# Measuring the Debt Risk Premium for Regulated Utilities

Report prepared for
**Horizon Power Pty Ltd**

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# 1 INTRODUCTION AND TASK

The Economic Regulation Authority (ERA) of Western Australia has released a Discussion Paper on 'Measuring the Debt Risk Premium: A Bond Yield Approach' (ERA 2010) for comment. It sets out a proposed new methodology for calculating the debt risk premium, which is one component of the weighted average cost of capital used as a benchmark in certain regulatory decisions by the ERA and other regulators.

This report has been prepared on behalf of Horizon Power Limited to address the following:

1. questions and issues arising in the Economic Regulation Authority Discussion Paper, 'Measuring the Debt Risk Premium: A Bond-Yield Approach';

2. whether other parameters of the cost of capital should be considered and calibrated to be consistent with the debt risk premium model, rather than considering the debt premium in isolation; and

3. whether key cost of capital parameters should differ for Horizon Power compared with larger firms like Western Power.

The cost of debt in the weighted average cost of capital used for regulatory decisions in Australia typically contains three components: a risk free rate, a debt risk premium that provides for the promised yield on debt and an allowance for debt issue costs. The debt risk premium in turn comprises components that relate to market risk, expected default losses and inferior liquidity on corporate bonds relative to risk free government bonds. The debt risk premium is typically estimated by calculating the premium of relevant corporate grade debt over the risk free rate. However, it is helpful to recognize its underlying components.

The discussion paper focuses on the debt risk premium but decisions about the debt risk premium cannot be completely isolated from decisions about other cost of capital parameters, in particular the market risk premium and the measure of systematic risk used in calculating the cost of equity. This is particularly the case where financial markets have been in a state of turmoil and some parameters are based on recent financial observations but others such as the market risk premium are based on longer term historical information. This issue is not adequately addressed by the ERA Discussion Paper.

# 2 THE ERA PROPOSAL

The ERA and other regulators in Australia have typically assumed a 10 year borrowing term in calculating the debt risk premium as a component of the allowable weighted average cost of capital for regulated entities. They have made use of estimates of fair yield curves derived by Bloomberg and CBASpectrum that provide yields for different grades of corporate debt and different time periods. However, Bloomberg no longer provides fair yield curves for 10 year yields (although periods up to seven years are still available) while CBASpectrum has ceased publishing its estimates of fair yield curves. This has led to a need to develop a new methodology for calculating a relevant debt risk premium.

The ERA has reviewed approaches and observations made by the Australian Competition Tribunal, the Australian Energy Regulator and the Independent Pricing and Regulatory Tribunal to help inform its approach.

The ERA is proposing to use a sample of bond yields of varying terms to maturity to estimate the market risk premium. The proposed sample excludes the use of the Bloomberg yield curves.

The ERA notes that ideally the bonds in the sample should have the same credit rating and be in the same industry as the regulated entity. However, it notes that there are only five bonds issued by the Australian energy market sector (with an average maturity of 5.36 years) and that there is a lack of liquidity in the market for corporate bonds, particularly 10 year bonds (ERA 2010, p. 10). To address the issue it proposes to include bonds issued in Australia for BBB-/BBB/BBB+ Australian corporate bonds with a time to maturity of 2 years or longer and which are actively traded. The proposed data source is Bloomberg. This leads to a sample of 15 bonds comprising a mix of energy, finance, property development and other industries. The ERA (2010, p.9) implies that its sample is sufficiently large enough to provide a reliable estimate of the debt risk premium.

Estimates of the debt risk premium are presented for several different sample measures: a simple (equally weighted) average, a weighted average based on number of years to maturity, a weighted average based on amount issued and the median. The estimates range from 2.775 to 2.885. The simple average of the years to maturity of the 15 bonds in the sample was approximately 5.3 years.

Although, the ERA Discussion Paper does not discuss the separate allowance for debt issuance costs, it is assumed that the ERA will still recognize such an allowance. The debt issuance costs need to be incurred when an entity issues debt and there should be provision in the WACC or an equivalent adjustment to recognize these costs. The acceptance of such an allowance is widely recognized by other regulators in Australia and other jurisdictions.

# 3 QUESTIONS IN THE ERA DISCUSSION PAPER

This section addresses the specific questions presented in the ERA Discussion paper for interested parties.

**Question 1**

**Is the Authority's proposed approach of estimating the debt risk premium likely to better reflect the prevailing conditions in the market for funds than the use of Bloomberg's estimates of fair yield curves.**

This question abstracts from the issue of choosing a specific maturity period for the market risk premium which is separately addressed in question 2.

To ensure a like-for-like comparison the Bloomfield fair yield curves would need to be used to obtain an average market risk premium for an average maturity corresponding to the average maturity implied by the ERA approach – i.e. approximately 5.3 years. The yield curve for 5 year bonds could be used as an approximation.

The issue then is whether the processes that Bloomfield uses to arrive at its estimates provide a more representative estimate of prevailing conditions for a bond with a maturity date of approximately 5 years then the use of the sample of 15 bonds and the method proposed by the ERA.

The Bloomberg fair value curves are designed to assess whether a particular bond issue is over- or under-priced (IPART 2010, p. 27). However, as the curves are based on data for liquid secondary market trades they are not used for pricing new issues except in a very general way (Second Opinion Financial Advisory 2010, p.27). In this respect, Second Opinion Financial Advisory provides reference to Bloomberg advice that considers new issues have always been provided at a premium to its fair yield curves that might have been quite small in settled market conditions but that may have increased in the period of recent turbulent conditions.

Bloomberg adopts an approach that helps to ensure bond prices are reliable estimates (Lee 2007 and Synergies 2010). This essentially entails using only prices, including indicative and executable prices for bonds that have a high level of liquidity and removing observations that are considered to be outliers (i.e. bonds with prices either significantly higher or lower than for comparable bonds). Bloomberg estimates a 'best fit' curve to its selection of reliable observations of bonds for various maturities, for a given credit rating, using a piecewise linear function (Lee 2007). This enables a prediction of the fair yield for a bond of a specific credit rating for a specified period. In the past Bloomberg has published a fair value curve for various credit ratings including BBB on a daily basis. However the daily estimates do not

necessarily include executed trades on a daily basis but rather the latest estimate of the 'fair value' price of a bond for a given credit rating.

Second Opinion Financial Advisory (2010, p.19) lists 26 bonds used in the Bloomberg curve in the indicative period it considered (19 October-13 November 2009) in its submission on behalf of WA Gas Networks for use in the revised access arrangement for Mid-West and South-West Gas Distribution Systems.

The main advantages of using the Bloomberg estimates are that: they are produced by an independent, expert provider of financial information with no interest in the outcomes of regulatory decisions with respect to market risk premiums; they ensure that a key aspect of obtaining a reliable financial price for a bond for benchmarking pricing i.e. liquidity is incorporated into the benchmark; the estimates are widely used by financial markets to provide up to date information for assessing relative value; and they provide specific estimates for specified maturity dates that formally recognise that yields vary with maturity dates.

The main disadvantages of using the Bloomberg data are that its exact method of estimating the fair yield curves is not made public so that it is not possible to exactly replicate the estimates and, although the removal of outliers and the use of prices for only liquid bonds is justified in terms of obtaining reliable estimates, the statistical reliability of the results is not clear.

The main advantages of the ERA approach are simplicity and transparency. However, these advantages are of limited use as the wrong concept is being measured. The ERA estimate of the average risk premium is an average over various maturities but there is well established theoretical and empirical support for the notion that yields and market risk premium are likely to vary over different maturities and potentially in a non-linear fashion. The ERA approach does not estimate a fair value yield curve for bonds with different maturities that takes account of such non-linear features but rather just an average yield for bonds with different maturities, which is then used to determine an average market risk premium for which the average maturity happens to be about 5 years.

Although the ERA approach may lead to the use of a larger sample and hence lower standard error, its measure of an average risk premium for a 5 year bond is biased when used for the purposes of pricing since it is an average over various maturities rather than an average over various bonds for the same maturity.

The ERA provides several proposals for weighting the estimates including one that uses years-until-maturity weights. However, it does not provide information on exactly how the latter weights are selected and in any case it seems as if they are not selected by a formal statistical procedure. This is in contrast to the Bloomberg approach that estimates a curve of best statistical fit to account for non-linear effect reflected in the concave nature of the typical fair yield curve.

In summary, the ERA Discussion Paper does not provide any discussion to justify why its averaging approach does not mis-represent the market risk premium for a 5 year pricing period when the typical yield curve has an upward sloping and typically non-linear pattern.

In addition to this problem the ERA approach has a number of other disadvantages.

The ERA suggests that its approach is representative because there are insufficient numbers of bonds with longer time maturities to generate reliable industry-wide estimates. However, it does not make any adjustments to its estimates to ensure that the sample that it has selected are liquid bonds nor to examine the data to remove outliers. Although the sample is based on Bloomberg data and the ERA notes that Bloomberg uses all BBB band bonds to estimate its fair yield curve, it is understood that the Bloomberg approach does not mean that all of the bonds in the ERA sample are retained based on liquidity and outlier criteria.

It is well accepted that prices in thin markets do not provide a reliable estimate of efficient market values. Synergies (2010, pp. 12-14), in reviewing IPART's approach to estimating the debt margin, provides a useful review of why liquidity is important. It notes that the most reliable prices in any market are derived from those that emerge when the greatest concentration of trading takes place. Synergies provides a number of authorities that support the positive relationship between an efficient price discovery process and trading volume. In addition, in support of the point about liquidity, in its recent ActewAGL Distribution determination, the Australian Competition Tribunal (2010, p.17) in its summary of reasons noted that: "In the absence of a deep market for corporate bonds, the AER will likely have to rely on published fair value curves to estimate debt financing costs."

However, there is one important qualification in relation to the issue of liquidity and that is that if a regulated entity has characteristics that mean that its bonds would be relatively illiquid, then there would be a need to allow for an illiquidity premium in the cost of debt. But in any case it is not likely to be useful to calculate an average based on a mix of liquid and illiquid bonds. If illiquidity is a factor that needs to be explicitly recognised then it would be better to derive a separate estimate for an illiquidity premium.

As to outliers, it is well established in empirical analysis of economic and financial relationships that it is appropriate to remove outliers and from a practical perspective this generally requires the use of discretionary judgement rather than a well, established codified method.

However, Second Opinion Financial Advisory (2010, pp. 32-33) has raised some concerns about the discretion used in the removal of outliers and suggest that if the fair value curves are to be used then it is important to assess the data inputs and curve outputs against available market data. It outlines how a number of specific factors can be assessed in reviewing the reliability of the Bloomberg fair value curves, including consideration of new bond issues of sufficient size and near the pricing period that are not included in the Bloomberg fair yield curves and other market evidence to confirm their reliability. These suggestions are supported by this report. However, the bond prices should be as close to the maturity period for pricing as possible or appropriately adjusted for differences in maturity periods.

Finally it is important to reiterate that the Bloomberg fair value curves are independent and widely used by market participants which also provides an indication of their usefulness for the purposes of setting a benchmark price reflecting current market conditions.

**Question 2**

**Is the use of a benchmark sample of Australian corporate bonds with a term shorter than 10 years likely to better reflect the prevailing conditions in the market for funds than the use of Bloomberg's estimates of fair yield curves to derive a 10 year term?**

Bloomberg has indicated that it will not be publishing any 10 year fair yield curves, however it will be publishing 5 year and 7 year yield curves for BBB rated bonds. A simple approach to obtaining a 10 year estimate would be to extrapolate the 7 year yield to 10 years based on the difference between the 5 year and 7 year yields. The difference between the 5 year and 7 year yields is not likely to hold exactly when extrapolating out to 10 years, however this approach does recognise that the yield curve is still likely to have an upward slope to 10 years and is considered to be more representative than adopting estimates that reflect an average of 5 years.

Such an approach has also been recommended by the Allen Consulting Group (2010a, p.12), Second Opinion Financial Advisory (2010, p.11), Synergies (2010, p.9). Second Opinion Financial Advisory (2010, p. 12) provides some evidence that suggests, though does not definitively conclude, that in the indicative pricing period considered the annual debt margin of 4.5 per cent estimated by this method for BBB/BBB+ bonds under-estimates the true debt margin. As noted Second Opinion Financial Advisory also suggests that the Bloomberg

yields still need to be assessed in a broad context to ensure it is consistent with prevailing market conditions.

The Allen Consulting Group has provided a recent update of a number of minor parameters in its report to the Independent Market Operator in Western Australia (ACG 2010, 2008). It recommends the linear extrapolation of the BBB seven year yield as described above, to give a debt risk premium of 5.19 per cent as of 26 October 2010.

We recommend that the ERA adopts the same linear extrapolation approach as recently applied by the Allen Consulting Group for the Independent Market Operator in Western Australia but checking the estimates against the data inputs and fair yield curve outputs used by Bloomberg to help confirm their reliability.

**Question 3**

**Is the Authority's proposed approach to the selection of Australian corporate bonds appropriate?**

The main issues here relate to the failure to take account of illiquidity and outliers as discussed for Question 1.

**Question 4**

**Which method for calculating the weighted average of observed yields from the sample should be used?**

As explained above, the proposed methodology does not measure a relevant concept because it does not recognise that the debt risk premium will vary over the time to maturity and make adequate allowance for that. However, if the approach is adopted an averaging process that gives greater weight to longer term securities should be adopted. It is suggested that this needs further investigation and consultation.

**Question 5**

**Are there any relevant sources of information that the Authority has not considered in this discussion paper with regard to estimating the debt risk premium?**

Key issues are covered in the response to Question 1. In summary, the wrong concept is being measured i.e. an average risk premium based on averaging different yields to maturity; and the approach fails to recognise the need to use estimates for liquid bonds where this is relevant.

In addition, it is important to recognise that the concern that the Authority has about taking account of market conditions should also apply to the other parameters in the cost of capital. In particular, in a period of considerable financial market disruption and uncertainty it is not reasonable to develop and apply a methodology for the debt risk premium in isolation from consistent consideration of other parameter in setting an allowable rate of return. There are relevant sources of information that should be considered in addressing this issue. The issue is explored in the following section.

# 4 CONSISTENCY WITH OTHER COST OF CAPITAL PARAMETERS

## 4.1 Consistency versus market relevance for the debt risk premium

In addition to proposing an inappropriate concept for the debt risk premium, the ERA is emphasizing the importance of recent information in setting the debt risk premium when some other key parameters in the cost of capital are based on longer term historical information. A separate issue is that the ERA is also in effect proposing to use a period of 5 years for the debt risk premium when other key components of the cost of capital – the market risk premium and the risk free rate – are based on a 10 year time horizon.

It is important to recognize that the Capital Asset Pricing Model that is used to calculate the cost of equity by the ERA is a forward looking model that applies to all assets including debt. It is also a one period model of no particular time dimension in terms of years. However, conceptually the time frame should be the same for all parameters in the CAPM, when it used to estimate the cost of capital, including those for the cost of debt. In practice, the cost of debt is also not typically estimated by calculating a debt beta using a CAPM equation but if an alternative is used, it should make use of estimates with the same time horizon as for the cost of equity.

The ERA considered the issue of consistency between the debt risk premium and other WACC parameters and concluded that it is of the view that the market relevance of the debt risk premium should carry more weight than the requirements for consistency with other WACC parameters (ERA 2010, p.8). It provides two reasons to justify this conclusion.

First the ERA argues that attempting to maintain consistency with other WACC parameters is likely to have reduced the level of market relevance of the debt risk premium, and this relevance is likely to be compromised in the future. Second the ERA argues that moving away from a 10 year term provides for a larger sample of Australian corporate bonds to be considered, which should improve the estimate of the debt risk premium.

These arguments are related. The first proposition amounts to assuming that the ERA approach better reflects market relevance than the use of Bloomberg fair yield curves. The second proposition assumes that the sample is used in a way that does not entail any bias. However, as explained above, these propositions are not reasonable since the ERA approach is measuring the wrong concept. The ERA approach entails an inherent bias as it does not derive an estimate based on bonds with the same maturity date. Thus the argument that the estimate is more reliable because it is based on a larger sample has little credibility when it is well recognized that the market risk premium varies for different maturity periods. In addition, even if the concept was accepted there are concerns about the reliability of the

bonds in the ERA sample, which the Bloomberg approach addresses in its methodology. These points were discussed in the previous sub-section.

In addition, as to market relevance, it is important to recognise that Bloomberg is a world leading expert and independent provider of financial information and that its fair yield curves are designed to be used as a tool for pricing current bond issues. Bloomberg has confirmed that it is proposing to continue to publish 5 year and 7 year fair yield curves for BBB rated bonds. If the Authority has concerns about using these curves to extrapolate to 10 years, then it is suggested that an estimate of the debt risk premium based on the Bloomberg 5 year or 7 year fair yield curve would still be superior to the approach proposed by the ERA. This approach has not been considered in the ERA Discussion Paper.

In summary, the overall cost of capital that is used for regulatory purposes is based on a risk adjusted opportunity cost of capital comprising an efficient mix of debt and equity. It is unsound from both a theoretical and market practice perspective to derive benchmark estimates for pricing purposes from parameters based on different periods. Exceptions would only be justified if there was no reasonable alternative but in this case there is a reasonable alternative.

## 4.2 Adjustment of other parameters for market relevance

If the ERA considers that a shorter – effectively 5 year term – is justified in estimating the debt risk premium, based on its assessment of the importance of market relevance for data that relate to that period, then this raises the issue of the extent to which other parameters should be reviewed for market relevance.

A key parameter that is most likely to have been affected by recent market developments is the market risk premium which is a component of both the cost of equity and the cost of debt. The convention of using recent, forward looking information to benchmark the cost of debt means that in effect a spot debt risk premium is adopted, as a component of the cost of debt, which incorporates the impact of recent market developments on the required market risk premium. This contrasts with the regulatory convention of using a market risk premium, as component of the cost of equity, that is based on long term averages. Thus what occurs in effect is that there is a spot risk premium for debt but an average risk premium for equity. This point has also been made by Value Investors (2009, p. 20).

While this inconsistency is not likely to be an issue when financial markets are relatively stable it is most likely to be a material issue following a period of substantial financial market turmoil as has occurred with the global financial crisis that was most evident in 2008 and 2009.

Thus if there is a concern to use market relevant information that incorporates recent information in estimating the cost of debt, this concern should also apply to the selection of the market risk premium used in estimating an allowable cost of equity.

As the CAPM is a one period, forward looking model it is important to recognize that this means the required return implied by the model is an expected required return for the relevant investment period. This in turn means that the market risk premium that is a key component of the CAPM is the expected market risk premium over the risk free rate for the relevant investment period. However, as noted, typically estimates of the expected market risk premium have relied heavily on long term historical data.

Although it is well recognized that the market risk premium can vary considerably over time, the market risk premium in Australia has by convention been accepted as about 6 to 7 per cent based on long term averages (see Value Investors 2009, p. 10). Given the uncertainty about the market risk premium, a long term average is likely to represent the most reasonable approach when markets are in relatively stable state. However, in periods of substantial financial crises and in periods following the crisis it is important to use more recent information to obtain a more 'market representative' estimate of the market risk premium as a component of the cost of equity for the relevant time period.

The use of a market risk premium that reflects current market conditions is particularly important if both the debt risk premium and the risk free rate are based on current market conditions that have been significantly affected by a period of market instability. This is because while the market risk premium, for both the cost of debt and equity, is most likely to increase, in the wake of a financial crisis, the observable risk free rate that is typically used may well decrease.

In considering a relevant market risk premium it is important to draw a distinction between an ex ante or expected market risk premium and an ex post or observable market risk premium. It is the ex ante market risk premium that is relevant as a component of the cost of capital. The risk premium arises because of concerns about the volatility of returns and if there is an expectation of heightened volatility of returns the ex ante premium must increase but this will be reflected in a reduction in share prices leading to a reduction in the ex post or observable market risk premium. An increase in share market price volatility and a corresponding significant reduction in share market prices were prominent features of the global financial crisis.

If greater weight is given to market relevance over a regulatory period spanning the next 5 years or so there is a strong case for using a market risk premium that is well in excess of 7 per cent. Bishop and Officer (2009) provide a summary of various evidence to support a higher market risk premium looking forward over the next 5 years or so. They also present a well supported methodology to take account of recent effects on the market risk premium.

Bishop and Officer examine two sources of information that indicate an ex ante MRP that is likely to be above the long term ex post average: volatility (as a measure of risk) in options on the Share Price index and the spread on corporate debt.

Bishop and Officer (2009, p. 16) measure the amount of risk by the standard error of the market risk premium (as a measure of volatility) and calculate the premium or price of risk as the basis points of risk (rate of return required) per unit of the standard deviation of the market risk premium.[1] They then apply this premium to a moving average of the implied volatility of a 12 month call option issued against the ASA 200 index, for the 21 day period ending 30 November 2009. This implies a market risk premium of 12.2 per cent which was relevant for at least one year as it was derived from a one year maturing call option.

Bishop and Officer also present data showing that the behavior of the forward risk premium was very similar to the behavior of debt spreads in the bond market.

Bishop and Officer recognize that the market risk premium will revert towards its mean over time. They present evidence based on the time to recover from previous stock market crashes and the results from trading strategies based on different holding periods to conclude that mean reversion would take 3-5 years implying an average market risk premium for the period 2010 to 2014 of 9.3 to 10.3 per cent. Taking a conservative approach that minimizes change but that also recognizes the MRP is above its long term average they recommend a market risk premium of 8 per cent.

In terms of the current relevance of the Bishop and Officer methodology, CEG (2010, p. 33) present a graph of the implied volatility in the ASX 200 index over the next 12 months with the latest estimates to late April 2010 indicating volatility well above the pre-GFC levels.

There is separate support for an above market risk premium from application of the dividend growth model which relates the cost of equity to the dividend yield and growth of dividends. CEG (2009, p. 23) use a dividend growth model to estimate a forward looking market risk premium, for the Australian market as a whole, of 12 per cent. CEG also showed that there is no reasonable set of assumptions about dividend growth that would be consistent with a forward looking market risk premium of 6 per cent in December 2008 (2009, p. 29). CEG

[1] The market risk premium average was 7 per cent and the standard deviation was 14 per cent implying a price of risk of 50 basis points per unit of risk.

concludes that although some of the re-pricing of risk, associated with the Global financial crisis, will be eliminated over time, some will be permanent and some will continue to be conditional on continuing uncertainty in economic conditions. They conclude the best estimate must be an equity risk premium that remains heightened over historical levels over the next five years (2009, p.31).

Further evidence for a market risk premium, higher than long term historical averages, is provided by analysis undertaken by Strategic Finance Group (2010) in examining the return on equity that is commensurate with the prevailing conditions in the market for funds. It estimates an expected dividend yield for comparable firms to WA Gas Networks of 10.5 per cent per annum and a combined estimate of expected dividend yield an capital gains of 13-14 per cent. With a risk free rate of say 5.5 per cent this implies a market risk premium of 7.5 to 8.5 per cent.

Another parameter that may have been significantly affected by the global financial crisis is the beta for individual companies. The average of all equity betas is 1 by construction since beta is a measure for risk relative to the market as a whole. However, firms with above average leverage may experience a relative increase in risk during a debt-related crisis. Firms that have relatively high fixed costs and that also experience greater variability in revenues in a debt related crisis may also experience a relative increase in risk during a debt-related crisis. CEG (2010) have estimated the betas for six Australian companies that are primarily owners of regulated utilities[2] for the 150 trading days centered on the day when the ASX 200 reached its lowest point (6 March 2009). The average beta estimates varied from 0.9 to 1.7 depending on the number of days used for the estimates. CEG (2010, p.24) presented other information to support the relatively high risk for these firms in the period reviewed and concluded that the risk was largely driven by the regulated utilities exposure to the systemic risks associated with refinancing heavily geared businesses.

As a final point the cost of equity is normally higher than the cost of debt, however, a mechanical application of the conventional regulatory approach to estimating the cost of capital can lead to a cost of debt that is higher than the cost of equity. This is a non-sensical result that can arise if the debt risk premium is based on a spot risk premium and the equity risk premium is based on a long term market risk premium.

[2] The six companies were Australian Pipeline Trust, Envestra, the DUET Group, Hastings Diversified Utilities Fund, Spark Infrastructure and SPN AusNet.

## 4.3 Choice of a shorter time horizon for all cost of capital parameters

As the ERA's proposed approach effectively shortens the time horizon for the cost of debt to a period of about 5 years, it is relevant to consider whether other parameters in the cost of capital should be adjusted to apply to a period of 5 years.

As noted, the CAPM that is used to calculate the cost of equity (and which can also apply in calculating the cost of debt) is a one period model, where the time frame in years is not specified.[3] The one period time frame can be interpreted as the time frame in which significant rebalancing of an investment portfolio occurs. Rebalancing of investment portfolios in investment markets is expected to occur quite frequently and furthermore CAPM equity betas are estimated using high frequency (weekly or monthly) data often averaged over a relatively short period. The market risk premium that is calculated in the CAPM is usually based on annual returns averaged over long time frames using historical data that may better reflect a reasonable estimate of an equilibrium estimate.

However, given the CAPM is a one period model (which is not specified) then it is reasonable to assume that the appropriate period is the investment horizon for the specific investment. A general principle that has been widely accepted is that firms should match the length of their financing maturity with the life of the asset to the extent that this helps to secure longer term finance while also minimizing transactions costs and interest rate and associated refinancing risks (Value Advisor Associates 2009, p. 18). In this respect, the use of a 10 year term for the CAPM has developed as a convention in research and in regulatory decisions. However, if prices are reset on a more frequent basis, say 5 years, and the cost of debt and the cost of equity are both reset at the same time, there is an issue of what the time frame should be for the parameters in order to ensure an appropriate return on capital. This report does not investigate this issue in any detail but notes that if a shorter regulatory period is used for the setting of cost of capital parameters, that apply to benchmark estimates, then any transactions and refinancing costs and risks that arise as a result of the practice should be recovered in allowances made for the cost of capital.

[3] This point is often not recognised (at least not explicitly) in many regulatory decisions.

# 5 COST OF CAPITAL PARAMETERS SPECIFIC TO HORIZON POWER

Several components of the cost of capital are common to all firms. The main company specific parameters, in the standard application of the CAPM, relate to: an equity beta; a premium for asymmetric risk to the extent that the CAPM assumptions do not apply; a liquidity premium for equity for small firms; and a debt premium (that effectively encompasses a debt beta and a liquidity premium for debt).

In specifying appropriate firm specific cost of capital parameters using a benchmarking approach it is also important to establish benchmarks based on firms with comparable risk and other relevant characteristics. Otherwise there will be inappropriate recognition of genuine factors that affect the required cost of capital consistent with facilitating efficient investment.

The Horizon Power electricity supply business has a number of characteristics that differ substantially from other electricity supply businesses in Australia, such as Western Power. It is understood that the main differences are as follows:

- Horizon Power is much smaller, serving approximately 43,000 customers versus approximately 900,000 customers for Western Power.
- Horizon Power owns a more vertically integrated supply chain, conducting transmission, distribution and retail activities and 13 per cent of its required generation. In contrast Western Power focused on transmission and distribution services only. It operates and maintains the South West Interconnected System which is a network of transmission and distribution infrastructure in the South West of Western Australia.
- The Horizon Power network is fragmented (not interconnected) with low customer density.
- Much of Horizon Power's service area is remote, serving Aboriginal communities and mining communities and is located primarily in harsh climates, such as deserts and tropical locations.
- Horizon Power faces input prices (for labour and materials) that are generally higher and likely to be more volatile.
- Horizon Power faces customer growth rates that are generally more volatile.
- Horizon Power is overwhelmingly more reliant on uncertain government funding than Western Power to support a cost base that is also more variable.

Given these characteristics it is reasonable to infer that Horizon Power faces more risk (scope for variability in its returns as well as risk of outright default) than Western Power. It is recognised that the CAPM that underlies the selection of cost of capital parameters only recognises diversifiable risk (as measured by the sensitivity of returns to the returns on the overall market) and if the model's assumptions apply then only non-diversifiable risk is relevant. However, two points are relevant here.

First given the characteristics set out above there is a reasonable likelihood that Horizon Power's non diversifiable equity risk (as measured by a relevant equity beta) is higher than Western Power. It is not possible to be definitive about this without a detailed empirical investigation, however, as overall variability of returns is likely to be higher it is reasonable to be cautious in assuming the same degree of non-diversifiable risk (a component of overall variability of returns) for Horizon Power as for Western Power or for other benchmarks based on larger listed companies.

Second a key assumption relevant in applying the standard CAPM does not apply in many regulatory settings. The CAPM is based inter alia on the assumption that from an investor's perspective there is symmetry in returns consistent with a normal distribution or the investor is not concerned with potential skewness in returns. If this assumption does not hold asymmetric risk will arise.

In other words, application of the CAPM model assumes that under and out-performance can be expected to offset each other, reflecting the assumption that risk in the CAPM is about the variance of returns and not just potential downside. If individual investments are not characterised by symmetry with respect to upside and downside potential then the CAPM is not likely to be effective in taking account of risk from an investor's perspective. Thus if regulation caps upside potential and there are no adjustments to ensure symmetric treatment of downside potential, then an asymmetry could be introduced that would require an adjustment consistent with providing an appropriate ex ante regulated rate of return required to facilitate efficient investment.

Thus if the regulatory arrangements do not have pass through mechanisms that take full account of asymmetric risk, then there is a strong economic efficiency rationale for adjusting the allowable rate of return to include a premium for asymmetric risk. For large regulated utilities providing basic services in areas where demand prospects are reasonably secure there may be little asymmetric risk and so this issue may not have received much attention in various regulatory decisions.[4] However, Horizon Power is very different from the typical benchmarks that are used for setting firm specific cost of capital parameters with

[4] Asymmetric risk has been recognised as a valid risk by Australian regulators but practice with respect to recognition has varied and there is not a well accepted methodology for measuring the risk.

considerably less secure revenue streams and more variable cost structures. Its upside potential is capped as is the case for many regulated firms but it faces more downside risk. Thus there is a reasonable justification that there should be recognition of higher asymmetric risk for Horizon Power then for listed regulated firms that are typically used as benchmarks.

Furthermore, it is not reasonable to take a position that since the CAPM model does not recognise asymmetric risk there should be no allowance for it as such a position can only be justified if the assumptions that underlie the CAPM model apply in practice.

Turning to the recognition of a premium for illiquidity for small companies, it is relevant to recognise that small companies are likely to be characterised by returns that incorporate a liquidity premium. Investors will require a premium to compensate for illiquidity and small companies are more likely to be characterised by illiquidity with respect to equity trading then large companies. In addition, it is likely that this illiquidity premium would increase in times of financial crisis.

Turning to the cost of debt, there is both a default aspect and a liquidity aspect to consider in choosing a benchmark debt risk premium for an entity with similar characteristics to Horizon power. It is considered likely that a relatively small entity characterised by relatively high and variable costs and uncertain revenue would not have the same access to bond and other debt markets as Western Power or other benchmarks typically used in setting allowable returns in the energy sector in Australia. This in turn suggests that the debt risk premium for Horizon Power should be higher than for Western Power.

In addition, it is likely to be the case that smaller companies find it more difficult to access debt markets on the same terms as larger companies with otherwise similar risk characteristics in times of financial market instability. To the extent that this is true, the debt risk premium for smaller companies would be likely to have increased by more than for larger companies following the global financial crisis.

When applying these considerations to Horizon Power it is important to recognize that there is a strong case that it has a much lower credit rating then BBB. An issue that the ERA needs to consider fully is whether benchmarks relevant to Horizon Power could issue BBB bonds in Australia. It is suggested that this issue needs to be investigated further for Horizon Power as it is not appropriate from a benchmarking or economic efficiency perspective to use a ‘one size fits all’ approach when there are genuine cost differences for Horizon Power that it cannot reasonably control.

These asymmetric risk, illiquidity and credit rating effects should be recognized in choosing a sample of firms for determining benchmark parameters to apply to Horizon Power.

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