its “own” discount rate, or the total cashflow stream (net operating income) can be discounted at the weighted average cost of capital because the present value of net operating income, discounted at the weighted average cost of capital, is equal to the sum of the net present value of equity cashflows discounted at the cost of equity, and the net present value of debt cashflows discounted at the cost of debt. This follows from the accounting identity that the value of any company or project must be equal to the sum of the value of the equity and the value of the debt.

The market value of the firm — equity plus debt — therefore is the present value of the expected after-tax cash inflows discounted at the weighted average cost of capital. To correctly value the financial claims on the firm, each cash stream should be discounted at a rate which reflects the risk of that stream, equity cashflows are discounted at the cost of equity and debt cashflows at the cost of debt. As gearing increases, the lenders take more and more of the low risk portion of the firm’s cashflows, leaving equity holders with the high risk residual cashflows remaining after debt service. As gearing also increases the rate of return to equity, then it is clear that shareholders “pay” for higher returns by having to accept higher risks. The corollary is that the cost of equity rises with gearing. This, however, does not necessarily affect the riskiness of firm cashflows which largely depends on the beta of the firm’s assets. Gearing allocates risk and return associated with the firm’s assets between the suppliers of capital.

Two Valuation Approaches

Two methods are potentially available to value a firm or project using market based equity betas, but such valuations will only be internally consistent when the chosen discount rate is correctly related to the chosen cashflow definition.

First, the firm or project can be valued by discounting net operating income at the weighted average cost of capital. This method values the firm cashflows as if the firm is all equity financed and adjusts the discount rate to reflect the benefits of debt financing. An important point, often overlooked, is that the cost of equity used in the weighted average formula depends on the level of gearing — it is “geared” equity — so share market derived estimates of the cost of equity should only be used when the weights used in the formula correspond to historical market gearing levels. Furthermore, the formula assumes that gearing is measured in terms of market, not book, value.

Another common mistake with this approach is to use the investing firm’s cost of equity to value investments or projects with different risks. If a low risk food company decided to invest in oil exploration, it should value the oil investment according to cost of oil exploration equity, not food equity. The cost of capital depends on “where you spend it, not where you get it.”

The second method values the equity in the firm by discounting the component of net operating income which accrues to equity at the rate of return required by equity holders. This approach has become quite common with the widespread use of project evaluation computer models which calculate debt service requirements and deduct them from cashflow. Since such cashflows are net of debt service, these models are attempting to value equity residuals and may therefore use share market based cost of equity capital estimates. Again, it must be emphasised that the cost of equity estimates used must be consistent with project gearing.
EXAMPLE 1 Security Valuation

Suppose that a firm generates perpetual earnings before interest and taxes of $7.5 million per annum with a debt to equity ratio of 1:1 and that the corporate tax rate is 50 per cent.

Given a market cost of equity after tax of 20 per cent and a pre-tax cost of debt of 15 per cent, the firm and its equity can be valued.

Approach 1 - Valuing the Firm

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<th>$ Million</th>
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<tr>
<td>EBIT</td>
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<td>Tax (50%)</td>
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<td>Annual firm cashflow</td>
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Since this is the firm's cashflow, it should be discounted at the weighted average cost of capital, which is calculated as:

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\text{Present value} = \frac{\text{Annual cashflow}}{\text{Weighted average cost of capital}}
\]

Which in this case is:

20\% \times 0.5 + 7.5\% \times 0.5, or 13.75\%. The present value of the firm is therefore $27.272 million, when discounted to perpetuity.

Approach 2 - Valuing the Equity Residual

The characteristics of this firm require that only one debt level can satisfy the specified 1:1 gearing ratio. Iterative methods show this to be $13.636 million, i.e. half the value of the firm.

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<tbody>
<tr>
<td>EBIT</td>
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<tr>
<td>Interest expense (1/1 gearing at 50% per annum)</td>
</tr>
<tr>
<td>Tax (50%)</td>
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<tr>
<td>Annual equity cashflow</td>
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The equity cashflow must be discounted as a perpetuity at the after-tax cost of equity of 20 per cent which reflects the level of gearing for the firm. The present value of the equity is therefore $13.636 million.

Clearly, the value of the equity and the value of the debt issued by this firm equals its total value:

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\$13.635 \text{ million} + \$13.636 \text{ million} = \$27.272 \text{ million}
\]

A difficulty here is that, in many cases, project debt levels decline over time and the projects themselves have finite lives, but valuation algorithms such as weighted average cost of capital assume permanent gearing levels and perpetual cashflows. Often too, market based capital cost estimates do not match proposed gearing and project life profiles. To compound these issues, actual project gearing may not, after all, be the relevant gearing anyway. If a company opened a new factory and happened to borrow 100 per cent of its value, it would not mean that the factory is geared 100 per cent. The relevant gearing for valuation purposes would still be the company's overall gearing which it expects to maintain over the life of the factory. The relevant degree of gearing for a project depends on the extent to which the debt capacity of the firm is affected.

Valuing the firm is therefore a different exercise from valuing its constituent parts. The weighted average cost of capital approach values the firm — equity plus debt — but the cost of equity alone values the equity in the firm.

A related but different issue is the investment evaluation process which attempts to measure net present values. The distinction is that, while the market value of a security is the present value of its cash inflows, its net present value, the present value of its cash inflows less the present value of its purchase cost, is always zero. You have to pay the market price for a marketable security. Firms therefore seek to create value by investing in projects that have positive net present values.

Since net present values attempt to measure the market value of increases in shareholder wealth, calculations of firm net present value and equity net present value should yield the same answer because firm net present values and equity net present values are the same. Debt issued to finance new projects always has a zero net present value as it is issued at the market rate of interest; lenders pay the market price for debt securities. This makes sense because it is the shareholders who are supposed to capture the benefits of positive net present values — defined as increases in shareholder wealth — not the lenders.

CONCLUSION

All valuation exercises attempt to simulate capital market behaviour. Securities analysts measure present values to see what the market would pay for a security, given a set of expected cashflows and the market’s required rate of return. If an analyst is bullish about future cashflows, his valuation of the security will be higher than the market’s and he will recommend purchase. The converse applies to bears. In the same way, companies evaluating investment opportunities measure net present values to see what the effect of the investment would be on the market value of their equity.

In either case, the accuracy of the valuation will depend not only on the accuracy of the capital cost estimate but how it is used.