

A COMMENT ON SCHMALENSEE (2022) VS LALLY (2021) AND AER (2022)

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I Background

1. I have been asked by the Australian Energy Regulator (AER) to undertake the following:

Please review our staff comments (AER, 2022) on Professor Schmalensee's statement (Schmalensee, 2022) and also raise any additional matters you think are relevant.

2. The point of contention underlying the above request has its genesis in a claim made by Dr Martin Lally in Lally (2021) regarding Schmalensee (1989):

“Schmalensee (1989) shows that satisfying [the NPV=0] principle requires that, at the commencement of each regulatory cycle (when the allowed cost of capital is set), the term to which the allowed cost of capital relates matches the term of the regulatory cycle.” (p7)

3. In short, Dr Lally seems to be claiming that Schmalensee (1989) provides external justification for the Lally (2021) conclusion that the appropriate term for the reg-

ulatory cost of equity must match the length of the regulatory period.¹ However, Lally (2021) does not explain how this justification arises, or make any further use of Schmalensee (1989).

4. In response, Energy Networks Australia (ENA) sought the views of Prof Schmalensee on Dr Lally's claim. His answer is emphatic — Schmalensee (2022) not only rejects the Lally (2021) claim, but also the broader notion that Schmalensee (1989) has any implications for the setting of regulatory returns.
5. Subsequently, in a review of Schmalensee (2022), the Australian Energy Regulator (AER) argues that the conflict between Dr Lally and Prof Schmalensee is primarily due to notational differences and semantics. AER (2022) demonstrates that once these features are harmonised in a common framework, the bulk of the disagreement disappears.
6. Rather than repeat the technical details so clearly set out by AER (2022), with which I agree, my approach attempts to provide a complimentary analysis that draws out the underlying differences between Professor Schmalensee and Dr Lally, how these differences have arisen, and how they can be resolved.
7. My conclusions are as follows. First, I agree with Prof Schmalensee that Schmalensee (1989), in and of itself, cannot be used to justify Dr Lally's argument about the appropriate term of the regulatory cost of equity. Second, however, I also agree with AER (2022) that this does not negate the analysis contained in Lally (2021), which comes from a different direction, has a different objective, and is set in the specific context of the AER regulatory environment.

¹The debate over the appropriate term for the regulatory cost of equity actually focuses on the term of the riskless rate component of the cost of equity, but to avoid cumbersome terminology I employ the common shorthand.

II Schmalensee (1989)

8. The primary focus of Schmalensee (1989) is depreciation. Specifically, taking discount rates as given, is there a depreciation schedule that ensures the sum of a regulated investment's discounted cashflows equals zero?
9. The fundamental result in Schmalensee (1989), known as the Invariance Proposition, is that if (and only if) the regulated investment's allowed rate of return on its depreciated original cost is set equal to the assumed discount rate at every date ($\epsilon_t = 0$ in the notation of Schmalensee, 1989), the sum of the investment's discounted cashflows will equal zero *for any depreciation schedule that fully recovers the investment cost.*²
10. The intuition for this profound result is straightforward. If depreciation is low in any given period, the depreciated book value in the following period is high, and therefore so is the return allowed on it; if depreciation is high in any given period, the depreciated book value in the following period is low, and therefore so is the return allowed on it. Over the life of the investment, the requirement that total depreciation must equal initial cost ensures that the offset is exact in present value terms.
11. An important aspect of the Invariance Proposition is that it applies irrespective of what the discount rate is assumed to be or how it is determined. If, for example, the anticipated discount rate applicable to date t cashflows is assumed to be 10%, then the Proposition holds so long as the date t allowed return is set equal to 10%; if the discount rate is assumed to be 12%, then the Proposition requires an allowed return of 12%. And so on.

²Schmalensee (2022) appears to refer to discount rates as allowed rates and the rates set by regulators as accounting rates, but to (hopefully) avoid confusion I use what I understand to be the terminology standard in Australian regulatory discussions.

12. Put another way, Schmalensee (1989) takes discount rates as given; how these are determined in practice is irrelevant for the Invariance Proposition. They could be set by CAPM-type investors, or by APT-type investors, or by celestial movements, or by tea leaves. It matters not — so long as the allowed rate in each period equals the discount rate for that period (however that is determined), the sum of the investment’s discounted cashflows must equal zero.
13. Viewed in this way, Schmalensee (2022) is right to claim that Lally’s (2021) arguments regarding the appropriate term of the regulatory cost of equity do not follow from Schmalensee (1989). If the Invariance Proposition holds for all discount rates, it obviously does not support a particular discount rate.

III Lally (2021)

14. Because Dr Lally approaches the problem from the perspective of a financial, rather than regulatory, economist, his analysis differs from that of Prof Schmalensee in two ways. First, he reverses the primary focus — depreciation is taken as given and the variables of interest are rates of return (discount and allowed). Second, the only discounted cashflow sum he is concerned with is the *market* value of those cashflows, i.e., the NPV. This obviously implies that the only acceptable discount rate is the expected return required by the market of investors.
15. So Schmalensee’s (2022, p7) claim that “Dr. Lally’s characterization of Schmalensee (1989) is almost exactly backwards” is correct, but this reflects the different focus and objectives of Lally (2021). The latter addresses what is essentially a reversed and special case of Schmalensee (1989) where depreciation is exogenous, the only permissible discount rate is the market-determined expected return over the relevant period, and the endogenous variable is the allowed rate of return.
16. Despite these differences, the underlying mathematics of the problems of interest

to Prof Schmalensee and Dr Lally are the same.³ As a result, Lally (2021) correctly concludes that, conditional on the discount rate being equal to the market-determined expected return over the relevant period, the NPV=0 criterion is satisfied if and only if the allowed return takes the same value.

17. Of course, this observation does not, on its own, necessarily imply that the “relevant period” is the regulatory period and hence that the term of the cost of equity is the regulatory term. To make this link, it is necessary to consider the regulatory framework in which AER operates.

IV Reconciling Dr Lally and Prof Schmalensee: the AER regulatory environment

18. At the risk of over-simplifying, the AER regulatory framework works as follows. At date 0 (the beginning of the “regulatory period”), a regulated firm’s maximum allowed revenue is set for the duration of the regulatory period; this is often five years, but can be a longer or shorter term. Determining that allowed revenue involves a number of factors, of which the allowed return on equity is only one. During the regulatory period, some of those factors are updated at various dates (possibly annually), but the cost of equity is fixed for the duration of the regulatory period.
19. In Schmalensee (1989), the cost of equity (ρ_t) is allowed to change every period. Clearly, this corresponds to the AER regulatory environment described in para 18 if and only if the model “period” is the same as the regulatory period. That is, because AER practice allows changes to the cost of equity only at the beginning of each regulatory period, the Schmalensee (1989) model captures that practice only if one model period equals the regulatory period.

³AER (2022, pp4-5) highlight this point, and in greater detail.

20. Viewed in this light, Lally's (2021, p7) claim that the term of the appropriate cost of equity "matches the term of the regulatory cycle" seems much more reasonable. In the specific context of the AER regulatory environment, one Schmalensee (1989) period corresponds to the regulatory period and so the "one-period cost of capital" referred to by Schmalensee (1989) is equivalent to the expected return required by the market over the regulatory period.
21. Lally (2021) takes this observation a step further. First, he notes that the market-determined expected return on equity over the regulatory period must equal the sum of the relevant riskless rate of interest and a risk premium.⁴ Second, appealing to finance theory, he argues that the relevant riskless rate must have a maturity equal to the term of the regulatory period in order to preclude arbitrage opportunities. In this sense, the term of the cost of equity must match the term of the regulatory period. Obviously, this goes well beyond what could reasonably be inferred from Schmalensee (1989), but nothing in that paper contradicts it either.

V Conclusion

22. It is easy to see why Prof Schmalensee believed that Dr Lally exaggerated the contribution of Schmalensee (1989). It is also easy to see why Dr Lally cited Schmalensee (1989) in the way he did. In my view, therefore, Prof Schmalensee and Dr Lally are both correct in their own ways. Prof Schmalensee is right to point out that the Invariance Proposition of Schmalensee (1989) has no direct implications for the term of the regulatory cost of equity. However, when viewed in the specific context of the AER regulatory environment, Dr Lally is also right to claim that the relevant cost of equity is that which applies over the regulatory period. Based purely on finance theory, it then follows that the term of the cost of equity should equal the duration of the regulatory period.

⁴Lally (2021, p8) specifically cites the CAPM, but this is not necessary.

References

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