

## InfraEcon's Insights



### Cost of Equity: Is CAPM the Only Way?

In many international arbitration cases dealing with a troubled investment, the quantum of damages is often determined using a cash flow model. Such models produce estimated outcomes for the investment over some period, typically the economic life of the investment, and reported annually. To reduce the stream of periodic outcomes to a single value for damages purposes, the stream is typically discounted at a factor reflecting the risk perceived by investors at the time of the investment, frequently the investor's cost of equity (CoE)<sup>1</sup>. For an investor, the cost of equity, also known as the required return on equity, is the minimum risk compensation demanded by the investor for committing its funds to the project. In the context of competing adversaries in litigation or arbitration, this

discount factor for estimating damages is usually a point of contention, particularly the method used to determine the CoE. Below two approaches are assessed in terms of the reliability and quality of the results.

Ideally, as I discuss later, one could theoretically ask each individual investor for each company what is their CoE. But for a typical publicly owned company or a traded security that is impossible. Therefore, the default tool for calculating the cost of equity is the Capital Asset Pricing Model (CAPM)<sup>2</sup>. The CAPM estimates a linear relationship between the required return on an investment and its risk.<sup>3</sup> The cost of equity formula essentially boils down to a risk-free rate of return plus a risk premium. More specifically,

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<sup>1</sup> From an investor perspective, one would use the CoE. If the analysis involve a company and it has debt, then one would use the Weighted Average Cost of Capital (WACC).

<sup>2</sup> The Dividend Capitalization Model is another, less frequently used, method to approximate future dividend

streams based on continued growth rate and the firm's dividend history which will not be discussed in this paper.

<sup>3</sup> This relationship is estimated using the statistical approach of linear regression most often employing a least squares method to find the best fit.

the CAPM formula is generally expressed as the sum of a risk-free return and the firm's Beta multiplied by a measure of the perceived riskiness of the investment.<sup>4</sup> In implementing the CAPM model, typically the data used is the risk-adjusted return of a portfolio of assets of similar risk.<sup>5</sup> This can allow for a comparison of the historical risk-adjusted return to that of an appropriate index.

The use of CAPM in estimating CoE has advantages and disadvantages. One advantage is that CAPM assumes that investors have a diversified portfolio which eliminates unsystematic risk and makes the calculation results more broadly applicable. The other advantage is that it is easy to calculate and can be stress tested to create a range of possible outcomes.

However, using CAPM also has its disadvantages. It is, by design, a calculation based mostly on estimates of the necessary parameters as well as a number of implicit assumptions.<sup>6</sup> For example, the risk-free rate of return ( $R_f$ ) is typically the yield on short term government securities which

is a variable that can change, even on a daily basis, leading to volatility in the CoE estimate.

Also, CAPM requires stock market data for a set of comparable companies to determine the average return on investment, and the lack of detailed risk information can be an issue. Another problem with relying on CAPM is that selecting the set of companies with similar riskiness and characteristics to the troubled investment is a challenging task and one could be ignoring specific risks. Another disadvantage is that CAPM uses historical data on returns, and the past is not always a good indicator of the future. Moreover, since CAPM relies on traded securities, the resulting market CoE changes moment-to-moment, as reflected in stock prices, making the estimates highly variable.

Perhaps the biggest disadvantage is that CAPM is based on four key but not always discussed assumptions. The first is that investors' CoE only reflects a return for the systematic risk of their portfolio understating the total risks that a specific investor faces.<sup>7</sup> The second assumption is that a standard holding period is assumed to make sure returns on different securities are

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<sup>4</sup> Written as Expected return:  $CoE = R_f + \beta (R_M - R_f)$ . Sometimes other risk components, like country risk, are included as well.  $R_m$  is typically taken to be the average return on all securities and  $R_f$  is a measure of a risk-free return.

<sup>5</sup> Note that if the company under analysis is publicly traded one could use the actual stock price. However, as noted below since those prices can change constantly then the calculation of return based on stocks will be very variable

every moment of the trading day raising the issue of which stock price to use.

<sup>6</sup> Frequently, the value for  $r^2$  (a statistical measure of the quality of the regression) is low which indicates a poor statistical fit. Therefore, the calculation of the CoE using CAPM is not, by its very nature, particularly reliable.

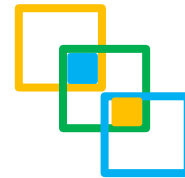
<sup>7</sup> Even though assuming a diversified portfolio makes the calculation of the CoE more broadly applicable, the exclusion of unsystematic risks also may understate CoE estimates.

comparable and this period may include unusual financial developments. Potentially, this assumption could also misestimate the CoE. The third assumption is that investors can borrow and lend at a risk-free rate of return, which is unrealistic as this is actually unattainable except for governments. The fourth assumption is that there is a perfect capital market which, in turn, assumes investors have perfect information, are risk averse, pay no taxes, have the same future expectations, incur no transaction costs, and that there are many buyers and sellers in the market.

On the other hand, if there were only a few investors in the project (which is very often the case in the types of projects that are involved in international arbitrations) there is a more reliable way to obtain a CoE estimate. One could simply ask the investors<sup>8</sup> (who do not tend to change), to determine what the minimum required return was at the time of the investment. For sizable investments such as a power plant, investors often form project-specific companies and have records of the investment analysis process and/or the recorded approvals of Boards of Directors, which specify an expected return on the capital involved. In many cases, the entire investment is funded with equity since project

companies typically cannot borrow money. In this way, a more reliable CoE can be determined.<sup>9</sup>

Therefore, when determining the CoE for damages purposes, one needs to assess the pros and cons of each methodological approach and determine which one introduces less “noise” to any quantum valuation. As I have explained, the CAPM approach suffers a number of deficiencies: it is a regression analysis based on required inputs and implicit assumptions about the market and the investor in question. If feasible, my suggestion is to consider using the alternative approach of investigating the relevant investors’ minimum required return at the time the investment took place.



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<sup>8</sup> A surrogate could be a review of the financial documents used for the approval of the investment.

<sup>9</sup> One concern of this approach is whether the companies could not obtain the information from the investors. But in

most cases, investors have records of the information needed or a reliable estimate can be made.