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APA submission on draft rate of return working papers

APA Group (APA) has reviewed the draft working papers, *Term of the rate of return* and *Rate of return and cashflows in a low interest rate environment*, which were published by the Australian Energy Regulator (AER) in May 2021. Our responses to the issues raised in these papers are set out in this submission.

The second paper, *Rate of return and cashflows in a low interest rate environment*, raises, explicitly, questions about equity returns in the current low interest rate environment. It also raises, but implicitly rather than explicitly, broader issues about how the regulatory rate of return should be set in the context of significant change in the macroeconomic environment. The broader issues are, APA believes, more important than the technical questions raised explicitly in the working paper.

The implications of the low interest rate environment are relevant to rate of return determination, but the process of revising the Rate of Return Instrument will be incomplete if consideration is not now given to:

- the pricing of carbon transition risk into the returns equity investors require from companies with higher direct and indirect levels of carbon emissions
- the pricing of carbon transition risk into debt issues [redacted].

In the current policy context and market environment, carbon transition risk is a more significant issue for gas transmission pipelines than for electricity transmission lines or electricity distribution networks. The costs of equity and debt for the pipeline sector will be different from the costs for electricity networks. This difference should be reflected in the revised Rate of Return Instrument.

We explain why in the first section of this submission. Our comments are brief, but this should not be read as according diminished importance to the issues. The issues will arise again as the rate of return review works towards the new Rate of Return Instrument.

In the second section of the submission, we turn to the term of the rate of return.

APA is of the view that, if the Sharpe-Lintner Capital Asset Pricing Model (CAPM) is used as the AER's foundation model, consideration should be given to using, in estimation of the risk free rate of return, Australian Government bonds with terms to maturity longer than 10 years. A rate estimated using yields on bonds with terms of 10 years is likely to be a downward-biased estimate of the risk free rate.

We explain that rates of return on equity estimated using the CAPM have no term which might then be matched with the term for inflation, the assumed term to maturity of debt, the regulatory period, or the lives of regulated assets.

APA continues to hold the views in its August 2019 debt submission. The AER should estimate the rate of return on debt using a 10 years trailing average of rates on debt with a term to maturity of 10 years. The EICSI, and the corresponding WATMI, should not be used to adjust the benchmark 10 years debt term.

Rate of return and cash flows in a low interest rate environment

APA agrees with the AER that interest rates on the debt of government and corporate issuers have substantially declined over the last decade (subject to the two critical changes identified below).

We have observed, as has the AER, that, as rates have fallen, the cost of the debt which we use to finance our business has also fallen.

Furthermore, we have seen a decline in the returns expected by equity investors as rates of return on other investment opportunities have fallen, although we do not see this decline as being properly reflected in calculations of the rate of return on equity made using the CAPM.

In this environment, the relationship between interest rates and equity returns (the rate of return on the market) might be reviewed to better inform rate of return on equity estimation. We appreciate the AER engaging Cambridge Economic Policy Associates, and look forward to engaging more extensively on this issue when the consultant's report is issued with the forthcoming return on equity draft working paper.

The substantial decline in interest rates may, however, be masking other changes taking place in the financing of energy infrastructure and, in particular, in the financing of gas transmission pipelines. These other changes, APA believes, need to be understood and their implications considered for the setting of rates, in accordance with the Rate of Return Instrument, which will determine returns from regulated infrastructure for up to five years in the future (to 2026).

Two changes are critical. They are:

- the pricing of carbon transition risk into the returns equity investors require from companies with higher direct and indirect levels of carbon emissions
- the pricing in carbon transition risk into debt [redacted].

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

The draft working paper *Rate of return and cashflows in a low interest rate environment* indicates, to us, that the AER has doubts about the value of including a financeability test in the Rate of Return Instrument. The AER will, however, reconsider whether such a test might have a role in an overall rate of return paper expected to be released later in the year.

We note the AER's advice that, where other regulators have adopted financeability tests, they have generally left the management of financeability with regulated service providers.

APA's view is that a financeability test is useful, and will be important as regulated businesses respond, through the investments they make, to climate change and the transition to renewables. However, in these circumstances, the role of the test will extend beyond its use solely as a cross-check on the allowed rate of return.

Term of the rate of return

Seven questions are asked in the paper *Term of the rate of return*. Three of these questions are about estimation of the risk free rate of return, which is used to estimate equity returns using the CAPM. We begin by looking at the CAPM, and the risk free rate of return.

The CAPM and the risk free rate

The CAPM is a model of asset market equilibrium. In equilibrium, the expected rate of return on any particular asset is the sum of the rate of return on a risk free asset, and a premium for risk. The

premium for risk is, in turn, the product of the beta for the asset in question and the market risk premium. The market risk premium is the difference between the expected rate of return on the portfolio of assets held by "the market" and the rate of return on the risk free asset.

Underlying the CAPM is a view of investors buying and selling assets to form portfolios which will transfer wealth to a time one period in the future. The supply of these assets is fixed. There is no supply of new assets and, in consequence, no adjustment of portfolios to accommodate new supply. The CAPM is, therefore, a short period model of market equilibrium.

Each investor chooses a portfolio from all of the risky assets available in the market. Given a "target" expected rate of return, a rational investor will choose weights for the assets in her or his portfolio so that, overall, the portfolio has minimum variance of returns (each investor will choose a portfolio on the "portfolio frontier"). Furthermore, if each investor's utility function is an increasing and strictly concave function of expected return and variance of return, as is usually assumed for portfolio theory, the investor will choose only those weights which are for a portfolio represented by a point in the space of return variance and expected return which is on the portfolio frontier above and to the right of the point of minimum portfolio variance. Investors will choose only mean-variance efficient portfolios.

Portfolio theory, as outlined it in the preceding paragraph, addresses only the question of how investors best allocate the wealth they have available for investment among the risky assets on offer in the market. It is not a theory of asset market equilibrium. Portfolio theory must be augmented if an explanation is to be provided of the prices at which particular assets trade or, equivalently, of the rates of return on those assets.

As Sharpe, Lintner and others have shown, an asset market equilibrium can be identified from this view of investors buying and selling assets to form portfolios if one of the assets available to those investors is a risk free asset. (The existence of a risk free asset is not necessary. A zero beta asset, constructed as a zero beta portfolio, could be used to identify the market equilibrium but, as has been argued on previous occasions, specification of, and measurement of the returns on, a zero beta portfolio is problematic. We do not consider further the possibility of a zero beta asset.)

When the risk free asset is added to the set of risky assets from which investors form portfolios, every investor will choose, to maximize her or his utility, a portfolio which is a linear combination of the risk free asset and the market portfolio. This defines asset market equilibrium, and allows the expected rate of return on any particular risky asset to be modelled as the sum of the risk free rate of return and the contribution which that particular asset makes to the total risk of the market portfolio (the product of the particular asset's beta and the market risk premium).[1]

The risk free asset of the CAPM is, then, a riskless asset available for inclusion in the portfolios of all investors. It is an asset quite independent of the risky assets available for portfolio formation, including (risky) regulated infrastructure assets.

The risk free asset has a riskless rate of return. This riskless rate of return – the risk free rate – does not vary over time (does not vary over the period of the model), and does not vary across states of nature. The yield curve for the return on the risk free asset is flat: it is neither upward sloping nor

[1] Chi-fu Huang and Robert H Litzenberger (1988), *Foundations for Financial Economics*, New York: Elsevier, provides a comprehensive textbook presentation of portfolio theory and CAPM derivation.

downward sloping. The return on the risk free asset does not have a term structure, which might then be imparted to an expected rate of return on equity estimated using the CAPM.

The risk free asset is a theoretical construct. No traded asset is risk free, although investors view some assets as having significantly less risk than others.

If the CAPM is to be applied as the AER's foundation model for rate of return on equity estimation, an estimate must be made of the risk free rate. Such an estimate may be made, and has been made for regulatory rate of return determination, from the rates of return on traded assets for which the returns can be observed.

Which assets, among all of the assets traded, do all investors (and not just those investing in regulated infrastructure assets) regard as being close to risk free?

Extensively traded financial assets – bonds – issued by reputable government borrowers are generally regarded as low risk among all traded assets.

Now, investors do not desire, for its own sake, the wealth which is transferred through time via asset portfolios. Wealth is desired for the consumption of goods and services which it makes possible. A risk averse investor will choose a stable – non-random – consumption plan, but will be unable to realise that plan by transferring wealth over time using a series of bonds with short terms to maturity. Although a bond with a short term may be close to riskless over its term to maturity, transferring wealth over longer horizons by rolling over short bonds is risky because future bond rates are stochastic. Long term bonds can finance stable long run consumption streams even in the face of time varying short term rates, and the ideal bond for this purpose is an inflation indexed bond without a maturity date – a "consol".[2] Inflation indexed consols are, however, unusual, and may not be among the traded assets for which returns can be observed. In practice, risk free rate estimation must be confined to extensively traded bonds with the longest terms to maturity.

Returns on extensively traded bonds with the longest terms to maturity should be used in estimation of the risk free rate for CAPM application.

CAPM application does not call for substitution of a low risk – but still risky – asset (a government bond) for the risk free asset of the model. To substitute a low risk asset for the risk free asset would be inconsistent with the underlying economic theory. When applying the CAPM, we are estimating the rate of return on the risk free asset from rates of return on low risk assets. Choosing low risk government bonds to estimate the risk free rate does not impart to the estimate the term structure of those bonds. The rate of return on the risk free asset has no term structure. Even if the risk free rate were thought to have a term structure, there is nothing in the underlying theory to indicate how that term structure would be imparted to a term structure for the return on equity estimated using the CAPM.

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2 That long term bonds rather than short term bonds were relevant to consideration of the risk free asset appears to have been first raised by Franco Modigliani and Richard Sutch (1966), "Innovations in Interest Rate Policy, American Economic Review, 56(1/2), pages 178-197. The theory was subsequently developed by, among others, Joseph E. Stiglitz (1970), "A Consumption-Oriented Theory of the Demand for Financial Assets and the Term Structure of Interest Rates", Review of Economic Studies, 37(3), pages 321-351; John Y Campbell and Luis M. Viceira (2001), "Who Should Buy Long-Term Bonds?", American Economic Review, 91(1), pages 99-127; and Jessica A. Wachter (2003), "Risk aversion and allocation to long-term bonds", Journal of Economic Theory, 112, pages 325-333.

Dr Lally, in his advice to the AER on the term of equity, assumes that the process of estimation of the risk free rate imparts to the risk free asset the term structure of the bonds used for risk free rate estimation.

This, in our view, is a conceptual error.

Certainly, financial economics research has, over the last decade, identified a term structure in equity returns. But the CAPM, which precedes that research, is a simple single period static model. It does not model any equity term structure. A term structure to equity should not be arbitrarily imported into the CAPM through estimation of the risk free rate of return. If equity returns are to have a term structure, the foundation model – the CAPM – must be abandoned, and replaced with a much more complex asset pricing model.

If equity returns were to be estimated from a more complex model, which incorporated an equity term structure, the argument from Dr Lally's advice might be relevant. Use of a more complex model, and estimation of an equity term structure, may lead to the conclusion that the NPV = 0 principle is satisfied if the term for equity is set equal to the length of the regulatory period.

If, however, equity returns are estimated using the CAPM, and have no term structure, the argument of Dr Lally's advice still follows through. The argument of Dr Lally's advice, in the absence of a term structure for equity, leads to the conclusion that the estimate of the rate of return on equity must be the market rate of return on equity, whatever that market rate may be. In the absence a term structure for equity in the CAPM, the NPV = 0 principle is still satisfied, and there is no implication that the term of the bonds used to estimate the risk free rate of return should match the regulatory period.

In a report for the Australian Competition and Consumer Commission, in 2003, Professor Davis had also advised that the term to maturity of the bonds used to estimate the risk free rate of return should match the regulatory period.[3] Again, the reason for this was that, by setting the maturity equal to the regulatory period, the NPV = 0 principle was satisfied. Unfortunately, Professor Davis's analysis was flawed, and did not support his advice.

Professor Davis, in effect, set out a necessary condition for NPV = 0: the number used for the risk free rate of the CAPM must be the same as the number used for the risk free rate in a portfolio tracking the investment in the regulated asset. This necessary condition was not, however, sufficient to characterise the risk free asset and the risk free rate.

As we have explained above, an estimate of the risk free rate should be made from observed returns on extensively traded bonds with the longest terms to maturity. That estimate can then be used in the CAPM to determine the return on investment in the regulated asset analysed by Professor Davis, and can be used in determining the return on Professor Davis's tracking portfolio. When this is done, the NPV = 0 principle is satisfied.

The length of the regulatory period is irrelevant to estimation of the risk free rate of return of the CAPM.

[3] Kevin Davis, Report on "Risk Free Interest Rate and Equity and Debt Beta Determination in the WACC", prepared for the ACCC, 28 August 2003, page 4.

In subsequent, similar, work – a report for IPART in 2011, and a working paper (2012) – Professor Davis did not refer to the issue of the term to maturity of the risk free asset.[4] He addressed only the assumption to be made concerning the term to maturity of the debt issued by the regulated firm when determining regulated access prices. When the working paper was subsequently published in the *Economic Record*, in September 2014, Professor Davis questioned whether the use of a 10-year bond rate in calculation of the historical market risk premium used in the CAPM required, for consistency, assuming a rate of return on debt with a term to maturity of 10 years.[5] He did not address the question of whether the use of rates on 10-year bonds, or on bonds with any other term to maturity, was appropriate for estimation of the risk free rate.

Neither the arguments of Dr Lally, nor those of Professor Davis, provide support for matching the term of the bond used to estimate the risk free rate of the CAPM with the length of the regulatory period.

Moreover, neither Dr Lally, nor Professor Davis in the work we have referred to in preceding paragraphs, sees the lives of particular risky assets – regulated infrastructure assets – as being relevant to the question of the term of the bonds used to estimate the risk free rate. Our view on estimation of the risk free rate (from returns on extensively traded bonds with the longest terms to maturity), similarly, does not accord any role to the lives of particular risky assets in determining the term of the bonds used to estimate the risk free rate. As we noted above: the risk free asset is an asset quite distinct from the risky assets available for portfolio formation, including (risky) regulated infrastructure assets.

Furthermore, the assets of the CAPM are claims to future income streams, and the underlying economic theory is a model of a simple exchange economy in which those claims are traded. The underlying economic theory does not model the ways in which the income streams are generated from the production and sale of goods and services, and does not give any consideration to the physical capital used in production. The lives of physical assets used to generate the income streams are irrelevant in the context of application of the CAPM. This is not to say that those lives are unimportant to asset prices, but extension of the economic modelling of asset pricing to production economies, with the accumulation of physical capital, leads to models which are much more complex than the CAPM.

In the paragraphs immediately following, we address each the seven questions in the *Term of the rate of return* draft working paper. Our response to Question 3 makes more specific our view on how the risk free rate should be estimated from the returns on extensively traded bonds with the longest terms to maturity.

1. Should the term for expected inflation match the term for the rate of return?

The AER's December 2020 final position paper on expected inflation concluded that inflation should be estimated over a future period of five years, matching the length of the regulatory period. Expected inflation is, in this context, considered as having a term, and that term is five years.

4 Kevin Davis, Determining Debt Costs in Access Pricing: A Report to IPART, Appendix A to IPART, Developing the approach to estimating the debt margin, Other Industries – Draft Decision, February 2011; and Kevin Davis, "The Debt Maturity Issue in Access Pricing", Draft 3, 2 September 2012.

5 Kevin Davis (2014), "The Debt Maturity issue in Access Pricing", Economic Record, 90(290): pages 271-281.

The rate of return allowed by the regulator is to be established as a weighted average of an estimate of the rate of return on debt for a regulated business, and an estimate of the rate of return on equity.

We consider, below, the term for the rate of return on debt, and the question of whether the term for expected inflation should match the term for that rate of return.

In the case of equity, there is no term for the rate of return on equity when that rate is estimated using the CAPM: there is no term for the rate of return on equity to be compared with the term for expected inflation. The idea of a term for the rate of return – a weighted average of the rates of return on equity and debt – is ambiguous. It is also unnecessary.

2. Should the term for equity match the term for debt?

There is no term for the rate of return on equity when that rate is estimated using the CAPM, and the question of whether the term for equity should match the term of the rate of return on debt does not arise.

3. Should the term for the return on equity align to the regulatory control period (typically five years) or a longer period more consistent with the life of the underlying asset (e.g. ten years)

If the CAPM is used to estimate the rate of return on equity, there is no term for the return on equity to be aligned with either the regulatory control period, or the life of the underlying asset.

To the extent that consideration must be given to term, it is in the context of the appropriate term to maturity of the issued bonds used to estimate the risk free rate. As we have noted above, risk free rate estimation must use extensively traded government bonds with the longest terms to maturity.

In the past, the AER has estimated the risk free rate using yields on Australian Government bonds with terms to maturity of 10 years.

Australian Government bonds with terms to maturity of around 10 years continue to be extensively traded, and might continue to be used for estimation of the risk free rate of return for application of the CAPM.

However, today (June 2021), the Australian Office of Financial Management has Australian Government bonds on issue with terms to maturity as long as 30 years. Of the bonds on issue, bonds with terms to maturity of around 10 years have a face value of some $158 billion. Issued bonds with longer terms have a face value of about $71.5 billion. A rate estimated using yields on bonds with a term of 10 years is likely to be a downwards-biased estimate of the risk free rate. Consideration should now be given to using, in estimation of the risk free rate of return, Australian Government bonds with terms to maturity of longer than 10 years.

4. What is the appropriate form for the rate of return on debt for the businesses we regulate?

APA concurs with Dr Lally's finding that an N years trailing average estimate of the rate of return on debt (N to be specified) satisfies, or approximately satisfies, the NPV = 0 principle.

Returns on debt (and on equity) are major components of the total costs of regulated infrastructure assets, and changes to the way in which the rates of return are estimated are major changes in the regulatory regime.

We see no strong argument for now changing from the current trailing average estimation of the rate of return on debt.

In 2013, the AER proposed switching from estimation of the rate of return on debt as an on-the-day rate to estimation using a trailing average. APA was cautiously supportive of the change, proposing at the time that if a trailing average with a ten-year transitional process were to be used, both service providers and users would need time to gain experience with the new method of estimation.

Trailing average estimates of the rate of return on debt were subsequently made, in April 2015 and in April 2018, for the revenue determinations for the Directlink and Murraylink electricity transmission interconnectors (APA investments), and in November 2017, for revisions of the Access Arrangements for APA's Roma Brisbane Pipeline and Victorian Transmission System.

A revised revenue proposal for Murraylink is currently with the AER, and revised regulatory proposals for Directlink, the Roma Brisbane Pipeline and the Victorian Transmission System are currently being prepared. In each case, there has been only a partial transition to a 10 years trailing average estimate of the rate of return on debt, and limited opportunity to gain experience with the last change of method.

APA is of the view that retention of trailing average estimation of the rate of return on debt is appropriate at the present time.

5. What is the appropriate term of debt given the form of the return on debt (in your response to question 3)?

The actual term of the debt used to finance regulated assets will, of course, vary across service providers, and vary over time as financing requirements and conditions in debt markets change.

We see no reason for change: the appropriate term of debt, given the use of a trailing average, continues to be the benchmark of 10 years.

6. Should our index of network debt costs (EICSI) and the corresponding WATMI be used to adjust the benchmark debt term?

APA has no confidence in the Energy Infrastructure Credit Spread Index (EICSI) as an indicator of the debt costs of an efficiently financed service provider, and no confidence in the corresponding weighted average term to maturity index (WATMI). The reasons for our lack of confidence in the EISCI were set out in our August 2019 submission, to the AER, on energy network debt data.

In our August 2019 submission, we noted that, in a small sample, like the sample which underpins the EICSI, credit spreads will differ, not because service providers fail to expend effort on minimising those spreads, but because the underlying risks of the businesses are different, lender perceptions of those risks (based on specific inquiry) are different, and there are different options available for managing them. With different technologies (electricity transmission, electricity distribution, gas transmission gas and distribution), different scales of operation (electricity distribution businesses are often much larger than gas transmission and distribution businesses), different equity financing arrangements (private, or publicly listed), and different market risks and contracting (regulated and partly implicit contracts with large numbers of end-user in the case of electricity and gas distribution; small numbers of large end users in the case of transmission), the credit spreads will be different. The sample for the EISCI was, in 2019, too small for the index to be a reliable indicator of the cost of debt, and that has not changed.

The reliability of any indicator of the cost of debt made using the sample which underpins the EISCI is, now, further compromised by differences in the pricing of carbon transition risk into the debt issues of electricity network and gas transmission pipeline service providers.

The EICSI, and the corresponding WATMI, should not be used to adjust the benchmark debt term.

7. What transitional arrangements would be required if a change in the debt term is implemented?

APA is of the view there should be no change in the term of debt. However, if a change in term is implemented, transitional arrangements will be required. Those arrangements will necessarily be complicated by the transition out of a regime into which a transition has only been partially implemented.

APA would be pleased to elaborate on any of the views in this submission. Our work on rate of return is being undertaken by [redacted], who is in our Perth office and can be contacted directly on [redacted] or at [redacted].

[redacted]

[redacted]
Regulatory Manager

2 July 2021