Keywords: market risk premium, weighted average cost of capital (WACC), cost of equity, global financial crisis.

ADJUSTING THE MARKET RISK PREMIUM TO REFLECT THE GLOBAL FINANCIAL CRISIS

Because of the substantial increase in stock market risk arising from the global financial crisis, it is not appropriate to use a constant market risk premium (MRP) when estimating the cost of equity. This is particularly so when estimates of the weighted average cost of capital include the current high risk premiums on debt but this is not reflected in the equity MRP. We propose a method for adjusting the MRP to reflect unusual risk situations.[1]

STEVEN BISHOP F Fin is Executive Director, Value Adviser Associates. Email: s.bishop@vaassociates.com.au

MICHAEL FITZSIMMONS SF Fin is Managing Director, JCP Investment Partners. Email: michael.fitzsimmons@jcpip.com.au

BOB OFFICER SF Fin is Professor Emeritus, University of Melbourne. Email: bobofficer@acorncapital.com.au

The global financial crisis (GFC) has had a significant impact on the capital market. The stock market return for 2008 was negative 40 per cent, the lowest in the 126-year recorded history of market returns. The most recent available data (as at early December 2010) show that market risk as defined by the variance of the market index, although declining from its peak, is still over 60 per cent above our estimate of the long-term average level of market risk.

There is an obvious link between the increase in market risk and the decrease in equity values. We argue that the market risk premium has risen to reflect this increased risk, and we suggest a method which reflects this increased risk in the cost of equity used for business valuations.

The increase in risk is very apparent in debt markets. Debt margins on BBB-rated corporate bonds are around 400 basis points (bps) above the 10-year Commonwealth Treasury bond rate compared with an average of around 120 bps prior to the GFC. While this is apparent in debt markets, estimating a weighted average cost of capital (WACC) also requires an estimate of the cost of equity capital. If we were to follow the common practice of using a 6 per cent market risk premium (MRP) in the Capital Asset Pricing Model (CAPM), which is used under more 'normal circumstances',[2] then the outcome would be a substantial narrowing of the difference between the risk premium on equity relative to debt. However, we argue that this could be misleading since the risk premium on equity would be expected to rise, at least commensurately with the risk premium on debt.

As we have indicated above, the cost of equity can be estimated using the CAPM. The CAPM defines the cost of equity as a risk-free rate plus a premium for risk, where risk is a market risk premium multiplied by beta (a measure of the risk of an asset relative to market risk). Since beta is a relative measure of risk, the impact of the GFC on the overall market return is unlikely to be reflected in changes in beta (the market beta will still be one). The overall market adjustment must be reflected in the MRP.

The MRP is a forward-looking risk premium and will change over time to reflect the changing view of risk and attitudes to risk on the part of risk-averse investors who require a positive risk premium relative to a risk-free asset. We would expect the MRP to vary within an average range of, say, 6 per cent to 7 per cent.

The method we use to estimate the current forward view of the annual MRP is to assume a constant required premium per unit of risk, implying increasing risk would increase the risk premium (the expected, or required, MRP), and conversely for decreasing risk. We apply this assumption to a forward view of risk derived from traded options on the S&P/ASX 200 Index.

Estimate of current market risk

A current view of market risk or volatility can be derived from trades in options on the S&P/ASX 200 Index using the Black and Scholes option pricing model. Given observations of the price of an option, the implied volatility can be derived as the only 'unknown' variable in the option pricing relationship and, by construction, it is a forward-looking estimate of the risk of the market. Estimates of this implied volatility are available from Bloomberg.

Figure 1 displays a time series of the implied volatility of a three-month call option issued against the S&P/ASX 200 Index for the longest time period available to us i.e. from 1 January 1997 to 3 December 2010.[3] The impact of the global financial crisis is clearly evident.

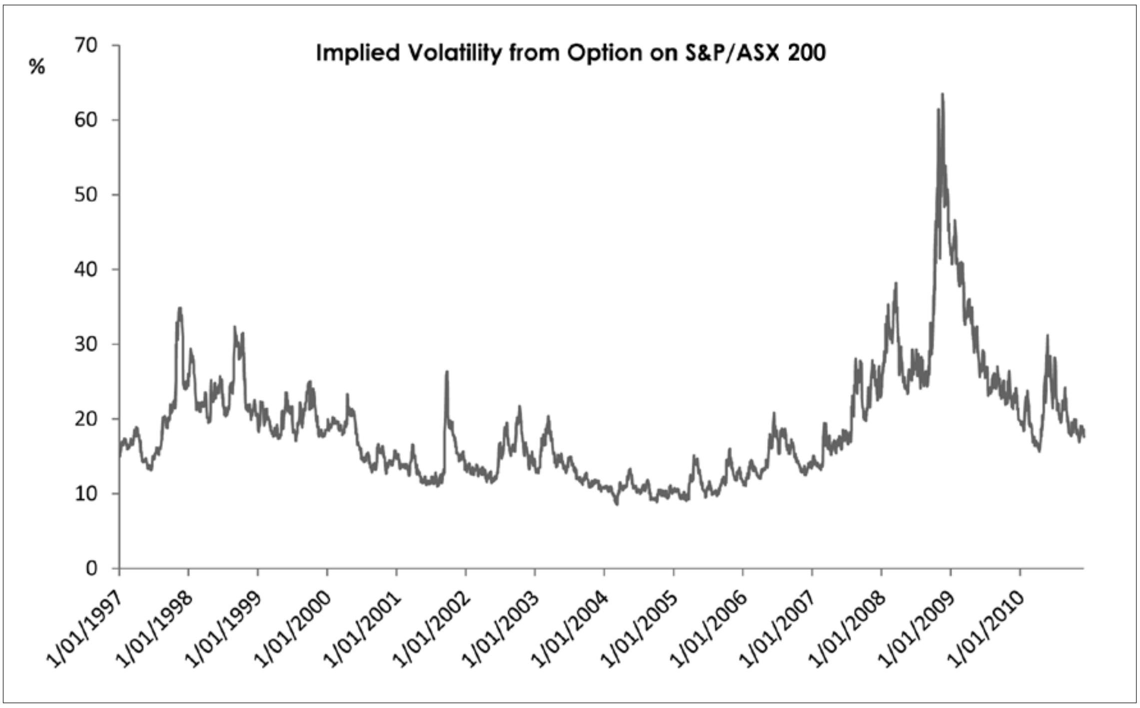
Current view of forward MRP

In deriving a forward MRP from implied volatility, we assume a constant required rate of return per unit of risk and apply it to the forward view of risk assessed from the implied volatility.[4]

Our estimate of the unit price of risk implicit in empirical estimates of the parameters of CAPM is about 43 bps, i.e. a 6 per cent MRP with an annual average standard deviation (volatility) of 14 per cent, which implies 43 bps per unit of risk (6%/14%).[5] This can then be applied to the current implied volatility. The implied MRP from such observations is 9.7 per cent (22.5% * 0.43 bps) where the implied volatility of the longest call option (12 months) is 22.5 per cent.

Converting this one-year implied MRP into a longer term forward-looking MRP requires further assumptions, such as fading it to an 'equilibrium' MRP (derived from the long–term historical average) over three years, or assuming step reversion at some future date.[6]

FIGURE 1: Forward view of volatility of stock market

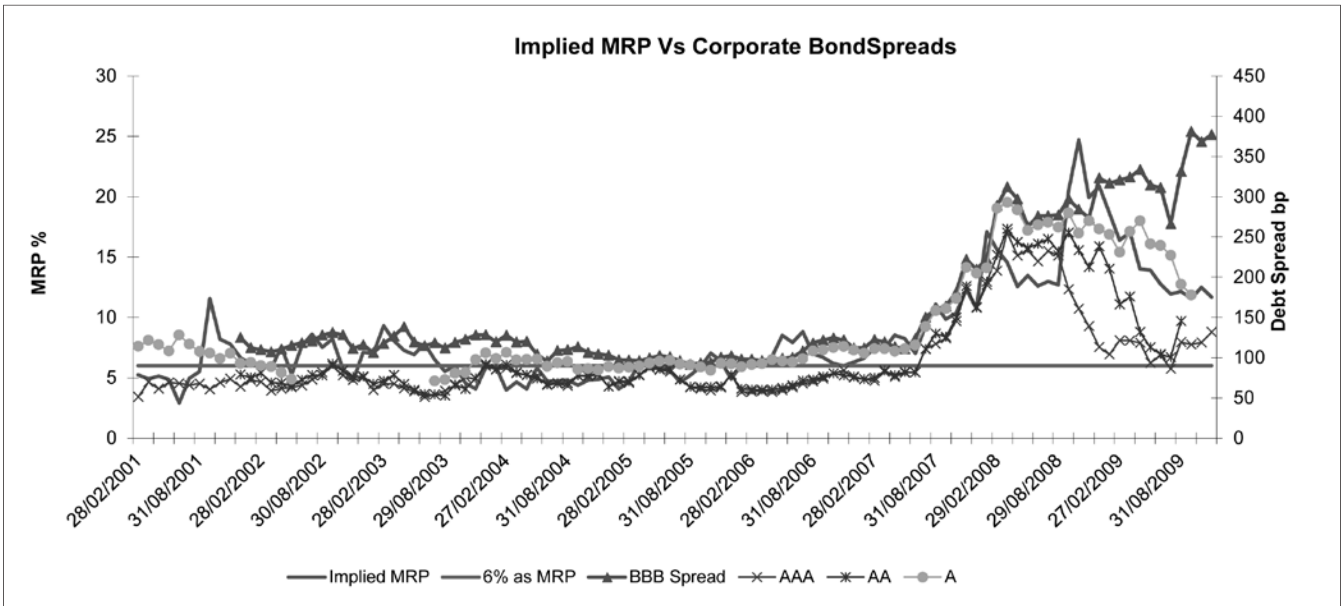


Source: Bloomberg.

There is empirical and theoretical support for this approach.[7] The recent behaviour of the forward MRP is similar to the behaviour of debt spreads in the bond market, as can be seen in Figure 2 (bond spreads against right-hand axis and MRP against left-hand axis where the spreads are seven-year maturing bond yields less the 10-year Commonwealth bond yield).[8] This is to be expected since both are risky assets and both can be priced using the CAPM. 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. This contrasts with the stable MRP at 6 per cent also shown in Figure 2, which clearly doesn't recognise the impact of the GST at all.

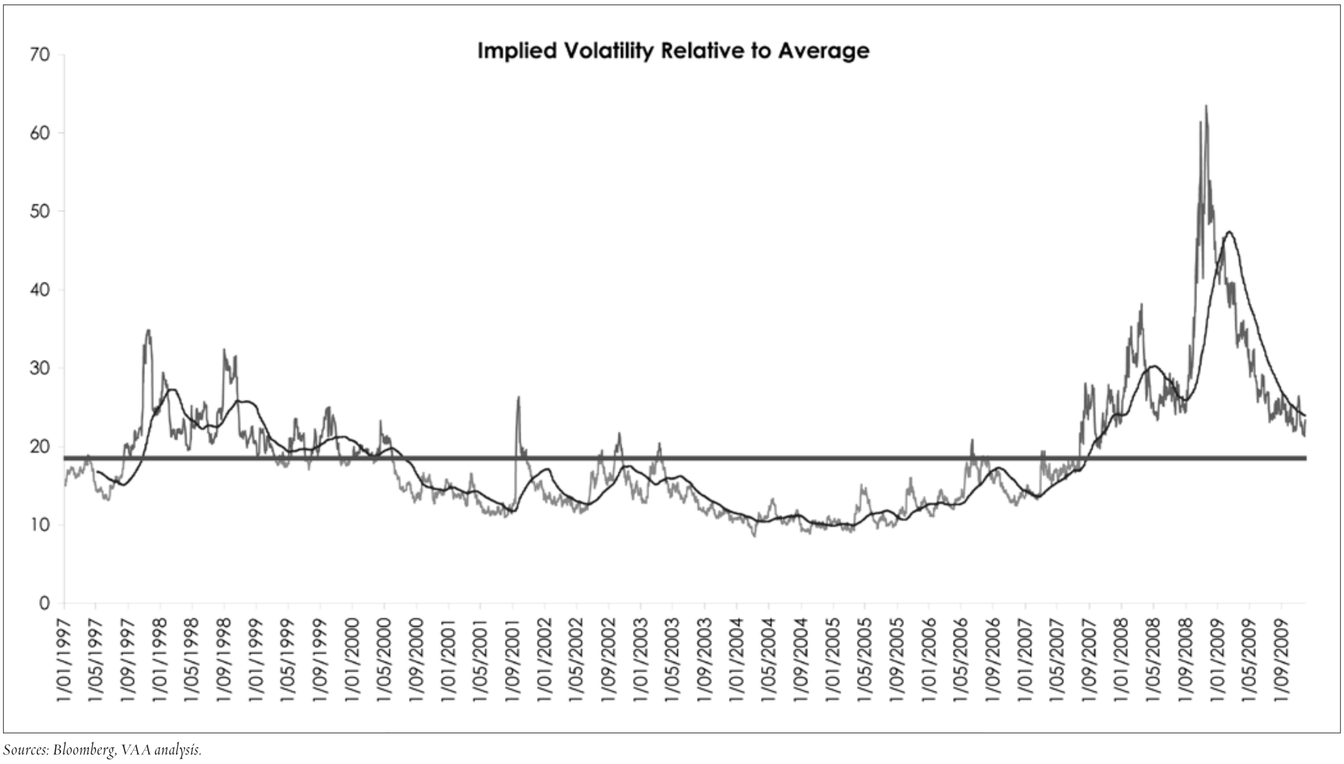
Although there is some disparity between the behaviour of the BBB premium and the premiums of other ratings of debt, all are above historical levels, particularly BBB debt, which is the investment grade bond 'closest' to equity.

FIGURE 2: Risk premium on BBB-rated seven-year corporate bonds vs implied MRP from option data



Sources: Bloomberg, VAA analysis.

FIGURE 3: Pattern of implied volatility relative to average



Sources: Bloomberg, VAA analysis.

Unfortunately, the history of implied volatilities is very 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 three years, probably longer, before reversion to the mean occurs from this assessment.

We have not investigated the reason for the disparate behaviour but simply note that there is considerable consistency in the behaviour of the premiums.

Time period of adjustment

Our estimate of the current one-year view of the MRP (December 2010) is 10 per cent (rounded from 9.7 per cent) as derived above. A challenge in applying our forward-looking approach to estimating the MRP for a longer time horizon for use in investment decision making and regulatory decisions is assessing the time period until reversion to the mean and the rate of decline. Without a term structure of implied volatility on options, we have to resort to a degree of informed judgment to establish this 'glide path'.[9]

The current unusual economic circumstances mean that there will not be much history to estimate the likely duration for which the current above-average MRP will exist. Nevertheless, we inform the choice of the duration of the glide path by looking for cycles in the behaviour of implied volatility and examining the duration of stock market crashes.

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.

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

Although there is some noise in the data (smoothed by the 90-day moving average), there are three distinct periods. The initial period in which the implied volatility is above the average extends from October 1997 to June 2000, a period of two years and 10 months. This is followed by an extended period of relatively low risk that extends to June 2007, a period of just over seven years. There was an interruption possibly due to the terrorist attacks on September 2001 and three small interruptions in 2002 (again not apparent in the smoothed data). The next period of above-average risk is what is being experienced currently.

Unfortunately, the history of implied volatilities is very 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 three years, probably longer, before reversion to the mean occurs from this assessment.

Recovery of an index from a crash

Our second approach to forming a view about the period for which the MRP will differ from the long-term average is to examine the duration of other stock market 'crashes'. If history is a guide then the 2007 crash will take up to 5½ years (i.e. to June 2014) to recover from December 2007 when the S&P/ASX 200 Index reached its peak.

Figure 4 and Table 1 present an analysis of the time it took for the Australian market to recover from a 'major' crash using a combination of monthly data for the All Ordinaries Accumulation Index post 1980 and from Officer (1989)[11] prior to 1980.

The shortest time to recover was 2.8 years (following the 1980 crash which was also the 'smallest' crash of the six presented). The 1929, 1951, 1973 and 1987 crashes took between around 5½ and 6½ years to recover with the overall average being 5½ years.

Information content of implied volatility changes

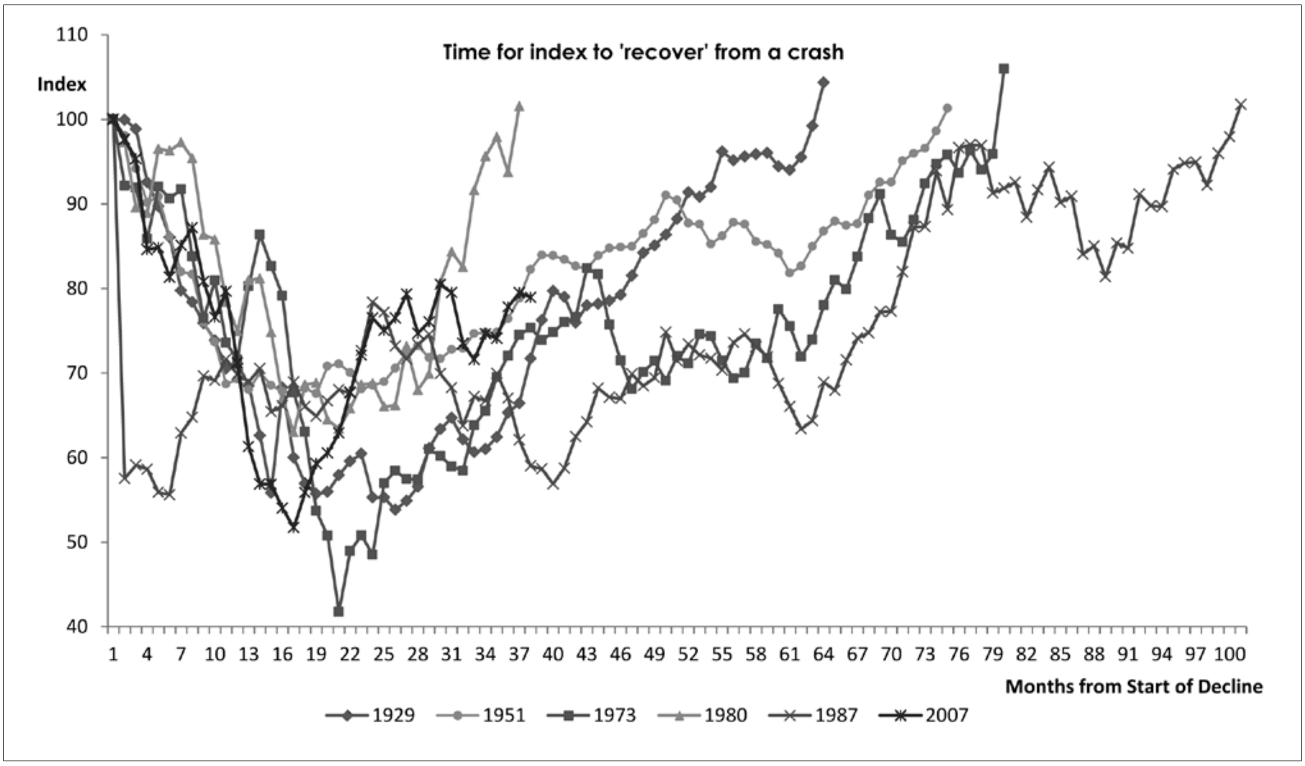
Does an investment approach based on the assumption that the MRP is variable and reverts slowly to a long-run equilibrium better reflect expected returns than the use of a simple flat MRP? To consider this, we examine the performance of two alternative investment strategies:

1. using implied volatility to take a long or short position in the S&P/ASX 200 Index over a number of different 'buy and hold' periods; and
2. buying and holding over the same time periods examined in strategy 1 (above).

TABLE 1: Time for the S&P/ASX 200 Index to recover from a major crash

	1929	1951	1973	1980	1987	2007	Average
Severity	-46%	-32%	-58%	-33%	-44%	-48%	-43%
Duration (Years)	5.3	6.3	6.7	2.8	5.8	?	5.4

FIGURE 4: Time for the S&P/ASX 200 Index to recover from a major crash



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' returns. 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 contains information about the MRP by implication) than an historical average (the second strategy). If the return from using information in the implied volatility to trade is higher than that from the simple buy-and-hold strategy (strategy 2) then it can be inferred that the implied volatility 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 develop an informed view about the duration of any predictive ability of changes in the implied volatility.

We use daily trading data from the All Ordinaries Accumulation Index over the period January 1980 to 30 November 2009 to assess its 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 S&P/ASX 200 Index. Further we are using the 90-day historical standard deviation as a proxy for the implied volatility. There is a high correlation (0.9) between these over the period for which we have implied volatility data (1997 forward), which provides comfort that the historical volatility is a reasonable proxy for the forward view of volatility that is of primary interest here.

The first trading strategy uses information in the implied volatility to invest in the All Ordinaries Index. It is used as follows:

> If the implied volatility is above the historical average on each day then invest long (i.e. buy the index) and hold for a defined period (we vary this holding period as will be apparent from Table 2). This is assessed on a rolling basis and is based on a view that if risk has increased then the market capitalisation will have fallen, consistent with the findings of Frijns et al.[12] 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 that the investment is liquidated at the end of the holding period and no further returns from that particular investment are earned.

> If the implied volatility is below the historical average each day then invest short (i.e. sell the index). 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) implied volatility is above an historical average and holding for five years provides a gross return of 16.7 per cent and a net return from being both long and short of 6.1 per cent (16.7 per cent minus

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	

Sources: Bloomberg, VAA Analysis.

10.6 per cent). The greatest return was for a holding period of four years which yielded a gross return of 17.3 per cent and a net return from both holding long and selling short of 7 per cent (17.3 per cent minus 10.3 per cent). Selling short for the five-year strategy when the implied volatility is below the historical average provides a return of negative 10.6 per cent, which is better than the overall buy-and-hold strategy of negative 12.6 per cent.

Buy-and-hold strategies for all years' holding strategies provide an improved return relative to the buy-and-hold stategy over the entire period of the data of 12.6 per cent from a long position. Assuming zero transaction costs, implying a zero-sum-game, then the short selling position yields a return of negative 12.6 per cent, as can be seen in Table 2.

The analysis is consistent with a competitive and informationally efficient market because the trading strategies could be expected to have greater risk (although we have not tested this). 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 shows the total returns, relative to the buy-and-hold, from both strategies. It is apparent that the highest return arises from a holding period of four years with holding periods of three years and longer providing returns above the shorter periods.

Conclusion

The GFC has had a significant impact on the capital market. In 2008, the overall stock market return was negative 40.4 per cent, the lowest in the 126-year recorded history of market returns. The most recent data available to us (end-December 2010) shows market risk, although declining from its peak, is still over 60 per cent above our estimate of the long-term average risk level.

Both history and other forward-looking data suggest the GFC is not over and still has considerable time to run, i.e. it is not a short-term phenomenon and the market has not returned to 'normal'. On these grounds, we recommend the use of a MRP with a mean-reversion profile rather than a simple 6 per cent p.a.

While there has been an upturn from the 'bottom' of the stock market fall, the stock market index is still only 79 per cent of the peak prior to the crash. Both history and other forward-looking data suggest the GFC is not over and still has considerable time to run, i.e. it is not a short-term phenomenon and the market has not returned to 'normal'. On these grounds, we recommend the use of a MRP with a mean-reversion profile rather than a simple 6 per cent p.a.

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 underestimates the required return on equity.

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. This forward-looking market risk premium is well above the long-term historical average due to current volatile market conditions brought about by the GFC. 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 underinvestment in assets.

While still an evolving area for research, we believe that the advances which have been made in this area, and the significant effect of the GFC on risk and risk premiums (spreads) in financial markets, warrant a departure from the use of the long-term average MRP for valuation related decisions. Consequently, we recommend a cost of equity (and WACC) profile that reverts to the mean over time. ■

Notes

1. We acknowledge the thought-provoking input to this avenue of research provided by Professor Bruce Grundy.
2. See Truong et al. (2008) for a survey of practice in using components of the WACC including the MRP.
3. The three-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 (Australia Volatility Index).
4. The approach is used, for example, by JCP Investment Partners ('JCP') and Value Adviser Associates ('VAA') to update their estimates of the cost of capital to meet current circumstances.
5. The 14 per cent is the average historical volatility over the longest period available; January 1980 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. We have used 6 per cent to represent the 'average' MRP which conforms with general practice although Officer and Bishop (January 2009b) recommend 7 per cent.
6. VAA adopts the former approach and JCP adopts the latter involving reverting to the long-term average after two years.
7. See, for example, J. Doran, E. Ronn and R. Goldberg (2005). This paper also provides references to this area of research.
8. Most 10-year corporate bonds did not trade during the GFC, so seven-year bonds were selected using Bloomberg data.
9. Some consultants, e.g. Oxera (2008), have suggested instead that the higher value is appropriate for a period of up to five years.
10. Note this is not the long-term average which we computed earlier to be 14 per cent. 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 within the current circumstances of above-average volatility.
11. R.R. Officer 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.
12. B. Frijns, C. Tallau and A. Tourani-Rad 2008, 'The information content of implied volatility: evidence from Australia', working paper. Available from http://ssrn.com.abstract=1246142.

References

Doran J., Ronn, E. and Goldberg, R. 2005, 'A simple model for time-varying expected returns on the ASX 500 Index', working paper, University of Texas.

Frijns, B., Tallau, C. and Tourani-Rad, A. 2008, 'The information content of implied volatility: evidence from Australia', working paper. Available from http://ssrn.com.abstract=1246142.

Officer, R. and Bishop, S. 2009a, 'Market risk premium: an estimate for 2010–2015', Value Adviser Associates, June, submission to the Australian Energy Regulator.

Officer, R. and Bishop, S. 2009b, 'Market risk premium: further comments', Value Adviser Associates, January, submission to the Australian Energy Regulator.

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.

Oxera 2008, *Impact of the financial crisis on BAA's cost of capital*, paper prepared for Civil Aviation Authority, 21 January. Available from www.caa.co.uk/docs/5/ergdocs/heatgatnov07/baa_a.pdf.

Truong, G., Partington, G. and Peat, M. 2008 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, vol. 33, no. 1 June.