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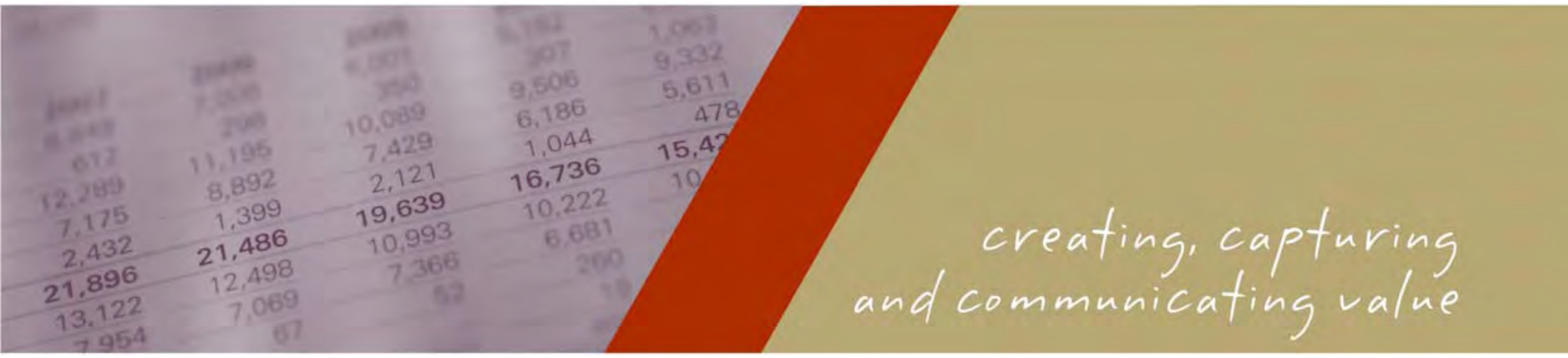

Market Risk Premium

Estimate for January 2010 – June 2014

Prepared for WestNet Energy

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1. Summary and Conclusion

We have been asked by WestNet Energy to provide an opinion on the Market Risk Premium ("MRP") on equity that is expected to prevail over the regulatory period January 2010 to June 2014. In our view this is in the range 7% to 12% with our point estimate being a conservative 8%.

It is now well recognised that investors require a return **on** capital, in addition to a return **of** capital when investing. The return on capital will reflect the risk of the investment being undertaken. Typically, the capital of a business is defined as equity plus debt capital and the required return is defined as a weighted average of the required return of the two.

The cost of equity can be estimated using the Capital Asset Pricing Model ["CAPM"]. It defines the cost or equity as a risk free rate plus a premium for risk where risk is a market risk premium or MRP multiplied by beta (a measure of the risk of an asset relative to market risk).

The MRP is an essential input to estimating a cost of equity under the CAPM. The CAPM is a forward looking model and therefore requires inputs that are forward looking. Despite this requirement it is common to use history to guide the selection of the inputs to the model. Regulators in Australia have used 6% as such an estimate in the past although a recent decision by the Australian Energy Regulator ["AER"] has increased this to 6.5%[1].

The MRP will change over time to reflect the "market's" changing view of risk and attitudes to risk. A positive risk premium, relative to a "risk free" asset, is required because investors are risk averse and require compensation for bearing risk. The MRP cannot be constant over time, if it was constant this would imply there was no risk and therefore there could be no risk premium.

In the current economic circumstances where there is greater market variability and economic uncertainty than has typically been experienced over at least the past 50 years we do not believe that a constant MRP reflecting the long term average is appropriate.

In the past we have recommended the use of the long term average historical MRP. This is **not** because we believe it to be stable over time but because there has been little in the way of evidence or theory that has allowed or encouraged other than the use of the average MRP. The current circumstances warrant a change:

- We have abnormal levels of market volatility that reflect the so-called 'Global Financial Crisis ["GFC"];and
- We have an approach that allows us to modify the average MRP for current economic circumstances.

The GFC has had a significant impact on the capital market. The stock market return for 2008 was a negative 40.4%, the lowest in the 126 year history of market returns available to us. The most recent data available to us (end November 2009) shows market risk, although declining from its peak, is still over 50% above our estimate of the long term average risk level. While there has been a recovery from the 'bottom' of the stock market fall, it is still only 76% of the peak prior to the crash. Both history and other forward looking data suggest the "Global Financial Crisis" is not over and still has considerable time to run i.e. it is not a short term phenomena and the market has not returned to 'normal'. On these grounds we recommend a MRP for the regulatory period January 2010 to June 2014 above the long term average.

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[1] Australian Energy Regulator, "Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters" May 2009

The use of an historical average as an input to the risk premium on equity contrasts with the widespread use of spot rates on debt to estimate the cost of debt. In practice this difference has not been of great concern however the current environment calls this into question. Because of large increases in debt premiums, there is a substantive disconnect between the risk spread on debt and equity when the historical average MRP is used to estimate the cost of equity. This process substantially under-estimates the required return on equity. In fact, it is possible for the cost of equity estimated this way to be below the cost of debt, which is a nonsense outcome.

We use a method that provides a view of a forward cost of equity that is consistent with current market conditions and with debt spreads. We estimate that a forward looking MRP of 8% will reflect 'average' current market expectations over the regulatory period. This MRP is derived as a compound average of our estimate of the spot MRP (November 2009) of 12% and a transition to the long term average of 7%[2] over the period of interest. Clearly accurate prediction may not be possible, however we are of the view that our approach does reflect the current view of risk in the market. The spot MRP has been estimated by reference to the forward view of volatility implicit in the pricing of options on the ASX 200 index and by the current high spreads in yields on corporate debt.

The forward looking market risk premium is well above the long term historical average due to current volatile market conditions brought about by the global financial crisis. Using a cost of equity derived from an historical MRP under current economic conditions will not provide the opportunity cost equity investors will expect and therefore its use runs the risk of under-investment in assets.

Four factors have combined to change a departure from our prior recommendations to use a long term average MRP to reflect a forward MRP:

a) A period of unusual economic circumstances in the form of the global financial crisis;
b) The substantive increase in risk spreads on debt arising from (a);
c) The availability of a forward view of market risk though the implied volatility of options on the stock market index; and
d) Promising research guiding the time period of departures from the 'norm'.

While still an evolving area for research, we are of the view that advances to date and the significant effect of the Global Financial Crisis (GFC) on risk and risk premiums (spreads) in financial markets warrant a departure from the use of the long term average MRP over the regulatory period 1 January 2010 to end June 2014.

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[2] Officer RR & SR Bishop, "Market Risk Premium: Further Comments", Value Adviser Associates, January 2009 submission to AER.

2. Context for Expert Report

We have been asked to provide an estimate of the Market Risk Premium ["MRP"] that is expected to prevail over the regulatory period 1 January 2010 to 30 June 2014. An MRP is required to estimate the cost of equity as a component of the weighted average cost of capital used, in turn, to include a return on capital in a building block approach to regulatory pricing.

3. Context for Market Risk Premium[3]

The required return (or cost) of equity investors can be derived from the CAPM. The CAPM is a forward looking model – it guides an assessment of what equity investors require to compensate them for time and risk over the period of interest. Our challenge is to estimate the forward looking, or ex ante, MRP. The MRP is defined as the expected return on the market, $E(r_m)$, less the risk free rate.

The CAPM describes the pricing of assets in the following way[4].

$$E(k_i) = r_f + E(MRP)\,\beta_i \qquad (1)$$

Where:

$E(k_i)$	is the expected rate of return from investing in the asset;
r_f	is the risk free rate;
$E(MRP)$	is the expected market risk premium and it is positive;
β_i	is the beta or risk of the asset relative to the market (It reflects the relative contribution of the asset to the risk of the market).

Some key features of the model for the purpose of this paper are that it:

- is forward looking
- defines a positive reward for bearing risk i.e. a market risk premium will be positive
- is a one period model of no particular time dimension;
- applies to all assets which also defines the market portfolio.

The most critical parameter is the expectations operator (E). The expectations operator should be thought of as the market's forecast of future or required (expected) returns before they will invest in the equity of 'average' risk (beta of 1). Ideally, what we need is some method of forecasting investor's expectations or equivalently their required returns for the different risk class of assets, averaged over all risk classes to capture the market view. Unfortunately, while such models exist, they require additional assumptions about investor behaviour and rarely have very much to offer in the way of forecast-ability. In an investment environment, this is perhaps not surprising insofar as if there were forecast abilities in these models then this would remove elements of risk and make the models redundant insofar as they are based on risk or stochastic returns.

Our view is that the ex-ante MRP is not constant and probably cannot be adequately represented by a stable distribution. Unfortunately, however, the theory as to what might cause the parameters of the distribution (and thus the mean ex-ante MRP) to change is not well developed. This makes forecasting changes difficult. Moreover, given the

[3] This draws heavily on Officer and Bishop June 2009 op cit.

[4] The symbols are similar to those in the Issues Paper however we have deliberately included the expectations operator E for emphasis. The model we refer to is the same as that referred to in the Issues Paper (e.g. page 6).

volatility of ex post market excess returns, even detecting such a change after the event is almost impossible. One exception, we argue, is the current credit crisis where there are a number of market data that all point to an MRP above the historical average at least for the short to medium term.

Despite these comments about the challenges in forecasting, there are some promising developments in identifying a forward looking MRP which we discuss later.

In circumstances where forecasting either the long term expected market return or the long term MRP, it is perhaps inevitable that, in order to be objective, forecasts rely heavily on historical data. The reason for relying on such data is that the expectations of investors will be framed on the basis of their experiences, which are of course historical. Therefore the mean of historical distributions of returns or models framing returns could be expected to have had the greatest influence on investors' expectations about the future. Hence the reliance on some average of historical MRPs in order to settle on an estimate of the investor's expected or required MRP.

Under these circumstances a longer time series is best as it will not only improve statistical 'accuracy' but it is also more likely to accurately weight events according to the likelihood of occurrence. For example, a short time period that incorporates the 1987 crash could potentially overweight that event compared to its likelihood of occurrence. Similarly, we note that observed market return for 2008 was a negative 40.4%, the lowest in the 126 year history of market returns available to us. From experience to date, this will be over-weighted in a short time horizon.

An alternative to estimating an MRP from historical data is to use forward looking approaches. One approach is to use information from forward markets and another is to use a version of the constant growth dividend discount model. These approaches can be further enlightened from examination of the pricing of other financial instruments, corporate bonds in particular. The latter reflect a forward view of the premium for risk and we normally expect this to move in accord with the MRP.

We now briefly review the historical MRP estimate before examining estimates of the MRP from a forward looking perspective[5]. The long term average is relevant because it is the best estimate of the level the current and expected MRP when there is no other information available than the historical series. It is also useful as a guide to the level it will return to after departures either above of below the average. However there is useful forward data available to assist determining an estimate of the forward MRP which we examine in a subsequent section. In particular, we examine estimates from implied volatility of a market index and from debt markets. These forward looking estimates provide a current MRP above the historical average. A particular challenge is to estimate the period for which the MRP is likely to remain above the long term average MRP and therefore what is most likely to prevail over the regulatory period commencing 1 January 2010. Our research suggests that the MRP is likely to remain above the average MRP for at least 3 years.

It is important is to recognise that we expect there will be some consistency or positive correlation between changes in the cost of equity and the cost of debt i.e. we would expect them both to move in the same direction. This has been particularly relevant during the GFC where many financial relationships that were previously thought to be independent have been found to be highly correlated. The spread on long dated (7 year) BBB rated debt is currently in the order of 399 basis points above 10 year Treasury Bonds at the end of November 2009. This spread has risen from a spread in less volatile economic conditions of 120 – 150 basis points. Since this rise is reflective of current economic conditions then we would expect a commensurate rise in the risk premium for

[5] More detail is provided in Officer and Bishop (August 2008 and January 2009)

equity. It is unlikely that there would be a narrowing of the spread between the cost of debt and equity under current conditions, rather a widening might be expected.

4. Historical MRP

The historical risk premium in Australia has been estimated over different periods by a number of researchers and regulatory authorities[6]. It has also been estimated by Officer and Bishop (2008) (2009) and others for a recent review by the Australian Energy regulator ("AER") of the weighted average cost of capital parameters for electricity transmission and distribution network service providers.[7]

4.1 Historical-based Research

Empirical research in Australia on the MRP has almost exclusively examined the historical behaviour of stock market returns relative to Treasury bond, or in some cases Treasury bill, returns. The exception is some research using the dividend discount model to estimate forward market risk premiums. These tend to be very sensitive to the assumed growth rate thus affecting the reliability of these forecasts[8].

Most historical studies have a genesis in data prepared by Officer (1989) where the early data was based on data complied by Lamberton (1958). Officer compiled a market realised return and risk free rate series from 1883 to 1987. The data preceded the introduction of imputation tax in Australia. The average excess return for this period was 7.9%. Subsequent studies have updated this series, just as has this paper. Subsequent studies include Dimson, Marsh and Staunton (2003), Hathaway (2005), Hancock (2005), Brailsford, Handley and Maheswaran (2008). In addition there have been papers prepared for regulatory hearings that update the Officer data, examples include Gray and Officer (2005), Bishop (2007).

Ball and Bowers (1986) did not use the Officer series but focused on the post 1973 period (1974 – 1985) determined by preparation of stock data by the Centre for Research in Finance ["CRIF"] at the AGSM. This group compute a value weighted index of all listed stocks in their files rather than the smaller number of stocks that are included in the Sydney Stock Exchange Indexes and subsequent ASX and S&P indexes. We have not correlated these indexes but are of the view that the MRPs are not substantially different since the latter 30 years of data was compiled from the same source.

While the base data sources either correspond or give similar MRPs in all studies, there have been some notable differences in two groups of studies.

1. The first group is Hathaway (2005) and Hancock (2005). These two studies adjust the base data for events they believe to be non-recurring and without the adjustments lead to an overstatement of the MRP. After adjustments, Hathaway argues that the appropriate market risk premium is 4.5% which is consistent with Hancock who argues that the MRP has not been stable over the prior 122 years and it is in the range 4.5% to 5.0%. We are not in favour of these adjustments, largely because there is no theoretical guidance as to what should be included or excluded. If exclusions are being undertaken, why not exclude periods like the 1987 crash? Our preference is to include all events but use a long time series to reflect the likelihood of occurrence.

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[6] See Brailsford T, J Handley & K Maheswaran, "Re-examination of the historical equity risk premium in Australia," Accounting and Finance, 48, (2008) pp 73-97 as one summary

[7] Officer RR & SR Bishop, "Market Risk Premium: Further Comments" Submission to AER, January 2009; Australian Energy Regulator, "Review of the weighted average cost of capital parameters: Electricity transmission and distribution network service providers", May 2009

[8] For example, Hird T & D Young (2009), "The Market Risk Premium and Risk Free Rate under the NER and in a Period of Financial Crisis: A report for ETSA", June 2009

2. The second group (of one) is the Brailsford et al (2008). This paper investigates the sources of data that comprise the Officer series and argue that the pre 1958 data has some measurement errors and cannot be relied upon. Nevertheless the post 1958 data is comparable to the updated Officer data used in this and other studies. Brailsford et al make a 'best efforts' adjustment to the pre 1958 market return data and calculate an average market risk premium of 6.4% over the period 1883 – 1987. This is below the average of 7.9% reported by Officer (1989). The difference is clearly attributable to the pre 1957 period where the averages are 6.1% and 8.0% respectively. The post 1957 averages (to 2005) are essentially the same at 6.4% and 6.3% respectively.

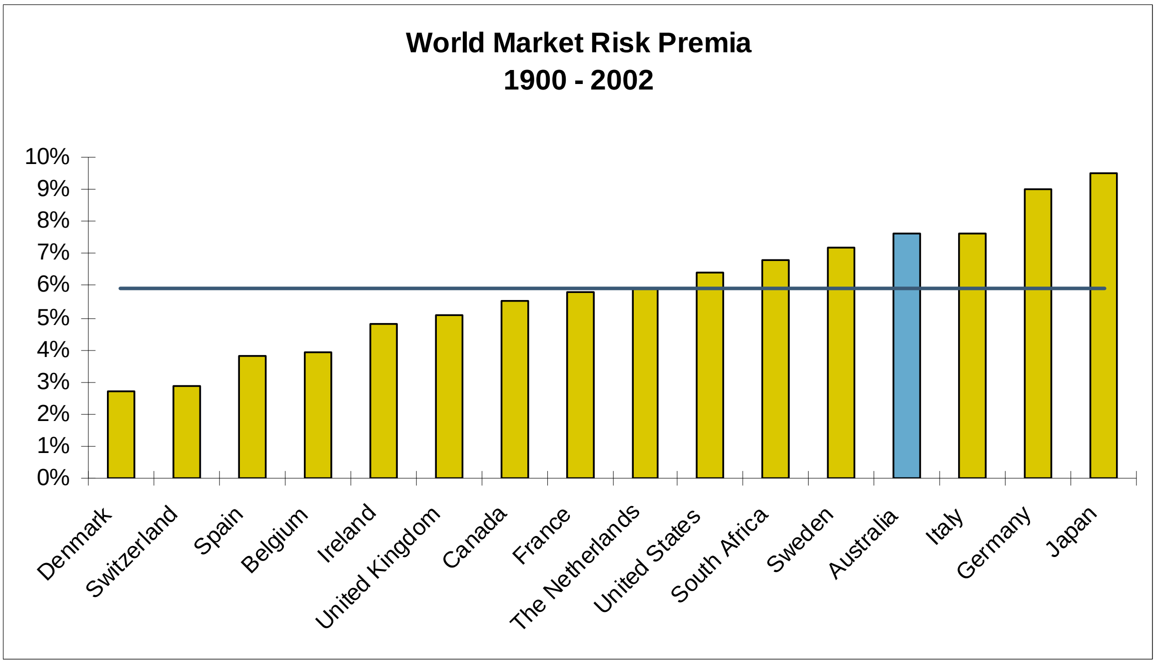
Given the above studies use essentially the same data source as this paper (subject to the comment above about Brailsford et al) we rely on our summary output as representative of the results of other research. With the exception of the section dealing with imputation tax, we report MRP data that does not explicitly include the impact of imputation tax on the market return. This is not because we are of the view that they have no value, the opposite is the case, but rather because we are not taking a position on the value of a dollar of distributed imputation benefits in this paper. While we rely primarily on the data used in this study, we do draw on the Dimson, Marsh and Staunton series of papers because they show Australian data in an international setting.

Dimson, Marsh and Staunton (2003) present MRPs (relative to long term bonds) for 16 countries using 102 years of data from 1900 to 2002. This is presented in Figure 1 below.

The (unweighted) average for the 16 countries is 5.9%. The Australian average was 7.6% (based on Officer data) and this excludes any adjustment for imputation tax benefits. Twelve of the 16 countries had MRPs greater than 5%. The Australian historical MRP is at the higher end but not dissimilar to the US, South Africa, Sweden and Italy based on these data but would be around the average using the unadjusted (for imputation tax benefits) data from Brailsford et al.

The market risk premium of 6% widely used by regulators in Australia is consistent with this world wide historical view of the average MRP as is our recommendation of 7% when imputation tax benefits are included at a gamma of greater than 0.3.

Figure 1: Australian MRP in International Setting



Source: Dimson, Marsh and Staunton (2003). The MRPs are calculated here as (1+Mkt Return)/(1+R_f rate) -1. This will give a slightly different premium that calculated as simply Market Return less R_f.

4.2 Updated Historical Market Risk Premium[9]

Our calculation of the historical MRP, as presented in Table 1 below, 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. The return on the Bond can be 'locked in' but the market return will not be known until the end 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.

The stock market return data was drawn from a number of sources:

- Research by Professor Officer as published in 1989[10];
- Summary data published by Brailsford et al[11];
- ASX index dividend data as available through Bloomberg; and
- Commonwealth Government Security yield data as provided by the Reserve Bank of Australia, generally yields on 10 year maturing securities were used when available however there were exceptions[12].

It is essential to recognise that stock market accumulation indices computed in Australia reflect a dividend yield plus a capital gain yield. They do not contain any yield from imputation tax benefits that have arisen from the introduction of the imputation tax system in July 1987.

One reason for the introduction of imputation tax system was to offset the otherwise double taxation of dividends. Under the prior classical tax system, dividends were taxed

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9 This sections draws on a report prepared for the Joint Industries Association for a submission to the AER in September 2008.

10 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

11 Brailsford (2008) op cit.

12 Officer (1989) describes the data.

firstly at the corporate level since they are paid out of after corporate tax earnings and secondly at the personal level since dividends are treated as taxable income. Under the imputation system, corporate tax paid can be viewed as a prepayment of personal tax for Australian Resident Taxpaying Personal Investors (ARTPI). Since we are interested in estimating the pre- personal but post- corporate tax rate of return from the 'market' we would be understating the return by ignoring any value associated with imputation tax benefits that could be attributed to personal tax savings. Thus the market return for a period should contain potentially three components:

1. dividend yield;
2. capital gain yield; and
3. imputation tax yield arising from any distribution with dividends.

To include a rate of return for imputation tax benefits requires knowledge of the market 'value' of these credits. We do not present a view on the value of these credits in this paper however we have estimated a rate of return component to include the market return based on a range of values for a dollar of imputation tax credits distributed.

The term "gamma" has been used widely to reflect the value of a dollar of imputation tax benefits. It is used to adjust either the tax rate in after tax cash flow estimation or to adjust the cost of capital when undertaking project or enterprise valuations or when assessing regulatory revenue requirements. However we do not use gamma but rather a component of it to adjust for the impact of imputation tax benefits on 'measures' company or market returns.

To explain our adjustment and its relationship with gamma, we draw on the description of three milestones in the life of an imputation tax benefit as described by Hathaway and Officer (2004).

1. It is **created** when company tax is paid;
2. It is **distributed** when company tax is paid to shareholders as an attachment to dividends;
3. It is **redeemed** when shareholders claim the rebate and enjoy the tax benefit.

Common usage is to define gamma (γ) as the value of a dollar of imputation tax benefit when it is **created**. A dollar of imputation tax created will be retained (and tracked as a "FAB" - franking account balance – until it is distributed by way of an attachment to a dividend. The imputation tax benefits are of direct interest to shareholders once they are distributed. Thus when looking at the return shareholders receive from their investment over a particular period, we are interested in capital gains, dividends and the imputation tax benefits attached to dividends.[13]

The relationship between gamma and the value of imputation tax benefits distributed is captured in equation (2).

$$\gamma = F \times \phi \qquad (2)$$

Where F is the proportion of imputation tax benefits created that are distributed (attached to dividends)

ϕ is the value of an imputation tax benefit that has been distributed. We define this to be the value on the day that the stock becomes ex dividend. Dividend drop-off studies estimate a value for ϕ.

[13] Any value to imputation tax benefits retained will be reflected in the share price through an anticipation of when they may be distributed and their value at this time.

Our focus here is on the value for ϕ.

The approach to adjusting MRP for imputation tax benefits is indicated by Officer (1994). The value is added to the market's expected rate of return so that a post imputation tax estimate of the MRP can be obtained[14]. The adjustment requires:

1. An estimate of the dividend yield (d_i) component of the total or cumulative yield (r_i). The total yield is made of the capital yield (p_i) plus the dividend yield (d_i) for the period (i). The implicit company tax paid on this dividend is estimated by grossing up the dividend yield (dividing by 1.0 less the company tax rate i.e. ($1- T_c$)) and then the tax component is estimated by multiplying the grossed up dividend by the effective company tax rate;
2. Since not all dividends are franked dividends, the proportion of franked dividends (f_i) has to be estimated. Multiplying this by the implicit company tax paid on the dividend gives the 'effective tax' implied on the dividend;
3. Finally, since not all investors value imputation tax benefits once distributed at their 'face value', see Hathaway and Officer (2004), an estimate of the value (ϕ) implied by the market of a unit or $1 of franking credits must be estimated.

The net result of these procedures is an estimate of the value of franking credits (VFC_i) in the return to investors for the period i, i.e.

$$VFC_i = d_i \left(\frac{T_c}{1-T_c}\right).f_i.\Phi \qquad (3)$$

We estimated a market return that included a value for imputation tax benefits that are attached to dividends paid according to equation (3).

A detailed description of our adjustment to the historical MRP to account for imputation tax benefits is provided in Appendix 1.

In summary, estimates of the value of franking credits ["VFC"] from 1987 to 2008[15] indicate an average value for the VFC of 84 basis points if the value of a dollar of franking credits distributed (ϕ) is 0.5. This would suggest an increase in the market rate of return for the period by an average of 0.84% (or 1.1% for ϕ of .65). For example if the MRP for the period or the expected MRP was 6.2% then it should be adjusted to 7.04% (7.3% at ϕ of 0.65) for the effective value of the franking credits. This is within the range of standard measurement error one might expect from estimates of the MRP. However, on the basis of such an estimate, given a value of 0.5 for imputation tax credits distributed, in our view a MRP of 7% is more justifiable than one of 6%. Added strength for this view arises from most historical averages (across different periods) being greater than 6%[16].

Research subsequent to Officer, by Brailsford et al (2008), revised the market return data used by Officer prior to 1958. We do not have access to these data. Consequently we have used the summary data from Brailsford et al (2008) to estimate the summary information in Table 1 for the periods commencing 1883 whereas we used our own data

[14] Gray and Hall (2006) present the mathematical relationship between the value of franking tax benefits and the MRP. Their adjustment is consistent with ours.

[15] Following a similar procedure to Brailsford et al

[16] For example, our updated estimate for 1883 – 2009' using Brailsford et al data for 1883 – 1958, is 6.2%

[18] We broke the entire period into 1883 to 1957 and 1958 to the end year. Brailsford et al summary data Number of years multiplied by the average to get the sum of the MRPs) was used for the former period and Officer and Bishop data used for the latter period.

creating, capturing and communicating value sources for the period commencing 1958[18]. 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.[19]

Table 1: **Historical Market Risk Premium**

From	To	MRP with no FTC	With gamma 0.5	With gamma 0.65
Brailsford et al adjustment to Officer Data				
1883	2007	6.4	6.5	6.6
1958	2007	6.7	7.1	7.2
1883	2008	5.9	6.1	6.1
1958	2008	5.7	6.1	6.2
1958*	2008	6.4	6.7	6.9
Officer Data				
1883	2007	7.5	7.7	7.8
1883	2008	7.1	7.2	7.2

* Adjusted to reflect 1 in 126 year weight

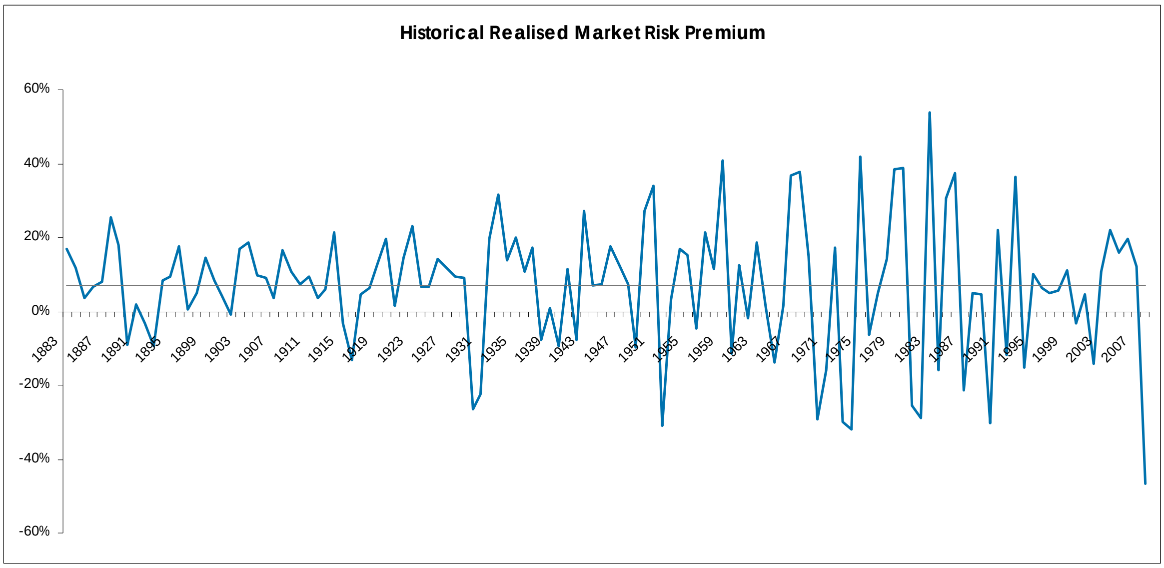
Table 1 shows that the long term historical MRP to 2007 with gamma at 0.65 was 6.6% for the longest time period and 7.2% for the period with the more reliable data (1958 to 2007).[20] The addition of 2008 changes these averages to 6.1% and 6.2% respectively. Clearly the impact is greatest for the shorter time period because the large negative result for 2008 received a much greater weight than in the longer time series. The fifth row (asterisked) shows the 1958 to 2008 series adjusted to demonstrate the point that shorter periods can overweight unusual years i.e. one that reflects a 1 in 126 year history rather than the 1 in 51 year history in the 1958 to 2008 period. In this case the average is 6.7% for gamma at 0.5 and 6.9% for gamma equals 0.65 (we have used 0.65 to reflect a view expressed by the AER in its May determination rather than express a view as to the value of gamma).

While the numbers above are presented with one decimal point it is important to recognise the lack of precision in the data. This should be apparent from Figure 2 which plots the empirical data on historical MRP as well as the average of 7.1% for this data. The wide range in actual MRP outcomes is apparent from this data and highlights the challenge in using one number to represent this situation. The standard error of the estimate of the mean is large leading to a wide confidence interval around the mean. The 95% confidence interval for the series that incorporates the "Lamberton / Officer" data is 4% to 10%.

[19] See both Brailsford and Officer and Bishop for further comments.

[20] Simply adding the value of franking credits to historical data to arrive at an implied cost of capital under an imputation tax system assumes that the introduction of such a tax has no effect on the cost of capital other than the value of the imputation credits. Such an assumption is likely to be wrong in a 'closed economy' but reasonable in an 'open economy' where there are significant international movements in finance and the country's capital market is small relative to world capital markets.

Figure 2: Historical annual market risk premium



Overall our assessment of the MRP from the historical series in Table 1 suggests an MRP in the range 6.1 to 7.2% when the adjustment for imputation tax credits is included. Clearly this is a long term average and applicable for a cost of capital assessed with a long term view.

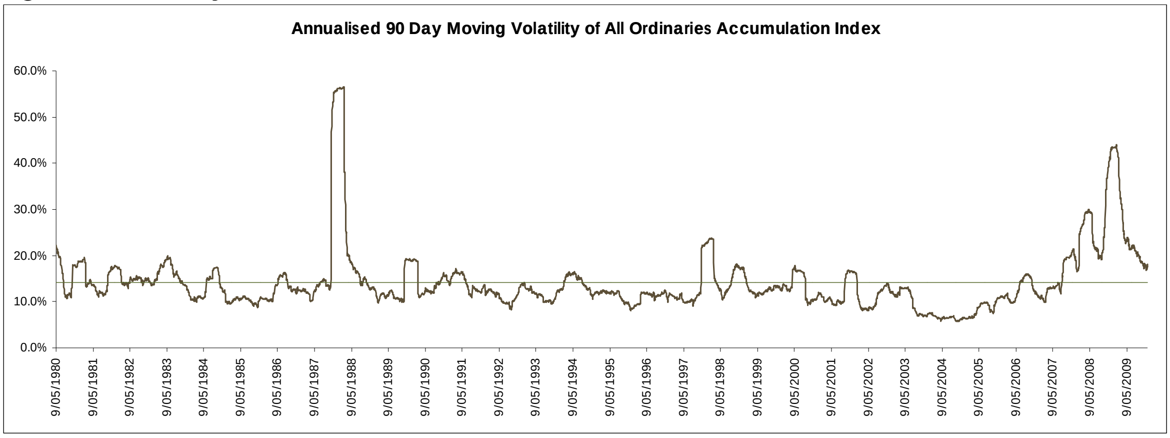
A challenge we have in recommending a number in this range is that we are strongly of the view that the MRP appropriate for the regulatory period is highly likely to be above this range. This comment is based on our assessment of the forward looking MRP to which we now turn. Our assessment of this information is that the market will require a return above the historical long run average in the next regulatory period.

5. Forward MRP under Current Economic Conditions

5.1 Current View of Risk

Equity and debt markets are experiencing an unusual period of 'high' risk. With the exception of the 1987 crash, current risk in the equity market, in particular, has been higher than other periods in the 29 year history of the daily data available to us. This situation is captured in Figure 3 below which shows a 90 day moving average of the volatility of the All Ordinary Accumulation index since 1980 to 30 November 2009. The current high levels of volatility have been sustained for the longest time period in the series.

Figure 3: Volatility of Stock Market



Source: Bloomberg, VAA analysis

Consistent with finance theory and evidence, we argue that risk averse investors will require a higher return to compensate for increased risk and the prevailing MRP has risen accordingly.

The evidence of increased risk and the current MRP being above the historical average includes:

- the implied volatility of options on the ASX 200 and a 90 day moving average of the return on the All Ordinaries Accumulation Index;
- yields on corporate bonds, in particular the yield spread between corporate debt and government debt.

These are examined below.

5.2 Forward View of MRP from Implied Volatility

We derive an estimate of the current, forward looking MRP from a process that assumes investors require a constant risk premium per unit risk and apply this to current estimates of market risk. The approach is described in more detail below after describing our approach to identifying the current forward view of market risk.

5.2.1 Estimate of Current Market Risk

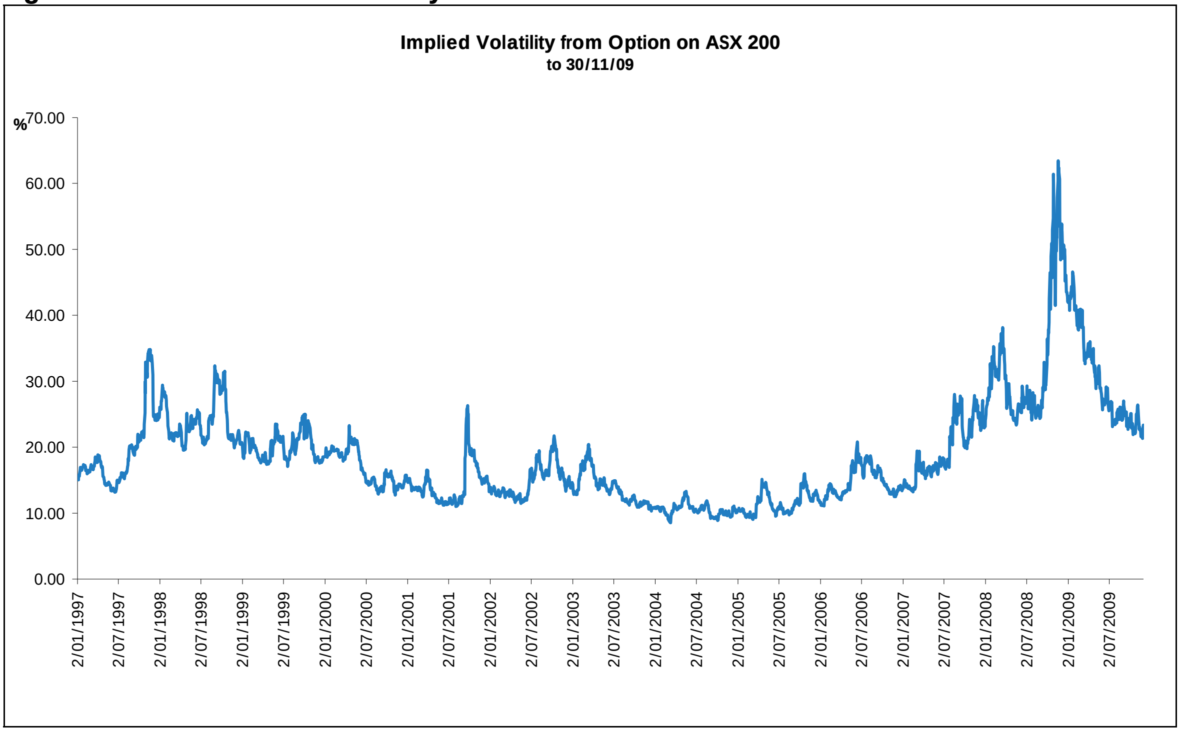
A current view of market risk or volatility can be derived from trades in options on the ASX 200 index. A key determinant of the price of these options is a view of the volatility of the market. The Black and Scholes option pricing model describes these prices in terms of 5 variables namely the current value of the index, the volatility of the index, the term to maturity of the option, the exercise price of the option and the risk free rate. Give observations of the price of an option, the implied volatility can be derived as the only 'unknown' variable in the Black and Scholes call option pricing relationship. By construction it is therefore a forward looking estimate of the risk of the market.

Estimates of this implied volatility are available from Bloomberg.

Figure 4 displays a time series of the implied volatility of a three month call option issued against the ASA 200 Index for the longest time period available to us i.e. since 1st January 1997 to 30 November 2009[21].

The impact of the so called global financial crisis is clearly evident.

Figure 4: Forward View of Volatility of Stock Market



Source: Bloomberg

Ideally we would like the volatility on a long dated option however while we have data over a short horizon for 12 month options, we have data over a longer period for 3 month options. Figure 5 below presents the implied volatility of 1, 3 and 12 month options but for a shorter period than shown in Figure 5. The time series for the 3 month option available to us is longer than the 12 month option series so our analysis focuses on the three month data. These series are highly correlated with a correlation coefficient of the 1 and 12 month option volatilities being 0.90 while it is 0.92 for the 3 and 12 month options. Clearly the time series is relatively short so we cannot place a great deal of reliance upon it alone. However, we do use these results to give us some comfort that we can use the longer time series of a three month call option over the shorter time series for the one year maturing options. In this regard we note corroborative evidence that the levels of implied volatility ["IV"] are similar across different maturity options on the same index. In reference to IVs on the FTSE, Oxera write:

> *". . . it is not clear why 12-month IV would be different than IV on options with 24 or 36 months' maturity. In particular, there is some evidence to suggest that longer IVs on options with short maturities are correlated with IVs on options with longer maturities. For example, Carr and Wu (2003) show that IVs are very similar across different maturities . . . In other words, there is some evidence to suggest that*

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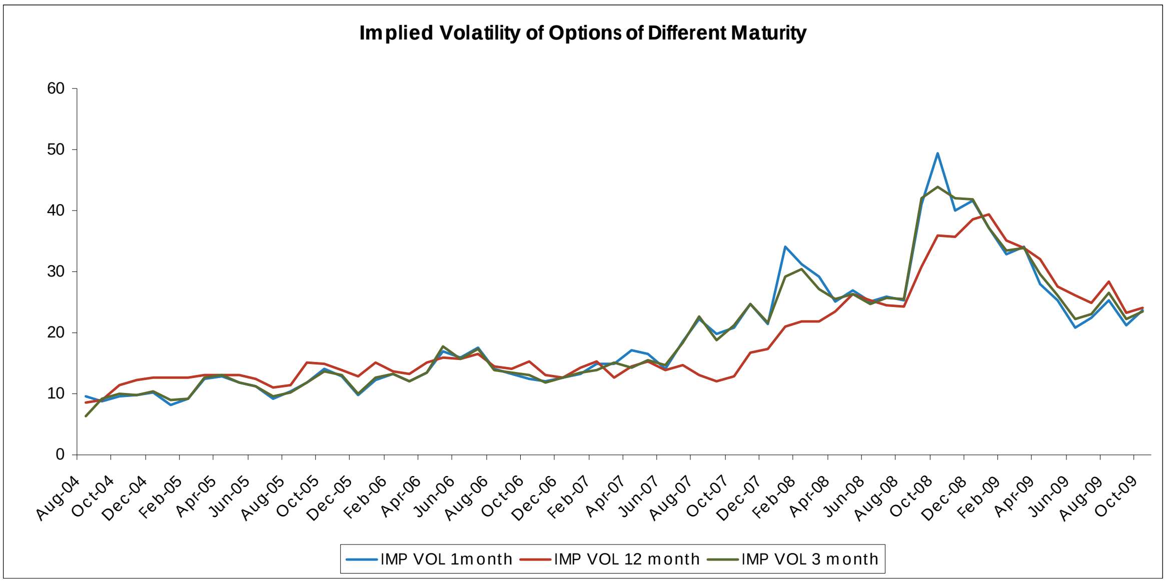
[21] The 3 month call option data was used because it was the longest time series available to us. We anticipate implied volatility from longer term options and put options would behave similarly but the time series is not available to us. The data is sourced from Bloomberg under the code CITJAVIX.

investor's expectations regarding short- and medium-term risks do not appear to differ significantly." [22]

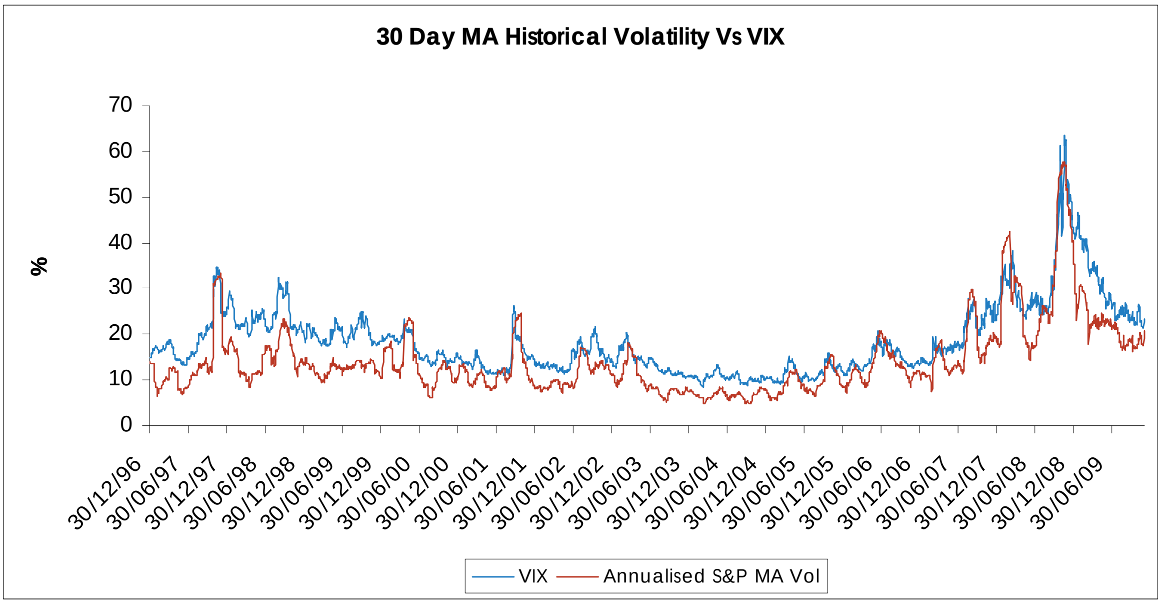
Figure 5: Volatility of Stock Market derived from Options of different maturity



Source: Bloomberg, VAA analysis

Figure 6 shows the annualised 30 day moving average of the standard deviation of the ASX 200 Index plotted against the implied volatility derived from the option price of a three month option on the index. This is highly correlated at 0.89 albeit lower. The IV is a forward looking volatility measure while the 30 day moving average is historical. The very high correlation between the two gives us some confidence to look at the much longer historical time series for which to relate the current level of the market and the MRP. We view the historical time series as a proxy for the implied volatility for periods when the latter is not available.

Figure 6: Volatility of Stock Market: Historical Versus Forward View



Source: Bloomberg, VAA analysis

[22] Oxera "Impact of the financial crisis on BAA's cost of capital", January 21, p 8

The strong relationship between the implied volatility and realised volatility has been found by others. For example, Frijns et al report:

> *"When evaluating the information content of both implied volatility indices we find that the implied volatility index based on the S&P/ASX 200 index options with a three-month horizon is most informative in terms of explaining stock market returns and forecasting future volatility. For this implied volatility index we find a significant negative and asymmetric relationship between changes in implied volatility and S&P/ASX 200 returns, i.e., stock market prices decline more when implied volatility increases than they increase when implied volatility drops. When evaluating the forecasting power of implied volatility for future market volatility we find that the implied volatility index based on the S&P/ASX 200 index options contains important information both in sample and out-of-sample."*

The implied volatility can be used to obtain an estimate of the forward MRP. Given the evidence on increased market volatility, it is most likely that the underlying MRP has increased substantially, at least in the shorter term. The quote above corroborates this relationship as it also finds the negative relationship between IV and stock market returns.

The recent and sharp decline in the annual historical MRP (of –46% in 2008) can be argued to be a result of lower expected cash flows from businesses, higher risk (therefore a higher required rate of return) including some combination of the two. We are of the view that an increase in risk and consequently the required rate of return is a substantive cause as is supported by the findings quoted above.

5.2.2 Current View of a Forward-Looking MRP

Finance theory predicts a positive relationship between risk and return. Consequently a predictable increase in risk should be accompanied by a predictable change in return through a higher risk premium. Consistent with this relationship is an expectation that unexpected increases in risk will lead to a downward pressure on stock prices, ceteris paribus, and therefore a negative relationship between observed returns and the unexpected changes in risk. The converse can also be expected to hold.

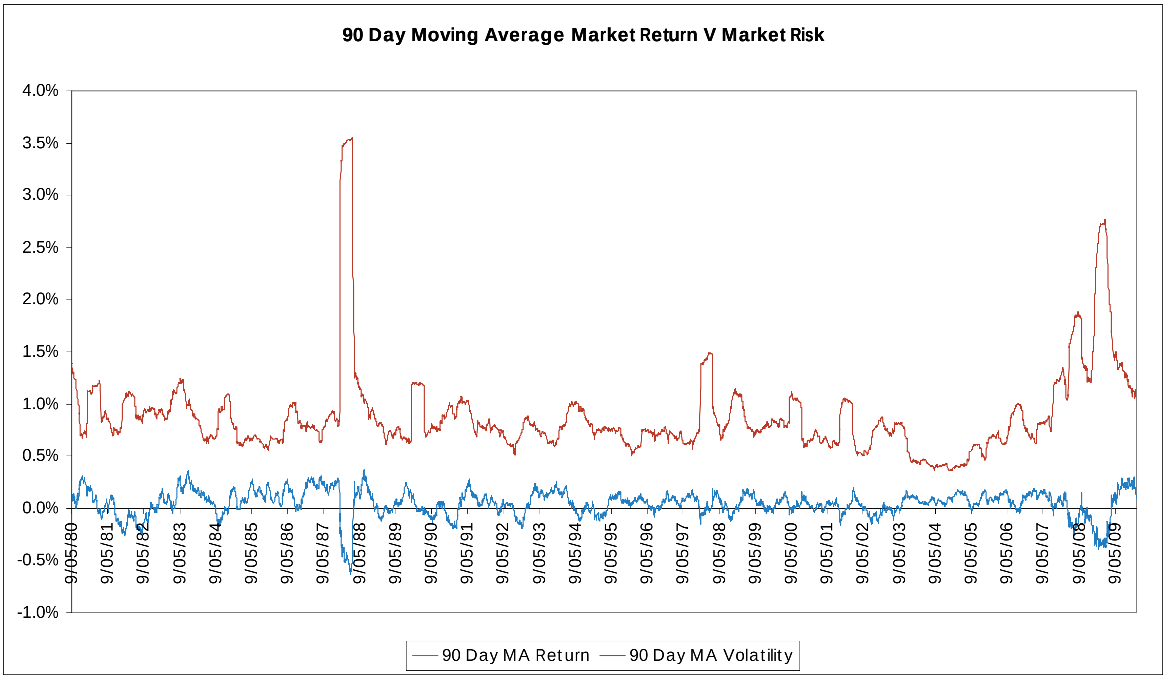
Figure 7 demonstrates this relationship between observed market returns (MRP) and risk calculated from the historical volatility of returns. It illustrates the historical relationship between the 90 day moving average of the return on the All Ordinaries Index and the standard deviation calculated in the same way. As is apparent, there is a negative relationship and the correlation coefficient is -0.53. Frijns et al report a similar finding.

The negative relationship between observed returns and changes in volatility is prevalent from empirical research. For example French, Schwert and Stambaugh (1987) find a strong negative relationship between the unpredictable component of volatility and the MRP for US data.

If the high correlation between the IV and the 30 day moving average of historical volatility shown in Figure 6 continues, and we have no reason to believe otherwise, then the historical relationship between implied market risk and realised return can be used to extend the period of data for estimating the MRP.[23]

[23] We have related the 30 day moving average to the implied volatility of a three month maturing option on the ASX 200. However for other analysis we have used a 90 day moving average to minimise noise. We do not believe there are any significant difference in results whichever is used.

Figure 7: Historical Market Return and Risk



Source: Bloomberg, VAA analysis

Given the strong relationship between the forward and backward looking measures of risk and this historical relationship between market return and risk, we have greater confidence that a forward MRP can be derived from the historical volatility measures of the market.

In deriving a forward MRP from implied volatility, we have found it necessary to assume a constant required rate of return per unit risk, an assumption implicit in the CAPM, and apply it to the forward view of risk assessed from the IV.

We reported an example of this approach on our submission to the AER as requested by ETSA (Officer and Bishop (June 2009)). The approach is used by JF Capital Partners ["JFCP"] and Value Adviser Associates ["VAA"] to update their estimates of the cost of capital to meet current circumstances.[24]

Our estimate of the unit price of risk implicit in empirical estimates of the parameters of CAPM is about 50 basis points i.e. a 7% MRP with an annual average standard deviation (volatility) of 14% implies 50 basis points per unit risk(7%/14%)[25]. This can then be applied to the current IV. The implied MRP from such observations is 12.2% (24.4% * 50 bp) where the IV of the longest call option (12 months) is 24.4%.[26]

JFCP and VAA then fade this estimate of the current MRP to the 'equilibrium' MRP (derived from the long–term historical average) over three years for their valuations of equity.

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[24] 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.

[25] The 14% is the average historical volatility over the longest period available; Jan1980 to end November 2009 derived from a moving average of daily data. The annualised standard deviation was essentially the same whether a 30 day or 90 day moving average was used.

[26] An average of 21 days to 30 November 2009. The only significance of this period is that it was the latest available when the analysis was undertaken and is 'smoothed' by the averaging. The implied volatility on 30 November 2009 was 23.4%.

There is empirical and theoretical support for the approach used by JFCP and VAA[27]. We also note that a submission to the Civil Aviation Authority in the UK also looked to the implied volatility in options on the index to infer changes in the forward MRP. The submission demonstrated high correlation between ex post measures of volatility and the implied volatility collaborating our finding and approach to assessing a current MRP. As noted on p12 of the submission:

> *"Hence, ceteris paribus, an increase in the volatility of returns on the market portfolio increases ERP [equity risk premium] in a linear way. For example, if [the variance of the market] doubles,ceteris paribus, the ERP also doubles, at least in the short to medium term (e.g. for investments in equity up to five years."*[28]

This is consistent with the approach to estimating the MRP followed by JFCP and VAA and used here which also assumes a linear relationship between the risk of the market and the required rate of return. Also of importance from this quote is the view that the higher than average MRP has a horizon of up to five years.

The current 'high' volatility is consistent with an MRP above the current 'long term average' MRP of 7%. A forward MRP consistent with this and derived from current volatility is 12.2%.

The recent behaviour of the forward MRP is similar to the behaviour of debt spreads in the bond market. This is to be expected since both are risky assets. The relative consistency in the behaviour of spreads in these two markets gives us confidence in the approach we have adopted to estimate the forward equity market MRP. We now contrast the behaviour of risk premia in the debt and equity markets to support our view of the current MRP being well above the historical long term average MRP.

5.3 Forward View from Bond Yields

A profile for BBB rated 7 year maturing corporate bonds is provided in Figure 8 below[29]. The market for bonds of longer maturity has effectively dried up thus 7 year bonds have been used as an alternative to the desired 10 year corporate bonds. The premium is over the yield on 10 year Commonwealth Government Securities ["CGS"].

Current spreads are substantially above historical levels and provide further evidence that prevailing economic conditions have led to investors requiring a higher risk premium than the long term average.

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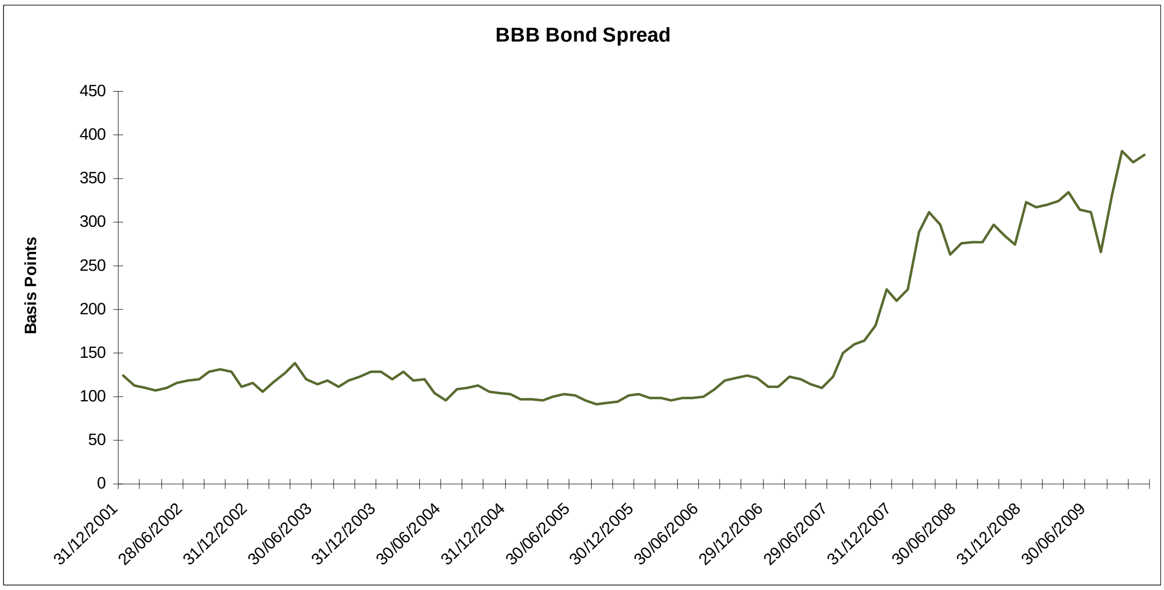
27 See for example, Doran J, E Ronn & R Goldberg (2005), "A Simple Model for Time-Varying Expected returns on the ASX 500 Index", Working Paper University of Texas, 2005. This paper also provides references to this area of research.

28 Oxera (2008), "Impact of the financial crisis on BAA's cost of capital," January 21st 2008.

29 BBB bonds were chosen to correspond with the credit rating of Distribution companies used by the AER and are closer to equity than higher rated bonds. 7 years is the longest maturing bond that trades currently.

Figure 8 : Risk premium on BBB rated 7 year Corporate Bonds



Source: Bloomberg

The most recent end of month spread (November 2009) was 399 basis points – well above the average prior to the GFC which was around 120 bp.

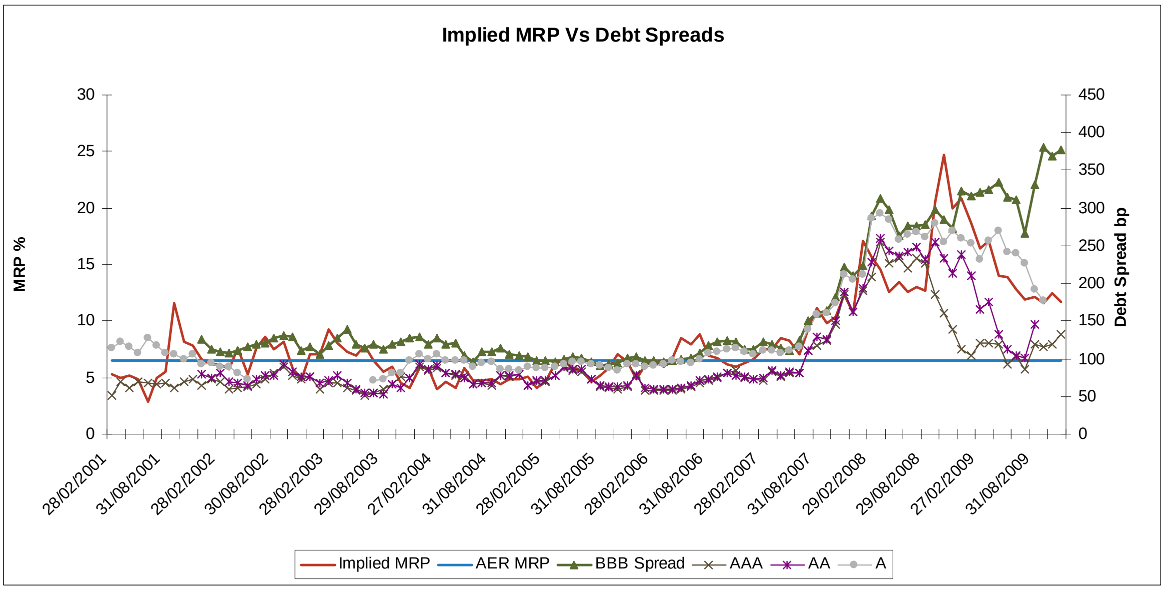
Corporate debt is a risky asset and can be priced according to the CAPM. In this context, the rise in the spread can be explained by either an increase in the MRP, an increase in beta or some combination.

If the MRP for the period to December 2006 is 7% then this implies a beta of debt of 0.17 to explain an average spread of 120 basis points on the BBB bonds. If we assume the average beta of debt does not change subsequently then the forward MRP would be 23.5% to explain a spread of 399 basis points. At the other extreme, the beta of debt would be 0.57 to explain an MRP of 7% for such a credit spread. The situation is similar for the AA and A bonds. 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 we would not expect the beta of debt to have more than doubled so increase in the MRP can be expected given the change in volatility apparent in the equity and options markets. Consequently we see this analysis as supporting our view of the current MRP being well above the long term average.

Figure 9 shows an overlay of the forward MRP, derived by applying a constant MRP per unit risk to the implied volatility of a one month option over the ASX 200 Index, and the spread over 10 year CGS for the index of different bond ratings. The former was derived by assuming an average volatility of 14% applied to a long term average MRP of 7% i.e. 0.5% MRP per unit of risk.

Although there is some disparity between the behaviour of the BBB premium and the premiums of other ratings of debt, all are above historical levels, particularly BBB debt which is the closest of the bond to equity. We have not investigated the reason for the disparate behaviour but simply note that there is considerable consistency in behaviour of the premiums.

Figure 9: Risk premium on BBB rated 7 year Corporate Bonds Vs Implied MRP from VIX data



Source: Bloomberg. VAA Analysis

It is importance to recognise that there will be considerable symmetry between the cost of equity and the cost of debt. The spread on BBB rated debt is currently of the order of 399 basis points above 10 year Treasury Bonds. This spread has risen from a spread in less volatile economic conditions of 120 basis points. Since this rise is reflective of current economic conditions then we would expect a commensurate rise in the risk premium for equity. It is unlikely that there would be a narrowing of the spread between the cost of debt and equity under current conditions, rather a widening might be expected.

5.4 Time Period of Adjustment

Our estimate of the current MRP (end November 2009) is 12%. This was derived by applying a constant required premium per unit risk to the current estimate of market risk derived from traded options on a market index. A challenge in applying our forward looking approach to estimating the MRP in investment decision making and regulatory decisions is assessing the time period until reversion to the mean and the rate of decline. As noted, JFCP and VAA use a 3 year 'glide path'. We have informed our glide path view with research which we now present.

We expect the MRP to change over time. A particular challenge is to estimate how long the forward MRP might remain above or below the average as this is important for the current circumstances i.e. that the current economic conditions are quite unusual and warrant a move away from the long term average for current regulatory purposes.

There is an underlying challenge in these assessments as we believe that the current economic circumstances are unusual therefore, this means that there will not be much history to estimate the likely duration of the above average MRP that currently exists.

In this regard, we note the comment in the Oxera quote above that the current MRP arising from current volatility is appropriate for the short to medium term described as up to 5 years. This corresponds to a regulatory period.

To estimate an appropriate time period for the abnormal MRP to revert to the mean we undertook two assessments and we draw on some analysis of Dr Chris Caton. The first of our assessments examined the historical pattern of IV and the second examined the information content of changes in the IV.

We note the high correlation between historical and implied volatility but also note that this alone does not help us assess the duration of the current period of high risk. For example, examination of Figure 1 reveals that recent risk behaviour is relatively unusual i.e. prior periods do not show extended patterns of above or below average risk, reinforcing our view that current circumstances are unusual and support a move to a higher MRP than the historical average MRP.

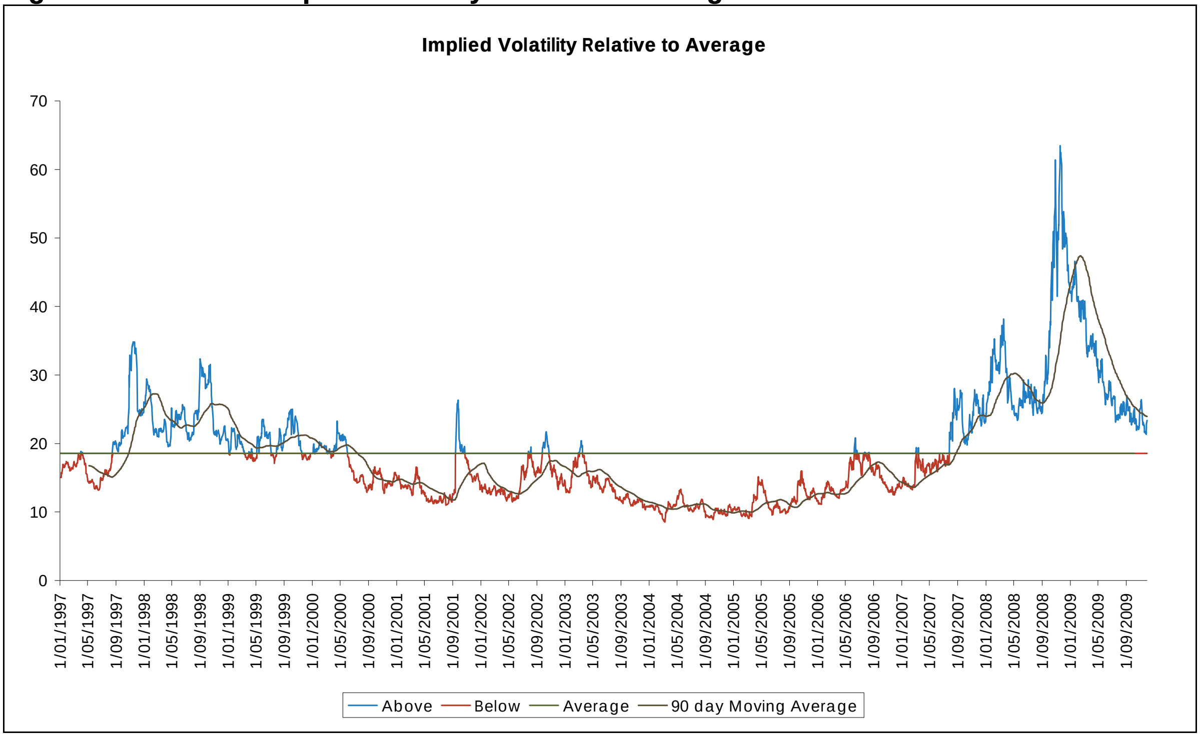
5.4.1 Cycle Observations

Our first test of the duration of a departure from the long term average MRP follows directly from the assumption of a constant unit of MRP required per unit of risk. Under this condition it is appropriate to look at the behaviour of risk to estimate the likely duration of the current high risk.

5.4.1.1 Australian Data: Behaviour of Implied Volatility

Figure 10 shows the behaviour of the 3 month implied volatility relative to the average calculated over the entire time period for which we have data[31].

Figure 10: Pattern of Implied Volatility relative to Average



Source: Bloomberg, VAA analysis

Although there is some noise in the data (smoothed by the 90 day moving average), there are 3 distinct periods. The initial period of the implied volatility being above the average extends from October 1997 to June 2000, a period of 2 years 10 months. This is followed by an extended period of relatively low risk that extends to June 2007, a period of just over 7 years. There was an interruption due to the terrorist attacks on September 2001 and 3 small interruptions in 2002 (again not apparent in the smoothed data). The next period of above average risk is what is being experienced currently. A 90 day moving average is also shown which 'smoothes' these 'blips' and confirms the periods of the cycle as defined.

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[31] Note this is not the long term average which we computed earlier to be 14%. Lowering the average would extend the period of 'above average' volatility at the expense of 'below average' volatility. This would not change our decision as to the best estimate of a glide path, in fact it would reinforce our choice for the current circumstance of above average volatility.

Unfortunately the history of implied volatilities is short relative to the 126 year history of realised MRPs. This makes it difficult to predict the duration of the current high risk period. Nevertheless we can expect at least 3 years, probably longer from this assessment.

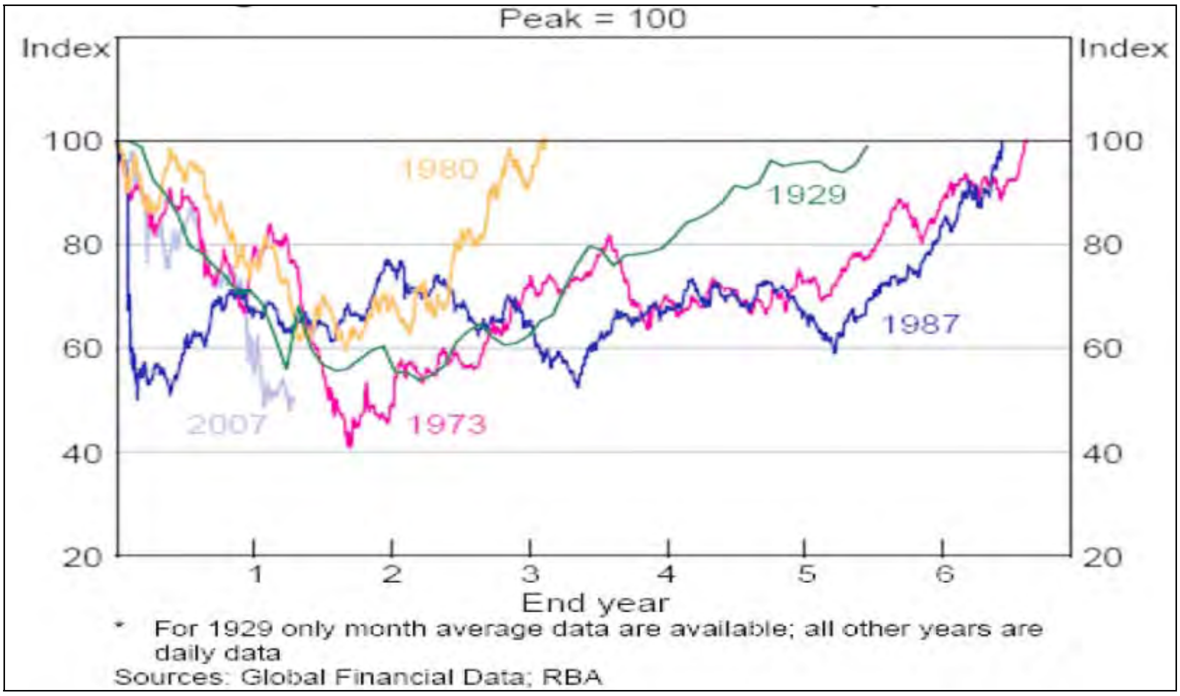
5.4.1.2 Australian Data: Recovery of Market Index from a Crash

If history is a guide then the 2007 crash will take up to 6½ years to recover i.e. from December 2007 when the Index reached its peak, to June 2014.

Dr Chris Caton of BT Australia recently presented an analysis of the time it took for the Australian market to recover from a 'major' crash. The graphical analysis has been extracted and is presented as Figure 11.[32]

The shortest time to 'recover was 3 years (1980 crash) however this was the 'smallest' crash of the 5 presented. The 1929, 1973 and 1987 crashes took between 5½ and 6½ years to recover.

Figure 11: Time for the stock market index to recover from a major crash



The analysis is indicative but informative.

5.4.1.3 UK Data

Extended periods of volatility above or below the average appear common in the UK as well, again with some noise. Figure 12 shows the historical 90 day moving average of volatility of the FTSE 100 index from May 1984 to November 2009. Historical data is shown because the implied volatility series available to us is much shorter than the Australian

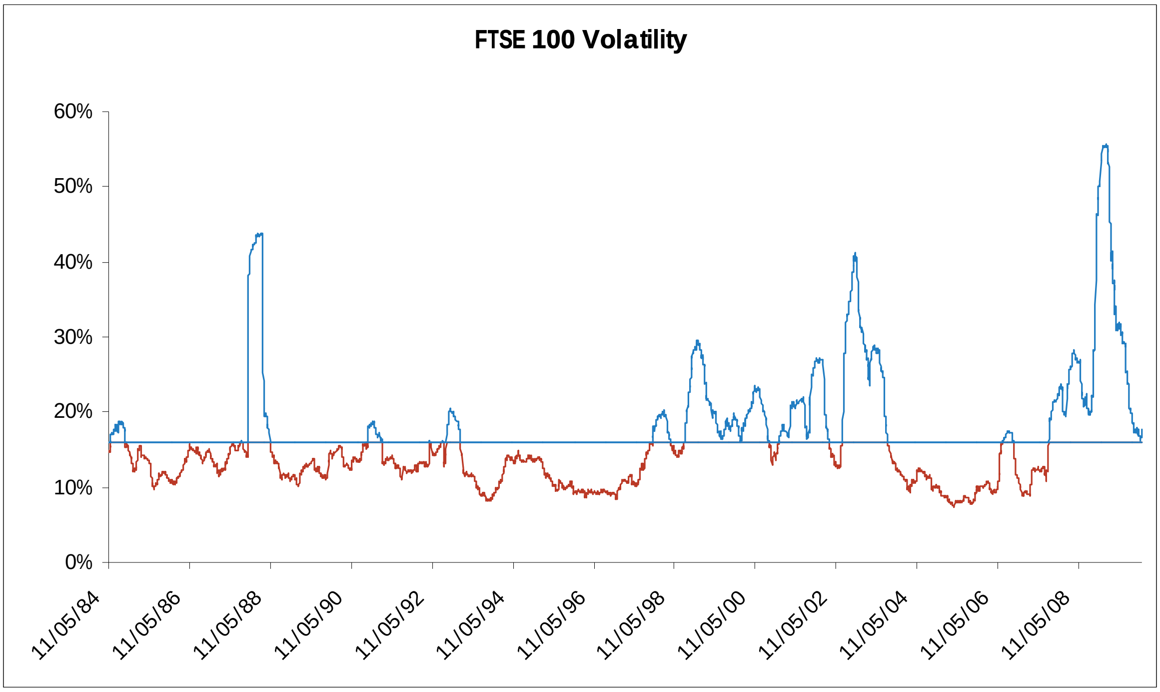
[32] Dr Chis Caton, "A global economic and market outlook" BT Australia, August 2009, p24. We checked the data for the 1987 crash. The all ordinaries accumulation index reached its peak in mid September 1987 before the October crash and it did not return to that peak until July 1993, just under 6 years later. We are not sure of the source of the data used in the graph but our checks are largely consistent with it

data. We rely on the high correlation between historical and implied volatility for our analysis.[33]

There is a thirteen year period of volatility below the average from October 1984 to October 1997 with 3 short periods of above average volatility 'interrupting' it. One interruption was the October 1987 crash. The interruptions were relatively short with extended periods of below average volatility in between. Similarly, there is a period of nearly 6 years of above average volatility between October 1997 and September 2003 with 3 periods of interruption of short duration. Below average volatility followed until August 2007, just under 4 years, with one interruption. Since then, volatility has been above average.

To the extent that historical 'cycles' repeat, this behaviour suggests the current period of high volatility will not be short-lived.

Figure 12 : Pattern of Implied Volatility of FTSE 100 relative to average



Source: Bloomberg, VAA analysis

5.4.1.4 US Data

As an additional check we looked for cycles, and the length of cycles, in US implied volatility data. The implied volatility index from CBOE is presented in Figure 13 along with the simple average. The history of these data is longer than both Australia and UK however for common periods it is evident from Figure 14 that there is strong correlation across the markets.

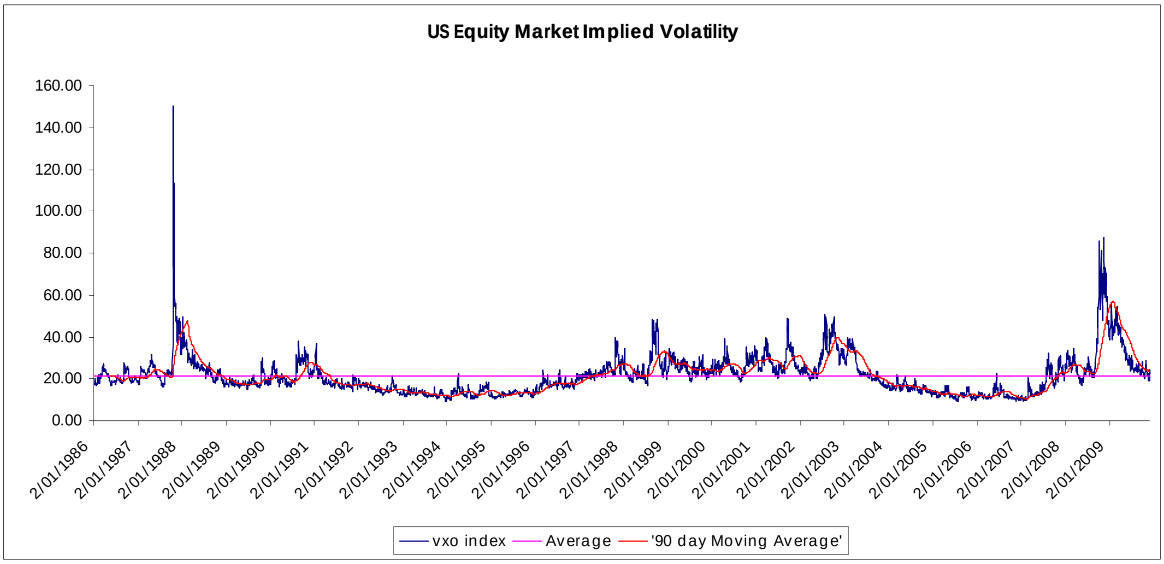
Cycles are apparent in the US data, despite short 'aberrations' as is the case with Australian and UK data. Extended periods of volatility being above and below the average are apparent post 1991. There is an extended period of 5.8 years of below the average volatility from March 1991 to December 1996. This was followed by a period of 5.6 years of above average volatility (with 'blips' below the average) from August 1997 to

[33] We do have implied volatility data from Jan 2000 to end November 2009. This shows the approx. 7 year below average period as for Australian data (using 90 day moving average data) but a more interrupted above average period from September 2001 to August 2003 as is apparent in Figure 14

April 2003. A period of 4 years of below average volatility followed (August 2003 to August 2008) before the impact of the GFC which took effect from September 2008.

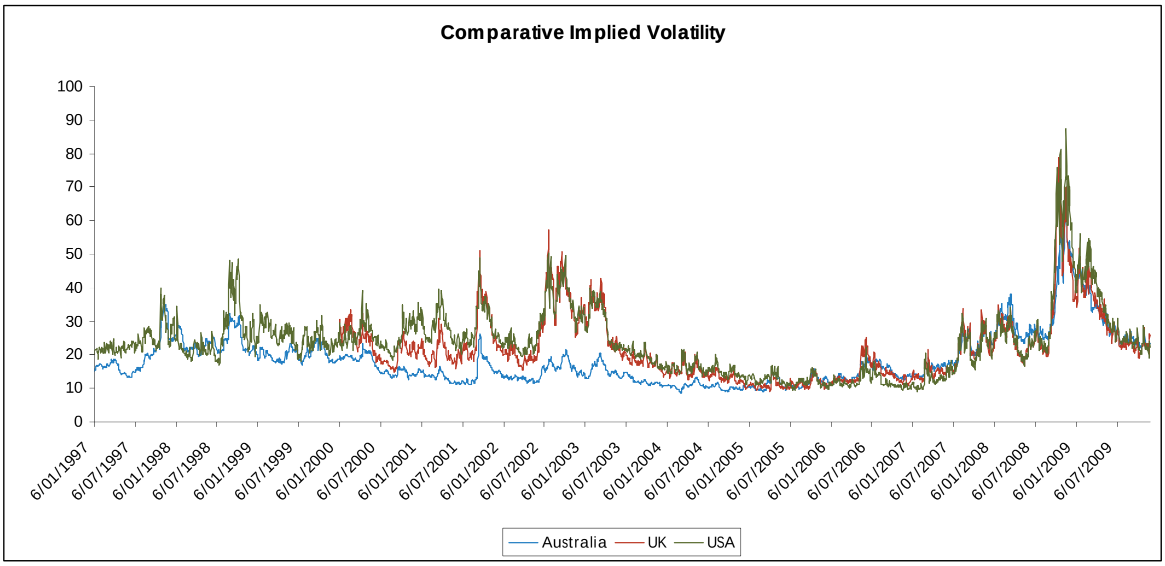
While judgement has been used here, it is reasonable to form a view that the cycles are for extended periods of 4 – 5 years. Clearly predicting the future is challenging but this analysis suggests that the current period of higher than average volatility still has a number of years to run.

Figure 13: Pattern of Volatility of US CBOE OEX Volatility Index



To provide some information about the reasonableness of examining the implied volatilities in other countries we have graphed the implied market volatility data from Australia, UK and US in Figure 14. As would be expected, there is similar behaviour across the countries however the cycles are more pronounced in the UK and US. Interestingly, Australia experienced a period of lower volatility up to 2005 than the UK and USA however the pattern was similar. This forward looking measure of market risk has been much closer across the three countries since then.

Figure 14: Comparative Volatility Patters: Australia, UK, USA



5.4.2 Information Content of Implied Volatility Changes

The expected strong relationship between risk and return is apparent in Figure 7**Error! Reference source not found.**. We investigate this relationship further to assist us understand the likely duration of any cyclical behaviour.

In particular, we examine the performance of two alternative investment strategies:

1. Using the IV to trade in the ASX 200 over a number of different buy and hold periods;
2. Buying and holding over the time period examined.

The second strategy is similar to investing on the assumption that the best prediction of future returns is the long term historical average; trading does not earn 'higher' return. This is consistent with a view that the long term historical average MRP is the 'best' prediction of the MRP.

We view the first strategy as a test of whether current volatility can provide a 'better' prediction of the future return on the market (and therefore the MRP by implication) than an historical average (the second strategy). If the return from using information in the IV to trade is higher than that from the simple buy and hold strategy (strategy 2) then it can be inferred that the IV is a 'better' predictor than the historical average return. Further, by examining the behaviour of the return relative to the buy and hold strategy we can estimate the duration of any predictive ability of changes in the IV.

We use daily trading data from All Ordinaries Index over the period January 1980 to 30 November 2009 to assess the relative forecasting 'ability'. This historical series is used because it provides the longest daily trading data series on a broadly based index. We are implicitly equating data and information from this All Ordinaries Index with the ASX 200. Further we are using the 90 day historical standard deviation as a proxy for the IV. As noted above there is a high correlation between these over the period for which we have IV data (1997 forward) – the correlation of the 90 day moving average was slightly higher than for the 30 day moving average.

The first trading strategy uses information in the IV to invest in the All Ordinary Index. It is used as follows:

- If the IV is above the historical average then invest long. This is assessed on rolling basis. If risk has increased then the market capitalisation will have fallen. This view is consistent with the findings of Frijns et al. Once risk 'mean reverts' then market capitalisation will be expected to 'recover' thereby providing a positive return to the strategy. The return over various holding periods is examined. It is assumed the investment is liquidated at the end of the holding period and no further returns from that particular investment is earned.

- If the IV is below the historical average then invest short. The driver of the investment strategy is the converse of the logic above.

Table 2 summarises the return from this first strategy for various holding periods. For example, taking a long position when (the proxy for) IV is above an historical average and holding for 5 years provides a gross return of 16.7%. Selling short when the IV is below the historical average provides a return of -10.6%. Both buy and hold strategies for 5 years provide an improved return relative to the buy and hold over the entire period of the data of 12.6% from a long position and the zero-sum-game short selling position of -12.6%.

This analysis is consistent with a competitive and informationally efficient market because the trading strategies will have more risk[34]. Consequently the higher returns would be expected. However, the strategies will convey which approach 'better' predicts the behaviour of the MRP.

The final column in Table 2 sums the return, relative to the buy and hold, from both strategies. It is apparent that the highest return arises from holding for 5 years with holding periods longer than 3 years providing returns above the shorter periods. The higher return after 3 years is 'maintained' in subsequent years.

The initial relatively poorer performance in the first 2½ years can be viewed as risk increasing (return decreasing) after the initial rise above the average before reverting to the mean. Additionally, it may be influenced by the shorter periods including a more substantive influence of the effects of the GFC whereas the longer holding periods will be less influenced by this.

Table 2: Rate of return from various trading strategies

Holding Period when trade (Yrs)	Long Position Return (%)	Short Position Return (%)	Overall Relative Position (%)
0.50	11.1	-10.0	1.1
1.00	10.2	-10.0	0.2
1.50	10.1	-9.8	0.3
2.00	12.0	-9.7	2.3
2.50	13.7	-10.3	3.4
3.00	15.9	-10.3	5.6
3.50	16.1	-10.2	5.9
4.00	17.3	-10.3	7.0
4.50	16.6	-10.6	6.0
5.00	16.7	-10.6	6.1
5.50	16.1	-10.4	5.7
Total Period	12.6	-12.6	

Source: Bloomberg, VAA Analysis

This outcome is consistent with changes in the IV being used to estimate the duration of the mean reverting behaviour of the market and therefore the period we might expect an 'abnormal' MRP might last. In turn, the method can be used to estimate an MRP for the 4½ year horizon from January 2010 to 2014.

As we noted above, the current MRP estimated from the IV is 12.2% based on a 7% long term average MRP. If the 6.5% selected by the AER is used instead to represent the mean MRP then the current MRP from the IV is 10.4% (6.5%/14% * 24.4%). This is, in our view, an upper bound of the MRP and can be interpreted as a short to medium term view of the MRP. It is at least a one year view because the IV was derived from a one year maturing call option.

Table 3 below contains sensitivity results around a forward MRP for different mean reversion horizons and different mean reversion profiles. It is constructed by using our prior recommendation of 7% as the mean to which a current MRP will revert.[35] Each row presents a different reversion profile with the last column summarising the profile by the geometric average of the MRP over the 4½ regulatory period 2010 to 2014. Reversion has been assumed to be linear to keep it simple.

[34] Although we have not tested this.

[35] This differs from our analysis for ETSA where we used the AER decision of 6.5% as the long term mean. However our recommendation was 7% and we have reverted to this as we are of the view that this is more appropriate given our analysis in the Officer and Bishop Jan 2009.

The 2010 column is a current estimate, at circa 30 November 2009, of the MRP for the forthcoming year. For simplicity we have assumed this applies on 1 January 2010 and it is the estimate to prevail until the end of 2010. The 2011 column is a forward estimate made at the beginning of 2011 for the subsequent year. Consequently, the period of interest for the regulatory review is labeled year 1 to year 4.5.

The different reversion horizon profiles suggest a range of 8.1 % to 10.3% for the MRP over the 4.5 year horizon of interest.

Table 3: Alternative profiles of MRP

Begin of Year	0 2010	1 2011	2 2012	3 2013	4 2014	4.5 2014	Geo Average
Decline after 1 year	12.2%	7.0%	7.0%	7.0%	7.0%	7.0%	8.1%
Decline over 3 years	12.2%	10.4%	8.7%	7.0%	7.0%	7.0%	9.3%
Decline over 5 years	12.2%	11.1%	10.1%	9.1%	8.0%	7.0%	10.3%
Decline after 3 years	12.2%	12.2%	12.2%	10.4%	8.7%	7.0%	11.4%
Immediate decline after 3 years	12.2%	12.2%	12.2%	7.0%	7.0%	7.0%	10.4%

Source: VAA analysis

The forward view is derived from the volatility of a one year call option, the longest maturity available. This represents a one year view of the future. However, we noted above that we simplified this to a 13 month view (to end of 2010). The 'trading' strategy analysis reported in Table 2 suggests the forward view dominates a simple average view and that the 'best' horizon is 3 - 5 years. We note this horizon is consistent with the view suggested by Oxera (see quote above). Thus the MRP derived from this is 9.3% to 10.3% depending upon the decline profile. Nevertheless, it is not clear how long the current high volatility and required rate of return will remain but is it apparent that the current MRP is above the long term average.

We take a conservative view of the behaviour of the implied volatility and MRP over the regulatory horizon of interest and assess the appropriate range to be between our prior recommendation of 7% and the current estimate of 12.2% with a recommended estimate at the lower end of the range of 8.0%. The 8% largely corresponds with an immediate decline after 1 year or the gradual decline over 3 years as in Table 2 above This estimate is conservative, reflecting an approach to minimise change on the one hand but recognising current economic circumstances are abnormal and that the MRP is above the long term average on the other hand.

We have not tested the likely duration of the high risk period against the very infrequent prior high risk historical period(s) that may be similar to the current unusual economic circumstances - the 1930s may potentially be the only similar prior period. Instead we have examined the period from 1 January 1980 because daily data is available for this period enabling the calculation of a short (90 day) estimate of volatility as a proxy for the IV.

6. Regulatory Period or 10 year Period

The AER made a number of points about the approach above in a Draft determination for Distribution in South Australia[36]. In it they argued that the Officer and Bishop analysis used a 5 year period to define an MRP profile which is inconsistent with the 10 year term of the

[36] 25 November 2009.

risk free rate. The AER disagrees that the MRP should be estimated over a 5 year term. Note that this analysis was for a 5 year regulatory period compared with a 4½ year period in the current circumstance.

In more detail, it is argued that the Officer and Bishop outcome is a 5 year horizon for the MRP when the horizon for the risk free rate is 10 years, hence there is a mismatch. AER points to quotes from prior Officer & Bishop papers and a document prepared for Australia Post that argue for a 10 year horizon for both i.e. that it is imperative for these time periods to be consistent.[37]

There is no inconsistency in what we argued and nor is there any requirement that the analysis be conducted over a 10 year period as the AER assert.

Our approach derives a series of one year MRPs by weighting an historical annual MRP based on 10 year Commonwealth Bonds by a ratio of current volatility to long-term volatility. It therefore provides an estimate of a forward looking annual MRP using the same essential time horizon logic as other MRP estimates i.e. the annual risk premium is the difference between the market return and the yield on a 10 year Commonwealth Bond. Indeed the 6.5% recommended by the AER is an annual rate derived in using the same approach and applied over the 5 year regulatory horizon – our logic is the same. The ten year bond yield we believe is the best surrogate for a 'risk free rate' that serves as a minimum risk rate that 'anchors' one end of the distribution of risks. If the AER is to criticize our approach then it must also be criticising its approach as the logic is the same. The only difference is that we are recommending a decline rather than a flat profile of MRPs.

If we were of the view that the current volatility would hold forever then we would be recommending an MRP of 12.2%. However, we are of the view that the volatility will revert to the mean over time therefore there will be a declining annual MRP. Rather than recommend 4½ different and declining MRPs to apply during the 4½ year regulatory period, we 'smoothed' our estimate to an annual equivalent using a geometric mean.

The current volatility at 24% remains well above the long term average (14%) and while apparently reverting to the mean it still has a way to go – consequently our glide path. This is also supported by reviewing the absolute level of the stock market index. While there has been some recovery from the lowest point of the decline it has not yet recovered to its prior peak. The short history of crashes presented by Dr Chris Caton would suggest there is 4 – 5 years to go until this will happen.

There is absolutely no requirement to look at a ten year horizon to match the term of the risk free rate because the long term average annual MRP used reflects this 10 year rate. We did assume that this MRP per unit of long term average risk would remain constant over time. It may be possible that investors become more risk averse in times of high volatility and therefore our approach understates the MRP in the current circumstances, however at this time, we do not have a model to guide us so in this regard we made the assumption that it remained constant.

We have not addressed all the commentary by the AER here as we interpret is as seeking clarification, but are very happy to do so. In our view none of the commentary affects the underlying basis of the approach.

[37] See pages 308-309 and 315 -316

7. Conclusion

We have been asked to provide an opinion on the Market Risk Premium ("MRP") on equity that is expected to prevail over the regulatory period January 2010 to June 2014. In our view this is in the range 7% to 12% with our point estimate being a conservative 8%.

It is now well recognised that investors require a return **on** capital, in addition to a return **of** capital when investing. The return on capital will reflect the risk of the investment being undertaken. Typically, the capital of a business is defined as equity plus debt capital and the required return is defined as a weighted average of the required return of the two.

The cost of equity can be estimated using the Capital Asset Pricing Model ["CAPM"]. It defines the cost or equity as a risk free rate plus a premium for risk where risk is a market risk premium or MRP multiplied by beta (a measure of the risk of an asset relative to market risk).

The MRP is an essential input to estimating a cost of equity under the CAPM. The CAPM is a forward looking model and therefore requires inputs that are forward looking. Despite this requirement it is common to use history to guide the selection of the inputs to the model. Regulators in Australia have used 6% as such an estimate in the past although a recent decision by the Australian Energy Regulator ["AER"] has increased this to 6.5%[38].

The MRP will change over time to reflect the "market's" changing view of risk and attitudes to risk. A positive risk premium, relative to a "risk free" asset, is required because investors are risk averse and require compensation for bearing risk. The MRP cannot be constant over time, if it was constant this would imply there was no risk and therefore there could be no risk premium. In the current economic circumstances where there is greater market variability and economic uncertainty than has typically been experienced over at least the past 50 years we do not believe that a constant MRP reflecting the long term average is appropriate.

In the past we have recommended the use of the long term average historical MRP. This is **not** because we believe it to be stable over time but because there has been little in the way of evidence or theory that has allowed or encouraged other than the use of the average MRP. The current circumstances warrant a change:

- We have abnormal levels of market volatility; and
- We have an approach that allows us to modify the average MRP for current economic circumstances.

The GFC has had a significant impact on the capital market. The stock market return for 2008 was a negative 40.4%, the lowest in the 126 year history of market returns available to us. The most recent data available to us (end November 2009) shows market risk, although declining from its peak, is still over 50% above our estimate of the long term average risk level. While there has been a recovery from the 'bottom' of the stock market fall, it is still only 76% of the peak prior to the crash. Both history and other forward looking data suggest the "Global Financial Crisis" is not over and still has considerable time to run i.e. it is not a short term phenomena and the market has not returned to 'normal'. On these grounds we recommend a MRP for the regulatory period January 2010 to June 2014 above the long term average.

The use of an historical average as an input to the risk premium on equity contrasts with the widespread use of spot rates on debt to estimate the cost of debt. In practice this difference has not been of great concern however the current environment calls this into question. Because of large increases in debt premiums, there is a substantive disconnect

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[38] Australian Energy Regulator, "Final decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters" May 2009

between the risk spread on debt and equity when the historical average MRP is used to estimate the cost of equity. This process substantially under-estimates the required return on equity. In fact, it is possible for the cost of equity estimated this way to be below the cost of debt, which is a nonsense outcome.

We use a method that provides a view of a forward cost of equity that is consistent with current market conditions and with debt spreads. We estimate that a forward looking MRP of 8% will reflect 'average' current market expectations over the regulatory period. This MRP is derived as a compound average of our estimate of the spot MRP (November 2009) of 12% and a transition to the long term average of 7%[39] over the period of interest. Clearly accurate prediction may not be possible, however we are of the view that our approach does reflect the current view of risk in the market. The spot MRP has been estimated by reference to the forward view of volatility implicit in the pricing of options on the ASX 200 index and by the current high spreads in yields on corporate debt.

The forward looking market risk premium ["MRP"] is well above the long term historical average due to current volatile market conditions brought about by the global financial crisis. Using a cost of equity derived from an historical MRP under current economic conditions will not provide the opportunity cost equity investors will expect and therefore its use runs the risk of under-investment in assets.

Four factors have combined to change a departure from our prior recommendations to use a long term average MRP to reflect a forward MRP:

e) A period of unusual economic circumstances in the form of the global financial crisis;
f) The substantive increase in risk spreads on debt arising from (a);
g) The availability of a forward view of market risk though the implied volatility of options on the stock market index; and
h) Promising research guiding the time period of departures from the 'norm'.

While still an evolving area for research, we are of the view that advances to date and the significant effect of the Global Financial Crisis (GFC) on risk and risk premiums (spreads) in financial markets warrant a departure from the use of the long term average MRP over the regulatory period 1 January 2010 to end June 2014.

[39]Officer RR & SR Bishop, "Market Risk Premium: Further Comments", Value Adviser Associates, January 2009 submission to AER.

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9. Appendix 1 Treatment of Imputation Tax Credits

An imputation tax system was introduced in Australia from July 1 1987. A key purpose of the imputation system was to remove the tax bias against equity income in the prior classical tax system and place it on the same tax footing as debt income. The imputation system removed the double taxation of dividend income under a classical tax system for Australian Resident Taxpayers. The classical system taxed equity income at the corporate level and then again at the personal level. Under the imputation system, corporate tax can be viewed as a collection of personal tax for those subsequently claiming the imputation tax benefits.

The Australian system has since been modified over time in a number of ways. Some relevant changes are:

- A corporate tax on superannuation funds was introduced from 1st July, 1988 to enable them to use imputation tax benefits and to remove any disincentive to invest in companies paying imputation benefits;
- The introduction of a 45 day holding period around the distribution of franking tax credits in 1997 which imposes additional 'cost' on trading in credits;
- A move to a rebate rather than tax credit system in July 2000 which enables domestic tax exempt and low taxed residents to now fully access imputation benefits.

An outcome of the imputation system is a differential effect across some shareholder groups. The 'beneficiaries' are, in the broad, individuals and superannuation funds whereas foreign investors and tax-exempt shareholders (historically) did not gain directly from the change. As a result, the net dollar return after tax these different shareholders groups earn can differ.

The term "gamma" has been used widely to reflect the value of a dollar of imputation tax benefits. It is used to adjust either the tax rate in after cash flow estimation or to the cost of capital when undertaking project or enterprise valuations or when assessing regulatory revenue requirements. However we do not use gamma but rather a component of it to adjust for the impact of imputation tax benefits on 'measures' company or market returns.

To explain our adjustment and its relationship with gamma, we draw on the description of three milestones in the life of an imputation tax benefit as described by Hathaway and Officer (2004).

4. It is **created** when company tax is paid;
5. It is **distributed** when company tax is paid to shareholders as an attachment to dividends;
6. It is **redeemed** when shareholders claim the rebate and enjoy the tax benefit.

Common usage is to define gamma (γ) as the value of a dollar of imputation tax benefit when it is **created**. A dollar of imputation tax created will be retained (and tracked as a "FAB" - franking account balance – until it is distributed by way of an attachment to a dividend. The imputation tax benefits are of direct interest to shareholders once they are distributed. Thus when looking at the return shareholders receive from their investment over a particular period, we are interested in capital gains, dividends and the imputation tax benefits attached to dividends.[40]

The relationship between gamma and the value of imputation tax benefits distributed is captured in equation (3).

[40] Any value to imputation tax benefits retained will be reflected in the share price through an anticipation of when they may be distributed and their value at this time.

$\gamma = F \times \phi$ (3)

Where F is the proportion of imputation tax benefits created that are distributed (attached to dividends)

ϕ is the value of an imputation tax benefit that has been distributed. We define this to be the value on the day that the stock becomes ex dividend. Dividend drop-off studies estimate a value for ϕ.

Regulatory bodies have used a value of 0.5 for gamma to adjust statutory tax paid to reflect the amount that is distributed and used by shareholders. However our interest when adjusting observed market returns for imputation tax benefits is in ϕ.

Hathaway & Officer (2004) estimate a value of 71% for F from tax statistics and a value of 0.5 for ϕ from their dividend drop off empirical work. Thus they suggest a value for gamma of 0.355 being the product of these two numbers. Values for these terms are subject to considerable uncertainty, measurement error and research. It is not our intent to review this research or form a view on values for these terms. Instead we estimate a total market yield for imputation tax benefits to add to the MRP estimated from historical data based on a range of possible values for ϕ.

As noted, under a dividend imputation tax system, there are potentially three components to the return received by equity holders – dividends, capital gains, and imputation tax benefits. In this setting, the appropriate measure of MRP is one that includes all three components. This point is clearly demonstrated in Officer (1994) and reinforced by Gray and Hall (2006). However, standard stock market accumulation indexes reflect dividends and capital gains only. Consequently, the value of franking credits should, in theory, be added to the historical estimates of stock index returns after the introduction of the system in July 1987.

There is a practical challenge in estimating the value of these imputation tax benefits and there is no single precise and robust estimate that is universally viewed as being correct. For these reasons, it is common not to include a value of imputation tax benefits when constructing stock return indexes.

It is not within the scope of this paper to estimate a value for imputation tax benefits. However we do include imputation tax benefits in the market return for a range of possible valuations of them where the valuations are derived from regulatory practice and empirical studies[41] to show the impact on the MRP. For example, we estimate the adjustment to be 85 basis points for a value of 0.5 for the imputation benefits once distributed.

In addition, regulatory and market practice[42] is to compute an estimate of MRP based on historical data, but to adopt a final estimate that reflects appropriate judgment about other information such as recent trends, changes in the market, survey evidence, evidence from various economic models and so on. These judgments and the lack of precision in the average arising from the high variance in observed MRPs explain why regulatory and market practice has been to use an estimate of 6% even though historical data from the last 30, 50, 75, or 100 produce estimates that are higher. In our view, taking the MRP to a decimal point could give an impression of accuracy in the estimate that is misleading.

[41] See Hathaway and Officer (2004) for example

[42] See again Truong, G., Partington, G. and Peat, M. (2005).

While any likely adjustment to reflect the value of imputation tax benefits is going to be small, in our view it may be large enough to support a change in the historical use of 6%.

Nonetheless, following the approach to adjusting MRP for imputation tax benefits indicated by Officer (1994) where their value is added to the market's expected rate of return a post imputation tax estimate of the MRP can be obtained[43]. The adjustment requires:

4. An estimate of the dividend yield (d_i) component of the total or cumulative yield (r_i) made of the capital yield (p_i) plus the dividend yield for the period (i). The implicit company tax paid on this dividend is estimated i.e. the dividend yield is grossed up (divided by 1.0 less the company tax rate i.e. (1- T_c)) and then the tax component is estimated by multiplying the grossed up dividend by the effective company tax rate;
5. Since not all dividends are franked dividends, the proportion of franked dividends (f_i) has to be estimated. Multiplying this by the implicit company tax paid on the dividend gives the 'effective tax' implied on the dividend;
6. Finally, since not all investors value imputation tax benefits once distributed at their 'face value', see Hathaway and Officer (2004), an estimate of the value (ϕ) implied by the market of a unit or $1 of franking credits must be estimated.

The net result of these procedures is an estimate of the value of franking credits (VFC_i) in the return to investors for the period i, i.e.

$$VFC_i = d_i \ (\frac{T_c}{1-T_c}).f_i.\Phi \qquad (4)$$

We focus on estimating a market return that included a value for imputation tax benefits that are attached to dividends paid.

The relationship of our adjustment to Officer (1994) and Gray & Hall (2006) (who also relates the relationship to Lally research) is demonstrated by equation 18 from Gray and Hall (our equation (5) below). This describes the relationship between the overall return investors receive (r'_t) and the return that is captured in stock market indexes which excludes any recognition of imputation tax benefits.

$$r'_t = r_t + \gamma \frac{C_t}{P_{t-1}} \qquad (5)$$

Here $\frac{C_t}{P_{t-1}}$ is the imputation tax benefit yield for benefits created

Substituting equation (3) for γ yields

$$r'_t = r_t + F\Phi \frac{C_t}{P_{t-1}} \qquad (6)$$

Where the last two terms [$\Phi \frac{C_t}{P_{t-1}}$] refer to imputation tax benefits distributed. Since we estimate these from dividends that have been distributed then we are interested in adjusting this yield by ϕ not γ. [44]

[43] Gray and Hall (2006) present the mathematical relationship between the value of franking tax benefits and the MRP. Their adjustment is consistent with ours.

[44] There is a potential logical inconsistency in practice. Market returns are measured as capital gains plus dividends. The full value of the dividend is included despite studies showing these are not necessarily fully valued (the price drop off is less than the amount of the dividend). We are not including the full amount of the imputation tax benefit but adjusting it by ϕ.

Estimates of the value of franking credits ["VFC"] from 1987 to 2008[45] indicate an average value for the VFC of 84 basis points if the value of a dollar of franking credits distributed (ϕ) is 0.5. This would suggest an increase in the market rate of return for the period by an average of 0.84% (or 1.1% for ϕ of .65). For example if the MRP for the period or the expected MRP was 6.2% then it should be adjusted to 7.04% (7.3% at ϕ of 0.65) for the effective value of the franking credits. This is within the range of standard measurement error one might expect from estimates of the MRP. However, on the basis of such an estimate, given a value of 0.5 for imputation tax credits distributed, in our view a MRP of 7% is more justifiable than one of 6%. Added strength for this view arises from most historical averages (across different periods) being greater than 6%[46].

[45] Following a similar procedure to Brailsford et al

[46] For example, our updated estimate for 1883 – 2009' using Brailsford et al data for 1883 – 1958, is 6.2%