

Market Risk Premium

Further Comments

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Prepared for Energy Networks Association, Australian Pipeline Industry Association and Grid Australia

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Introduction

We prepared a review paper dated August 2008 on the appropriate market risk premium to use in the context of estimating the cost of equity capital using the Capital Asset Pricing Model [CAPM]. This review paper comprised part of a submission by the Joint Industry Association ["JIA"] to the Australian Energy Regulator ["AER"] for consideration in its assessment of weighted average cost of capital parameters for electricity transmission and distribution network service providers. Our primary conclusion is summarised below:

"We recognise that precise estimation of both the MRP without imputation tax benefits and the estimation of imputation tax benefits is a challenge due to 'noise' in historical data. An overlay of the need for regulatory certainty encourages us to recommend that there be no change in the widely used 6% under a view that imputation tax benefits have no value but it this is not enough to prevent our recommendation of 7% when imputation benefits are included. While we have not focused on estimating an explicit value of gamma or the value of imputation tax credits once distributed in this paper, regulatory practice places a value on gamma of 0.3 and greater. Under these circumstances we recommend the MRP be 7%."

The AER released a proposal and explanatory statement in December 2009. In response to the AER release, the Joint Industries Association ["JIA"] has asked us:

". . . to advise whether the inclusion of 2008 data is sufficient for [us] to change the view expressed in [our] report and whether the prevailing condition in the market might suggest, if anything, the ex-ante MRP is expected to be considerably higher than 6 percent. This also needs to consider why Officer now considers a MRP of 7 percent is appropriate given that when he initially set MRP at 6 percent the historical average was 7.9 percent (as noted by the AER)."

In addition we have been asked:

"1) If the WACC parameters (other than the MRP) were to be set as per the AER's Proposed Statement, is there persuasive evidence to set the MRP at 7%?"

2) In the circumstances identified above, would an MRP of 7% be necessary for the businesses to have a reasonable opportunity to recover at least the efficient costs the operator incurs in respect of the cost of equity (excluding equity raising costs)? In this question, please assume that the parts of the regulatory framework other than the WACC parameters (such as the Opex and Capex approval process) are set appropriately.

3) In the circumstances identified above, would an MRP of 7% be necessary for sufficient incentives to be in place to promote efficient investment. In this question, please assume that the parts of the regulatory framework other than the WACC parameters (such as the Opex and Capex approval process) are set appropriately."

This document:

- Updates our review paper dated August 2008 to include data for the full year 2008; and
- Responds to the requests above from the JIA by:
 - Commenting that our view about the appropriate MRP has not changed in light of the additional data; and

- Elaborating upon why 7% is considered appropriate in light of the earlier recommendation by Officer of 6%.

In summary our view is guided by a number of 'principles':

- the market return should include a component for imputation tax benefits;
- a long term view of the historical MRP is the best guidance for forming a view about the forward looking MRP;
- this long term view should not be substantially influenced by the addition of any single year and should be informed by examining a multitude of data and statistics (e.g. exponential smoothing, moving average, volatility);
- an integer value for MRP should be used rather than implying spurious accuracy from using a decimal point;
- while 2008 reduces the average MRP it actually reflects an inverse relationship for a forward looking MRP; and
- there is not, as yet, a generally accepted method of adjusting MRP for the underlying changes that occur in the market. Therefore the regulator should adopt a conservative approach to how it treats such changes in the MRP.

Taking these 'principles' into account, our particular recommendation for an MRP of 7% over 6% reflects:

- the market return explicitly including a component for imputation tax benefits with theta greater than 0.3. We note that the AER have proposed gamma (and theta as we read the view) to be 0.65;
- our view that the unusually large negative realised MRP for 2008 year should be 'weighted' from a long term rather than shorter –term perspective;
- the evidence highlighting that the forward looking MRP is well above 6% for the shorter to mid–term and can be expected to prevail at least over the period to which the MRP will apply for the purposes of the current WACC review; and
- 7% is the integer value that captures the market evidence we have examined.

It follows therefore that our answer to each of the questions numbered 1) through 3) above is "yes".

Update of Historical MRP Data

Our calculation of the historical MRP is assessed by examining the excess realised rate of return over a year for an investor who invests in the market portfolio and the proxy for the risk free rate at the beginning of the year. Thus the MRP is calculated as the realised market rate of return less the opening yield on a proxy for the risk free rate. We suspect the AER (and possibly Brailsford et al) estimates have been calculated using the closing yield for the proxy for the risk free rate. This can affect shorter term averages in particular.

Our August review paper provided an estimate of the MRP using historical data for the time frame 1883 to 2007 and various sub-periods. The data was essentially drawn from four sources:

- Research by Professor Officer as published in 1989¹;
- Summary data published by Brailsford et al²;
- ASX index dividend data as available through Bloomberg; and
- Commonwealth Government Security yield data as provided by the Reserve Bank of Australia.

Research subsequent to Officer, by Brailsford et al³, revised the market return data used by Officer prior to 1958. We do not have access to this data. Consequently we have used the summary data from Brailsford et al to estimate the summary information in Table 1 for the periods commencing 1883 whereas we used our own data sources for the period commencing 1958⁴. The market returns, and consequently the MRP, for the original Officer series are higher for the period 1883 to 1958 as implied by the data in Table 1.⁵

Table 1: Impact of adding 2008 to historical MRP

From	To	MRP with no FTC	With gamma 0.5	With gamma 0.65	Adj by 20 bp to 5 year CGS
Updated Brailsford et al data					
1883	2007	6.4	6.5	6.6	6.8
1958	2007	6.7	7.1	7.2	7.4
1883	2008	5.9	6.1	6.1	6.3
1958	2008	5.7	6.0	6.1	6.3
1958*	2008	6.0	6.3	6.4	6.6
Updated Officer Data					
1883	2007	7.5	7.7	7.8	8.0
1883	2008	7.1	7.2	7.3	7.5

* Adjusted to reflect 1 in 126 year weight

Data for the full year 2008 is now available and we have updated the historical MRP and some volatility data to include this additional year. Summary data is presented in Table 1 and Figures 1 and 2 with more detailed information included in the Appendix. We have

¹ Officer, R. R. (1989), 'Rates of Return to Shares, Bond Yields and Inflation Rates: An Historical Perspective', in Ray Ball, Philip Brown, Frank J. Finn and R. R. Officer(eds.), *Share Markets and Portfolio Theory: Readings and Australian Evidence*, University of Queensland Press

² Brailsford T, J Handley & K Maheswaran, "Re-examination of the historical equity risk premium in Australia," *Accounting and Finance*, 48, (2008) pp 73-97

³ Op cit

⁴ We broke the entire period into 1883 to 1957 and 1958 to the end year. Brailsford et al summary data was used for the former period and Officer and Bishop data used for the latter period.

⁵ See both Brailsford and Officer and Bishop for further comments.

used the summary data presented by Brailsford et al as the basis for updating that series (i.e. the 1883 – 2008).

The year 2008 was an unusual year to the extent that the overall annual realised stock market return of -40.4% was the lowest in the 126 year history of data described above. Consequently the outcome reduced all average market risk premia for the overall period and sub-periods as is apparent from Table 1 and the tables in the Appendix. We have retained the same length sub-periods as our prior review paper in these latter tables consequently the starting year is generally 1 year different (except for one period of interest, 1958 – 2008).

There has been a change in the average MRP, without any recognition of imputation tax benefits, as a result of adding the 2008 year outcomes. Specifically, the MRP has:

- declined by approximately 40 basis points over the period 1883 to 2008 as a result of adding 2008 (there is rounding in the Table which implies 50 bp); and
- declined by approximately 100 basis points over the period 1958 – 2008.

Table 1 and Figure 1 presents the historical MRP from 1883 to 2008 and the large negative realised MRP for 2008 is apparent (please note that the graph uses Officer data for the period 1883 to 1957 so the MRP may be slightly overstated relative to the Brailsford et al data).

Figure 1: Historical MRP, 1883 to 2008

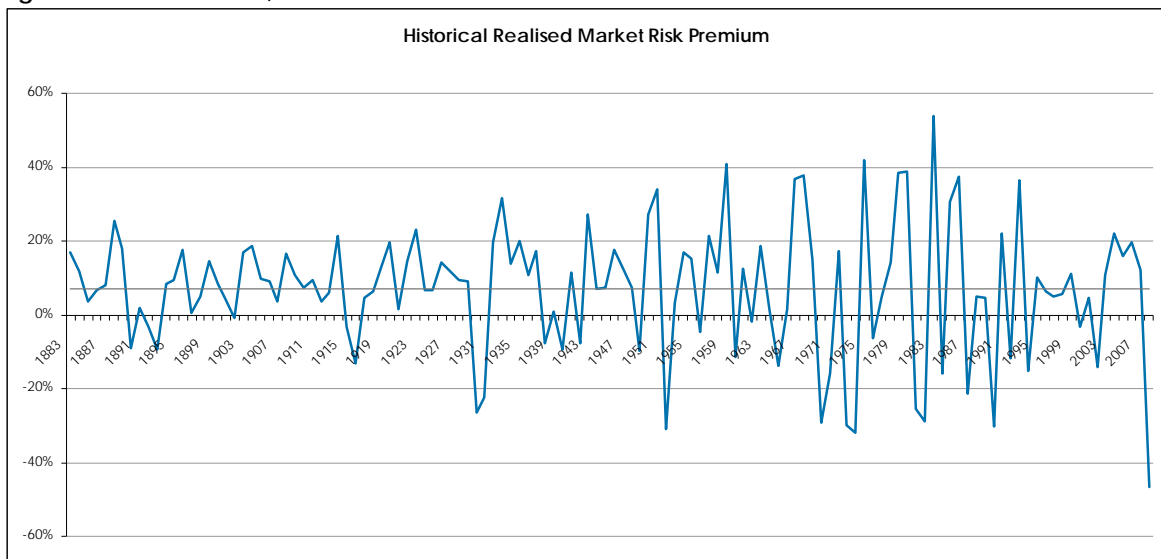
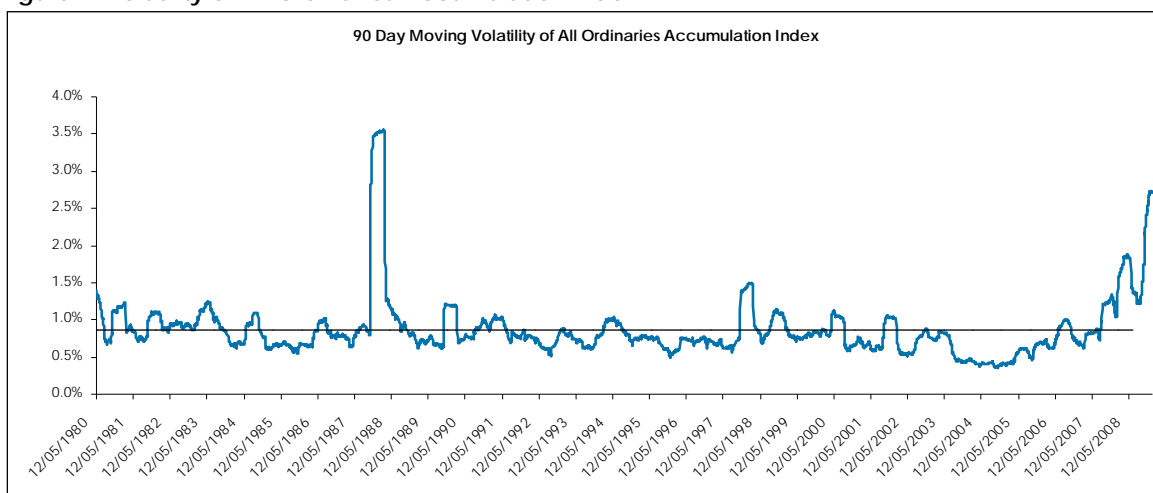


Figure 2 shows the increase in volatility that has accompanied the decline in the realised return from the market, as measured by the 90 day moving average of the stock market volatility. Volatility in the market is currently at the second highest level over the period – second to volatility around the October 1987 stock-market crash.

Figure 2: Volatility of All Ordinaries Accumulation Index



Commentary on Updated Data

A view expressed in our previous review paper⁶ was that the longest time series possible, subject to minimising data measurement errors, should be used to estimate the MRP. An important basis for this view is that the longest period possible gives a weighting to each annual outcome that 'best' reflects the probability of the outcome occurring.

Additionally, Gray and Officer are quoted in the AER Explanatory Statement (p170) as saying:

We recognise that it is likely that the MRP is not stationary and likely to vary under different economic conditions. However, the fact that there is no adequate theory underlying the variability of MRPs makes it dangerous to adjust an MRP estimate simply because another year or two or three of data alter the estimated mean. For example, a year ago the 30-year mean excess return was less than 6%, leading some to call for a reduction in the MRP used by Australian regulators. Now, the most recent 30-year mean return is 7.7%.

We do not advocate increasing the MRP now for the same reason we did not advocate reducing the MRP estimate last year. The problems of the theory and measurement of MRPs suggest a conservative approach – a regulator should be very careful about making any changes without compelling evidence.⁷

We agree with this approach. The addition of the 2008 numbers has not changed our position from that recommended in the previous review paper. The recommendation to increase the MRP to 7% if imputation tax benefits were valued at greater than 0.3 when distributed was based on both the inclusion of imputation tax benefits to an historical average that had not explicitly catered for them and also on the general behaviour of the MRP over time cross-checked against other estimates e.g. forward-looking estimates. This view has not changed because of a one year stock market decline. In fact the temptation is to recognise that the observable increase in market risk will be driving an increase in the market risk premium above our recommendation. There is recent

⁶ Officer zbob and Steven Bishop, "Market Risk Premium: Review Paper," August 2008

⁷ S. Gray, and R.R. Officer, A report for the Energy Networks Association, op. cit., 2005 pp.10-11

evidence to which we refer later that suggests a substantial rise in at least the short- and medium- term MRP.

Stock market declines or booms of 'magnitude' are relatively infrequent. The 2008 market decline of -40.4% is the largest negative outcome in the 126 year time series described above. This is apparent in Figure 1. The next largest negative outcome was -27.3% in 1952. It also represents the largest absolute deviation from the mean at 54 percentage points below the mean. The largest deviation above the mean was 47 percentage points in 1983.

Including this 2008 negative outcome in a short time period would overweight its likelihood of occurrence and provide a misleading number. For example, giving it equal weight to other years in the shorter period 1958 – 2008 would overweight it, just as might be the case for an unusually large positive event. To expand, the 2008 outcome has a weight of 1 in 51 years in the latter time period compared with 1 in 126 in the 1883 to 2008 time period. It may even be over-weighted in a longer time series (pre 1883) but an even longer time series is not readily to hand to confirm or deny this weighting.

Ignoring the impact of imputation credits, the average historical MRP for the period 1958 – 2008 is 5.7% compared with 6.7% for the period 1958 – 2007, a decline of approximately 100 basis points arising from adding the 2008 year.

Again ignoring imputation credits, the average historical MRP for the period 1883 – 2008 (using the Officer data for the prior period) is 7.1% compared with 7.5% for the period 1883 – 2007, a decline of approximately 40 basis points arising from adding the 2008 year.

In our view the latter adjustment is more appropriate than the former. Looking at the longest time period provides a weighting of events in accordance with their 'likelihood' of occurrence. Applying this logic to the Brailsford et al series, ignoring the impact of imputation tax benefits and using the Brailsford summary data, provides an historical MRP for the period 1883-2008 of circa 5.9% and circa 6.0% for the period 1958 – 2008 if a one in 126 rather than one in 51 year weighting is applied.⁸

Adding an imputation tax adjustment with theta at 0.65 leads to an historical average MRP of circa 6.1% for the longest time series and 6.4% for the adjusted shorter period. If the MRP was estimated using a 5 year Commonwealth Government Bond ['CGB'] rather than a 10 year CGB, the average is estimated to be 6.3% and 6.6% respectively.

As noted above, we are wary about changing our recommendation based on the addition of one year's data and we prefer the longest time period possible to 'best' reflect the relative weighing of events, especially extreme events. In addition, in our view use of an integer value for MRP is appropriate on the basis of the spurious accuracy of this premium (i.e. look beyond the simple decimal point). We do not change our recommendation of 7% derived prior to adding the 2008 year simply as an outcome of its inclusion. In our view the cross checks to other data provided below, particularly forward-looking data, supports our recommendation.

Forward View and Prevailing Market Conditions

The prevailing market conditions suggest that the current short – medium term MRP is well above 6.0%. There is evidence from a variety of sources, some summarised below, all pointing to this view. For example, analysis of the futures market suggests that the short

⁸ Note that our key point here is that the 51 year history will potentially overweight extreme events relative to the frequency of occurrence over a longer time frame. Based on observable history there is at most a 1 in 126 chance of the 2008 outcome.

term MRP is in the range 16 - 18%. This is reinforced by analysis of the corporate bond market and from cash flow based models⁹.

The current economic circumstances are most unusual. As already noted, 2008 stands out as the year realising the lowest market return in the 126 year history available to us.¹⁰ Equity risk is also at the high end of experience. As a consequence, we see a need to add more weight to the prevailing market conditions and forward evidence than we might otherwise consider. However, in the face of this evidence, we do not change our prior recommendation that there is support for an MRP of 7.0% if the chosen theta is greater than 0.3.

As discussed in our previous review paper, the CAPM is a forward looking model and we are using historical outcomes to guide a view on what the forward MRP would be. Investors require a positive return for bearing risk consequently the MRP should be positive. Clearly the 2008 year outcome of a negative 46% MRP does not mean there is a negative forward MRP as this is not consistent with a positive reward for bearing risk. There is a likely inverse relationship between a realised MRP and a forward looking MRP. A decline in stock market returns arises from either a downgrading of expected cash flows for all stocks and / or an increase in the average discount rate. It is most likely that forecast expected cash flows have declined and the discount rate has increased. Since there was a decline in the 10 year CGB rate over 2008 (from 6.34% to 4.01%) and given the evidence on increased market volatility, it is most likely that the underlying MRP has increased substantially, at least in the shorter term.

Figure 2 above highlights the increase in market volatility that has accompanied the substantive fall in the realised MRP.

Recognising the MRP is an ex-ante variable, an estimate can be derived (by making a number of assumptions) from forward markets such as options on the SPI (Share Prices Index) contracts. Where we have other relevant information, such as that derived from forward markets, we could use this to enable us to get a more accurate estimate of the 'correct rate' for the current time period. Such estimates are only valid for the time period implied by the option or the forward period. We might expect that, although variable, such an estimate of the rate might approach (from above or below) an equilibrium value over time such as that implied by the 'long term average' estimate of MRP.

An example of this approach is used by JF Capital Partners ["JFCP"] to modify their estimates of the cost of capital to meet current circumstances. JFCP note that nearly all asset pricing models imply a constant price per unit risk so that changing values reflect changing risk.¹¹ JFCP estimate that this price of risk for the empirical estimates of the parameters of CAPM is about 43 basis points per unit risk e.g. a 6% MRP with a standard deviation (volatility) of 14% implies 43 basis points (6%/14%). JFCP then estimate the implied volatility from the call option on the SPI contract. The current estimate of the volatility using this approach is 42% as apparent in Figure 3, reflecting the enormous volatility currently being observed in capital markets. The implied MRP from such observations is 18% (42% * 43bp). JFCP then fade this estimate of the current MRP to the 'equilibrium' MRP (derived from the long-term historical average) over a number of years for their valuations of equity.

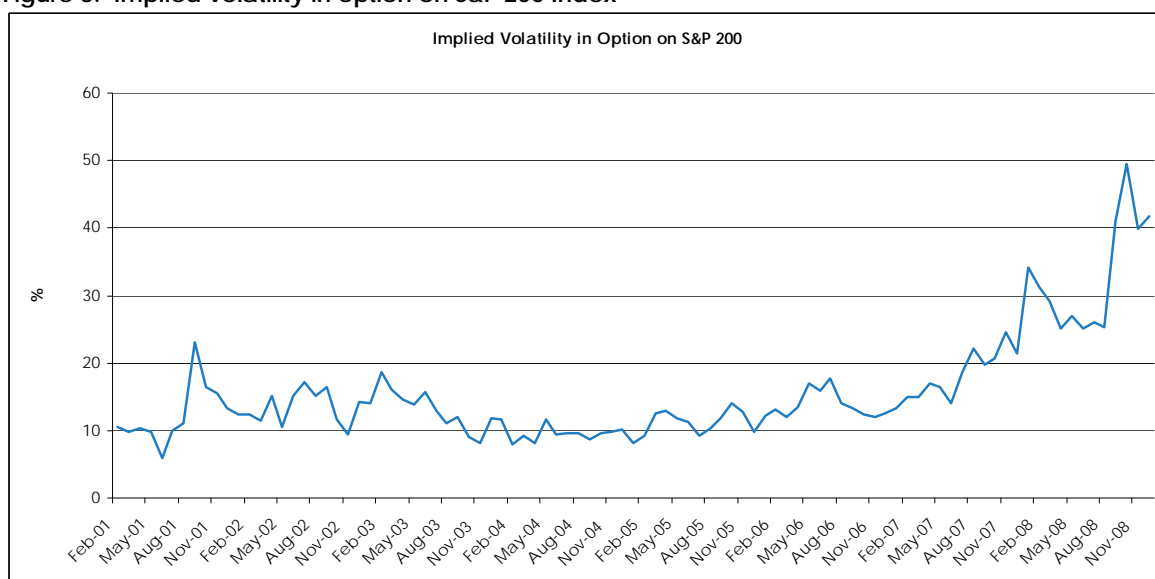
⁹ See submission by CEG "Forward looking estimates of the equity premium - for regulated businesses and the market as a whole", January 2009

¹⁰ While there are other 'large' negative and positive years, they are in the past and do influence the historical MRP. These too should be weighted in a very long term context. However, while we are estimating the forward MRP from historical data we are also cross-checking it against other data. The other data is signalling that the current MRP is higher than 6% and even higher than 7%.

¹¹ JF Capital Partners is a fundamental, research-driven Australian equities manager. Professor Officer is Chairman of JF Capital Partners and sits on the Investment Advisory Committee.

We have also estimated the implied volatility for a 12 month option and this is 38% suggesting an MRP of 16%.

Figure 3: Implied volatility in option on S&P 200 Index



There is empirical and theoretical support for such an approach as that used by JFCP¹². Moreover, it would imply an MRP above the current 'equilibrium rate' or 'long term average' being used by regulators. While we are not advocating this approach to estimating an MRP at this time, we make the point that 6.0% is clearly well below the prevailing shorter term (and longer term) forward MRP.

The implied forward MRP from the JFCP analysis is reinforced by examining yields in the corporate bond market where credit spreads over the Commonwealth Government Securities have risen since early 1970. This is illustrated in Figure 4 for BBB rated corporate bonds. The average spread in the data to December 2006 was 122 basis points. For the calendar year 2008, the average spread has been 295 basis points – well above the prior average.

There is a limited history on corporate bond data consequently we see our analysis as indicative. Equally we have not replicated the analysis for other rated bonds.

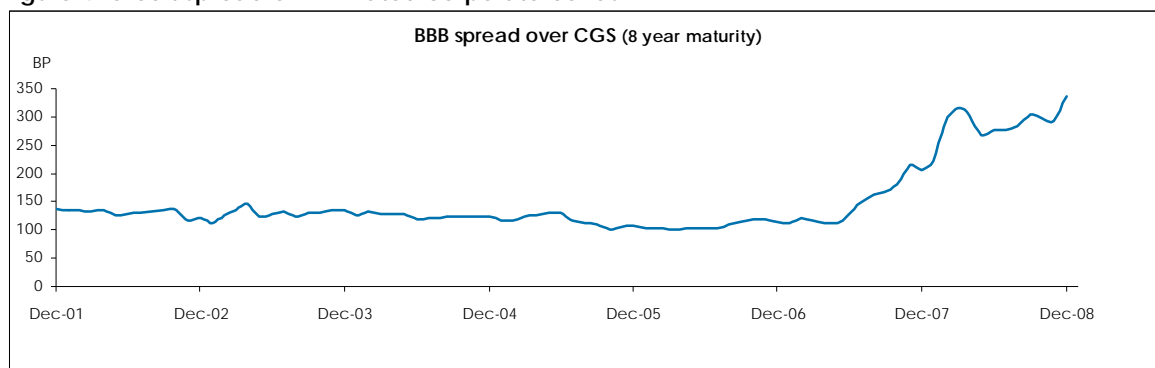
Corporate debt is a risky asset and can be priced according to the CAPM. In this context, the rise in the spread can be explained by either an increase in the MRP, an increase in beta or some combination.

If the MRP for the period to December 2006 is 6% then this implies a beta of debt of 0.2 to explain an average spread of 120 basis points. If we assume the average beta of debt does not change subsequently then the forward MRP would be 15% to explain a spread of 300 basis points¹³. At the other extreme, the beta of debt would be 0.5 to explain an MRP of 6% for such a credit spread. It is not clear whether the beta of debt, the MRP or both have changed to explain the spread in the context of the CAPM. However an increase in the MRP can be expected given the change in volatility apparent in the equity and options markets.

¹² See for example, Doran J, E Ronn & R Goldberg, "A Simple Model for Time-Varying Expected returns on the S&P 500 Index", Working Paper University of Texas, 2005. This paper also provides references to this area of research.

¹³ We note that there are other partial explanations for the rise including that presented in a CEG report entitled "Establishing a proxy for the risk free rate" September 2008 that CGS yields are lower than the risk free rate because they offer a 'convenience' factor.

Figure 4: Credit spread on BBB rated corporate bonds



Source: Bloomberg

In addition to this forward based evidence, we noted in our review paper that there are a number of cross checks to consider when setting the MRP. We have updated Table 1 from our prior review paper that captured the forward looking MRP presented by Bloomberg. This is presented as Table 2 below.

This shows the increase in the derived forward MRP which reflects current market conditions. Clearly the derived MRP has continued the general upward trend in all countries to July 2008 and to January 2009 except for Australia. In the latter case the MRP at jumped in the July number to 8.6% and fell to 8.0% in January 2009. The MRP for all countries listed has risen by circa 300 basis points since 2004 with Australia at the top end of the increases. The source of the data was described in our prior paper with the three columns 2005 to 2008 captured by Allen Consulting from Bloomberg and the last 2 columns captured by us from Bloomberg (Bloomberg do not retain a history of these estimates).

Table 2: Bloomberg forward based estimates of MRP

Country	Market Risk Premium				
	2004	2006	2008	July 2008	Jan 2009
Australia	4.5	4.9	7.9	8.6	8.0
Canada	6.6	6.6	7.8	6.8	9.8
United Kingdom	5.0	5.2	6.3	6.7	7.9
USA	5.1	4.5	6.8	6.9	8.7

Source: Allen Consulting Group, Bloomberg

Certainly the increases in the Australian MRP are consistent with the increase in volatility evident in Figure 2.

The Bloomberg analysis has a long term view of the future as described in our review paper. The modeling used to derive the MRP ends up with a perpetuity view of cash flow forecasts. Consequently the 8% in Table 2 above is a long term view in contrast to the 18% short term view described above. From our assessment of the approach taken by Bloomberg, there is no allowance for the value of imputation tax credits in the analysis. Based on our estimate of 170 basis points if theta was one, we would add 110 basis points for a theta of 0.65 arriving at an adjusted MRP of 9.1%.

There is little doubt that the current forward MRP is above historical averages. As noted earlier, and in our previous review paper, the MRP will change over time. However there is as yet no 'accepted' theory to guide how to change the MRP for current conditions which is why we adhere to using an MRP informed by the long term historical MRP to minimise regulatory risk.

Having regard to the historical evidence adjusted for imputation tax credits (certainly at 0.65 foreshadowed by the AER) as well as the market evidence from the current economic environment, our particular recommendation is for an MRP of 7%.

Commentary on Officer Views

The second part of the primary question the JIA asked us to respond to¹⁴ was:

"... consider why Officer now considers a MRP of 7 percent is appropriate given that when he initially set MRP at 6 percent the historical average was 7.9 percent (as noted by the AER.)"

Officer undertook the initial research into the time series of MRP in Australia. Officer provided independent expert advice to the Office of the Regulator General ["ORG"] over a number of price determinations. In a staff paper prepared by the ORG¹⁵, Officer was asked to comment on a paper recommending a MRP of 6.5%. The following was quoted in the staff paper:

"A market risk premium of 6.5% is being used and I have no strong grounds on which to alter this although I have consistently used an MRP of 6% in my own work, simply on the basis of that I believe 6% is a consistent estimate with historical evidence. Moreover the fact that it does not apply a decimal point does not give any indication of spurious accuracy in this premium. The premium is highly variable – it would not be a risk premium if it was not highly variable – and therefore it is difficult to concede from historical data what the expected premium is in the future. Without further evidence, one must accept that the number 6.5% is within the range of reasonable values for such a premium." P 24 (see footnote 14 for the reference)

Officer holds the view consistently (i.e. both then and in this paper) that use of a decimal point suggests spurious accuracy. Consequently he prefers the use of an integer.

In light of the evidence, the challenge is whether best judgment leads to an MRP of 6% or 7%.

While the entire series 1883 forward is the longest time period and ideally the most relevant, challenges with the earlier data (pre 1958) meant the primary focus was on later periods. The initial input to the ORG paper (CSFB) examined 1947 – 1991 / 1992. The Officer data provided an average MRP of 7% for this period. Another period of interest was 1955 – 1992 where the average was 6.6%¹⁶. In addition regard had to be made to exponential and rolling averages, not just a simple average. It should also be noted that the market returns did not contain imputation tax adjustments for the relevant period.

Consideration of these matters, recognising that the historical data did not adjust for imputation tax benefits and examination of the data prior to price determinations led Officer to use 6% as a matter of course.

Consideration of the data to 2007, the impact of ensuring historical data reflected the impact of imputation tax credits and of current market conditions led to the recommendation in our initial review paper. We do not see the 2008 outcome as changing this position.

Overall, and consistent with the views in our previous review, we recommend the MRP be 7%.

¹⁴ See page 1 above for the questions we were asked to address.

¹⁵ Office of the Regulator-General, Victoria, "Weighted Average Cost of Capital For Revenue Determination: Gas Distribution", Staff Paper No. 1, 28 May 1998

¹⁶ See Melbourne Business School Cost of Capital Seminar presentations.

Appendix: Historical MRP data for various periods to 2007 and to 2008

Table A1: MRP including impact of Imputation

Period				Market Risk Premium				
				$\phi = 0$	$\phi = 0.65$		$\phi = 1$	
Years					Adj	With Imp	Adj	With Imp
1999	-	2008	10	3.2	0.9	4.0	1.3	4.5
1989	-	2008	20	3.2	1.1	4.3	1.6	4.9
1979	-	2008	30	5.9	0.8	6.7	1.2	7.1
1969	-	2008	40	3.9	0.6	4.5	0.9	4.8
1958	-	2008	51	5.7	0.4	6.1	0.7	6.4
1949	-	2008	60	6.1	0.4	6.4	0.6	6.6
1939	-	2008	70	6.3	0.3	6.6	0.5	6.8
1929	-	2008	80	6.3	0.3	6.6	0.4	6.7
1919	-	2008	90	6.9	0.3	7.2	0.4	7.3
1909	-	2008	100	6.8	0.2	7.0	0.3	7.1
1899	-	2008	110	7.6	0.2	7.8	0.3	7.9
1889	-	2008	120	7.3	0.2	7.4	0.3	7.5
1883	-	2008	126	7.1	0.2	7.2	0.3	7.3

Table A2: Impact of Imputation on MRP (Table 1 from review paper)

Period				Market Risk Premium				
				$\phi = 0$	$\phi = 0.65$		$\phi = 1$	
From	To	Years		Adj	With Imp	Adj	With Imp	
1998	-	2007	10	8.4	1.1	9.5	1.7	10.1
1988	-	2007	20	5.8	1.1	6.9	1.7	7.5
1978	-	2007	30	7.9	0.7	8.7	1.1	9.1
1968	-	2007	40	6.0	0.6	6.6	0.8	6.9
1958	-	2007	50	6.7	0.4	7.2	0.7	7.4
1948	-	2007	60	7.0	0.4	7.3	0.6	7.5
1938	-	2007	70	6.8	0.3	7.1	0.5	7.3
1928	-	2007	80	7.0	0.3	7.3	0.4	7.4
1918	-	2007	90	7.5	0.2	7.8	0.4	7.9
1908	-	2007	100	7.4	0.2	7.6	0.3	7.7
1898	-	2007	110	7.5	0.2	7.7	0.3	7.8
1888	-	2007	120	7.4	0.2	7.6	0.3	7.7
1883	-	2007	125	7.5	0.2	7.7	0.3	7.8