NOTES FOR THE EXPERT SESSIONS 10 FEBRUARY 2022: TERM OF THE RATE OF RETURN

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9 February 2022

1. The Appropriate Term for the Allowed Cost of Equity

1.1 The Proposition

In an earlier paper (*The Appropriate Term for the Allowed Cost of Capital*, 9 April, 2021), I explained why a regulator should use an allowed cost of equity for the current regulatory cycle equal to the regulatory term (of five years). The competing view is that it be ten years. To simplify the analysis of this issue, I omitted debt, taxes and opex. I also assumed a regulatory cycle of one year with revenues set now and due in one year. The regulated resetting process in one year implies that the firm also expects to receive a value in one year for subsequent cash flows equal to the regulatory asset value in one year. So, at the current moment, with a regulatory asset value of A, the regulator sets depreciation for the first year (DEP_1) and an allowed rate of return k on the asset value A. These cash flows plus the regulatory asset value in one year ($A - DEP_1$) must be valued at some rate d. So, the value now of the regulated business will be

$$V_0 = \frac{[Ak + DEP_1] + (A - DEP_1)}{1 + d}$$

Because these benefits in the numerator arise in one year, the correct discount rate is the one year cost of equity *ke01*. The regulator must then choose the allowed rate k so that V_0 is equal to the current regulatory asset value of A (the NPV = 0 test):

$$A = \frac{[Ak + DEP_1] + (A - DEP_1)}{1 + ke_{01}}$$

The solution to this is that the allowed rate k must equal the discount rate, which is the one year cost of equity. By extension, when the regulatory cycle is five years, the allowed cost of equity must be the five-year rate.

1.2 A Contrary Argument

Mr Kumareswaran argues that the right discount rate would be for a term longer than the regulatory cycle (ten years rather than five), because this is standard market practice. In terms of the example above, this could be thought of as using a discount rate of *ke02* (the two year rate) rather than *ke01* (the one year rate). It follows from the last equation that the allowed rate k must them match this discount rate.

His evidence for this claim appears in a submission from the ENA: "*The Term of the Rate of Return: Response to the Draft AER Working Paper*", 2 July 2021, section 4.4. In turn this paper references a number of other documents, but the only one of these that explicitly refers to valuing regulated assets in general is a 2013 report by Incenta for the ENA: "*Term of the Risk Free Rate for the Cost of Equity*".[1] This is a 2013 survey of the valuation practices of 14 investment analysts. Incenta (page 26) posed four questions to these analysts, of which the first two were as follows:

(a) what risk free rate term is used in valuing a regulated businesses subject to five-year regulatory cycle

(b) is a different rate applied to an unregulated business

Incenta claimed that all interviewees used the ten-year rate in valuing regulated and unregulated businesses (ibid, pp. 27-29). Incenta therefore concluded that regulators should use the ten-year rate so as to achieve consistency with the practice of valuation professionals (ibid, page 43).

I do not agree with this argument, as follows. Firstly, I do not favour simply copying the behaviour of practitioners. A government bond maturing in one year seemingly must be valued now using the one year risk-free rate, not the two year rate. If a survey of practitioners revealed that they used the two-year rate, it would be essential to understand why they did it (and assess their arguments) rather than simply accept their view. Similarly, for a regulator seeking to determine the appropriate discount rate on regulated cash flows arriving in one year and an RAB at that time, the correct discount rate seems to be the one-year cost of equity. If practitioners are doing otherwise we would need to know why, and then assess their arguments.

Secondly, since Incenta refers to regulatory debates over the choice of the five or ten year rate, and these regulatory rates are the *prevailing* rates (those at the commencement of the regulatory cycle), and Incenta recommends regulatory use of the ten-year rate, it follows that Incenta is recommending regulatory use of the *prevailing* ten-year rate. However, the rates used by its interviewees averaged 5% (Incenta, Table 2) whilst the contemporaneous ten-year

[1] See https://comcom.govt.nz/__data/assets/pdf_file/0015/61260/WELL-submission-attachment-Incenta-Term-of-the-risk-free-rate-for-cost-of-equity-June-2013.pdf.

rates averaged 3.2%.[2] Thus, most of the interviewees were *not* using the prevailing ten-year rate. Furthermore, one of the interviewees (Mr Edwards of Lonergan Edwards) stated that the term structure was significantly upward sloping and therefore a rate in excess of the prevailing ten-year rate was warranted for valuing the infinite-life cash flows of these businesses (ibid, page 45). Other interviewees described their risk free rate as being "through the cycle" (ibid, pp. 45-46) and therefore they were presumably using a ten-year rate averaged over some historical period. Thus, despite Incenta recommending the use of the *prevailing* ten-year rate on the basis that it accords with market practice, their survey of market practitioners reveals that they were not doing this.

1.3 A Second Contrary Argument

Prof Partington correctly notes that the current regulatory debate is whether to use five-year or ten-year government bonds as a proxy for the risk-free rate. He believes that standard practice in Australia is to use ten-year bonds, because ten year bonds are the most liquid. However, a bond valuer seeking to value a five year bond must use the prevailing YTM on five year bonds. Using the ten-year YTM, even if it is more liquid, will produce the wrong answer. The same principle applies to regulation. The right discount rate to value (unlevered) regulatory cash flows over a regulatory cycle of five years plus RAB in five years is the five year cost of equity, not the ten-year cost of equity.

Prof Partington also attaches some significance to the rates *ke01* (the one year cost of equity determined now), *ke12* (the one year cost of equity determined in one year), etc, in my 9 April 2021 paper, and calls this a term structure of expected discount rates. He also believes that my analysis requires these rates to differ. I do not agree with this. The rate *ke12* (being the one year cost of equity arising in one year's time for the following year) is not an expectation now but a value arising in one year. Furthermore, whether *ke12* turns out to be more, less or equal to *ke01* has no significance in my analysis, and the fact that I use symbols for the rates *ke01* and *ke12* rather than numerical values reflects that.

[2] The dates of the interviews are not given but the report is dated June 2013 and I therefore examine the ten-year rates over the preceding year (June 2012-May 2013). The monthly averages range from 2.86% to 3.5% over this period and average 3.2% over the full year (data from the table F2 on the Reserve Bank website: www.rba.gov.au).

Prof Partington also comments on the term structure for costs of equity. These rates (all annualised) would be *ke01* (the rate for the first year), *ke02* (the annualised rate over the first two years), etc. He poses the question of whether the term structure here matches the term structure of the risk-free rates. This is equivalent to asking whether there is a term structure to the risk premiums (the cost of equity for a period net of the risk-free rate for the same period). This is an interesting question, but it is not relevant to the issue of whether one should use a discount rate (and therefore an allowed rate) matching the regulatory cycle or a longer term rate.

2. Implications of a Five Year Cost of Equity for R_f, Beta and the MRP

If a five year cost of equity is adopted, one must use a five year risk-free rate, an estimate of beta for the next five years, and an estimate for the MRP for the next five years.

No problem arises in identifying the five-year risk-free rate.

In respect of the MRP, if estimated using historical average excess returns (market rates net of the prevailing risk-free rate), the risk-free rates used here must be the five-year rates. Similarly, if the MRP is estimated from the DGM, one estimates the cost of equity from the DGM and then deducts the five-year risk-free rate.

In respect of beta, one uses a time-series of weekly or monthly rates of return over some historical period. Seeking an estimate of beta for the next five years does not alter the use of weekly or monthly rates of return but it might alter the preferred historical period. That period should be chosen to yield the best estimate of beta over the next five years. If betas could be estimated with perfect precision, the choice of historical period would reflect beliefs about how the true beta evolved over time. For example, if one believed the true beta was a random walk, the best historical period to use for both five and ten years ahead would be the current beta, estimated precisely with minimal past data. By contrast, if one believed the true beta was mean reverting, the choice of historical data would reflect whether one was seeking an estimate for five or ten years ahead and how slowly mean reversion operated.

None of these conditions holds: betas cannot be estimated with great precision, we don't know if the beta for a particular company is a random walk or mean reverting, and if mean

reverting how slowly it does so. So, the question of whether a five or ten year future beta is sought should not alter the historical period used to estimate it.