REPORT TO THE AER

REVIEW OF THE AER'S OVERALL APPROACH TO THE RISK FREE RATE AND MARKET RISK PREMIUM

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ON BEHALF OF

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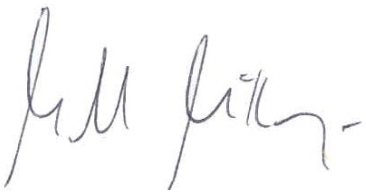
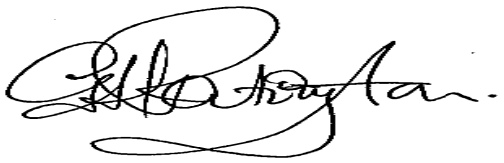
Expert Witness Compliance Declaration

We have read the Guidelines for Expert Witnesses in proceedings in the Federal Court of Australia and this report has been prepared in accordance with those guidelines. As required by the guidelines we have made all the inquiries that we believe are desirable and appropriate and that no matters of significance that we regard as relevant have, to our knowledge, been withheld from the Court.

Signed





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Preamble

In the context of the AER's WACC framework, we have been asked to provide a written report that addresses the following questions:

1. The businesses and consultants suggest that the cost of equity is relatively stable over time. Critically review the material on the stability of the cost of equity, distinguishing real and nominal considerations. Explain whether you agree or disagree and set out theoretical and empirical evidence to support your position. Discuss the extent to which these findings support the use of an MRP that moves in the opposite direction to the risk free rate.

2. Critically evaluate whether the AER's approach to determining the cost of equity is internally consistent and whether it is consistent with the CAPM. Advise on whether the AER's approach to estimating the cost of equity (by using a prevailing risk free rate and a 6% MRP) is reasonable in current market conditions. In particular:

    a. Do you consider that the current yield on 10 year CGS is a reasonable estimate of the 10 year forward looking RFR? Explain your position.

    b. Do you consider that a 6 per cent MRP is a reasonable estimate of the 10 year forward looking market risk premium? Explain your position.

3. If the AER's approach is internally inconsistent or unreasonable in current market conditions, recommend the best alternative value or methodology for the risk free rate and /or MRP.

In answering these questions, we have engaged with the relevant academic literature and other research as well as the key documents provided, including:

- AER, *Draft decision Envestra: Attachments*, September 2012, pp. 114–116, 121–144
- AER, *Draft decision Envestra: Appendices*, September 2012, pp. 1–55
- CEG, *Response on MRP and RFR consistency*, November 2012, pp. 6–20, 62–64
- CEG, *Update on MRP and RFR consistency*, November 2012 pp. 5–28

- Ernst and Young, *Cost of equity*, November 2012, pp. 5–16
- Gregory, *RFR and the present value principle*, November 2012, pp. 6–8
- Gregory, *Establishing the cost of equity, RFR and MRP*, November 2012, pp. 1–21
- NERA, *Cost of equity under the CAPM*, November 2012, pp. 18–38
- SFG, *Return on equity response*, November 2012, pp. 9–19, 27–28, 39–42
- Wright, *Response to Lally*, November 2012 pp. 1–9
- Wright, *UK approaches to the RFR and cost of equity*, November 2012, pp. 1–17

Executive Summary

In response to the first question, we begin by noting that if it is assumed that the expected return on the market is stable, ie. $E(\overline{r_M})$, then by definition an inverse relationship must exist between the risk free rate and the market risk premium, ie. $E(\overline{r_M})$ = $\downarrow r_f$ + $\uparrow MRP$ (and vice versa). Given this relationship, CEG and SFG (collectively referred to as the consultants hereafter), take the view that current interest rates are low, and so an argument can be made for an increase in the *MRP*.

To analyse this proposition, we begin by considering the case as to whether interest rates are abnormally low. The evidence provided by the data suggests that the history of interest rates over the last few decades is not truly representative of the long run in this market. For both the U.S., UK and Australian markets, evidence exists which suggests that bond yields were stable (and possibly even falling) in the long run. The history of data over the last few decades is anomalous and the high interest rates observed during this period are clearly not representative of the longer time series. As such, one conclusion may be that the current environment is nothing more than a return to the 'normal' long run interest rate regime. On the other hand, it could be argued that there is a new normal and the GFC represents a true regime shift for global financial markets. It is difficult to determine whether this is the case or not - only in the fullness of time will we be able to comment on this with any certainty.

The second part of this report questions the assumption that the cost of equity is stable. In the context of equity valuation, we argue that there may be times when it is changes in expected cash flow that largely drive changes in equity values and there may be times when it is changes in the cost of equity that largely drive changes in equity values, and it is likely that there are times when equity values change because of changes in both the expected cash flow and the cost of equity. There is little doubt that understanding the relative importance of discount rate and cash flow news in asset pricing is a crucial and unresolved issue. However, it is implausible that the overall cost of equity is a constant in either nominal or real terms.

Having stated our proposition that the cost of equity varies, the next part of this report considers whether the market risk premium and risk free rates vary and what, if any,

relationship exists between them. Despite the consultants strong support for a negative relationship, we find that a pro- and a counter-cyclical market risk premium are possible. An examination of the relevant evidence leads us to conclude that the relation between the MRP and the level of interest rates is an open question and that the relation, if any, is not sufficiently well established to form the basis for a regulatory adjustment to the MRP.

In response to the second question posed, we interpret the AER's approach as combining an estimate of the current risk free rate with an estimate of the current market risk premium and this is both an internally consistent approach and consistent with finance theory. The argument of the consultants that the AER approach mixes current and historic estimates of the risk-free rate in the CAPM misses the point. What matters is getting the best estimate of the current risk free rate and the best estimate of the current market risk premium. Using the same estimate of the risk free rate for both provides no assurance whatsoever that the best estimates will be obtained.

We consider that the current yield on 10 year CGS is a reasonable estimate of the 10 year forward looking RFR. We also consider that 6% is a reasonable estimate of the market risk premium.

In response to the third and final question, we do not regard the AER's approach as internally inconsistent or unreasonable. Consequently, we do not recommend an alternative value, or estimation method, for the risk free rate and/or MRP.

1. **The businesses and consultants suggest that the cost of equity is relatively stable over time. Critically review the material on the stability of the cost of equity, distinguishing real and nominal considerations. Explain whether you agree or disagree and set out theoretical and empirical evidence to support your position. Discuss the extent to which these findings support the use of an MRP that moves in the opposite direction to the risk free rate.**

This issue appears to have come to the fore as consequence of the argument that the current rate of return on government securities is abnormally low. To understand why this is important, recall that the expected return on the market is equal to the risk free rate of return plus the market risk premium, ie.:

$$E(r_M) = r_f + MRP$$

If we assume that the expected return on the market is stable, ie. $E\overline{(r_M)}$, then by definition an inverse relationship must exist between the risk free rate and the market risk premium, ie. $E\overline{(r_M)} = \downarrow r_f + \uparrow MRP$ (and vice versa).

Therefore, in formulating our response to this question, we must address three central issues:

- Are interest rates abnormally low?
- Is the cost of equity stable?
- What is the relationship between r_f and *MRP*?

We will address each of these issues in turn.

1.1 Are interest rates abnormally low?

To classify interest rates as being abnormally low is a relative statement. Whether or not it is true requires a definition of what is considered a 'normal' rate of return and one commonly used method is to assess the current rate against a long history of data. To this end, in the discussion that follows, we shall consider the history of yields in the USA, UK and Australia (we include the USA and UK in this discussion as they have long data histories available and, arguably, the lessons provided by these countries are relevant for Australia).

What history reveals is that current Australian bond yields rates are low, but not abnormally so, particularly when compared to the first seventy or so years of the twentieth century. Current bond yields are somewhat below the very long-term averages, but those averages are inflated by a period of abnormally high interest rates, which in Australia and the UK began about the 1970s returning towards more normal levels about the start of the current century. Prior to this period bond yields were typically in the range 3% to 6%, but then jumped and for a substantial period were typically between 10% and 15%. The explanation for this jump was a sustained period of inflation, starting in the 1970s, when inflation rates above 10% were not unusual. The prevailing view was that high inflation would be around for a long time and it was not until the 1990's that inflation was ultimately tamed. The period of high inflation was also a period of transition, as financial markets were being increasingly deregulated. Our conclusion is that it is the period of high interest rates in the seventies, eighties and nineties that are the best candidate for being abnormal, rather than the current "low" rates.

Before commencing our analysis of bond returns, we note that while the arithmetic average of returns may be an appropriate basis for measuring expectations of the MRP, it is not the most appropriate basis for comparing the current yield on government bonds against historic bond returns. To explain this point - if we measure the government bond yield today, both the expected return and the realised return to maturity are equal to the current yield. This is because we get the promised return provided we hold the bond to maturity. The current yield is given by the internal rate of return on the bond. That internal rate of return is the compound rate of return on the bond to maturity and by definition is equal to the geometric average of expected annual returns over the life of the bond. Thus, in judging whether current yields are high or low relative to historic annual bond returns the natural benchmark is the geometric average return (the compound rate of return on bonds).

US and UK bond data

A number of authors have presented information on the history of financial aggregates, including the returns to bonds. Siegel (1992) provides a long history of American data beginning in 1802. The rates of return to long term government bonds are summarised in the table below and it shows that nominal returns to bonds were reasonably constant until

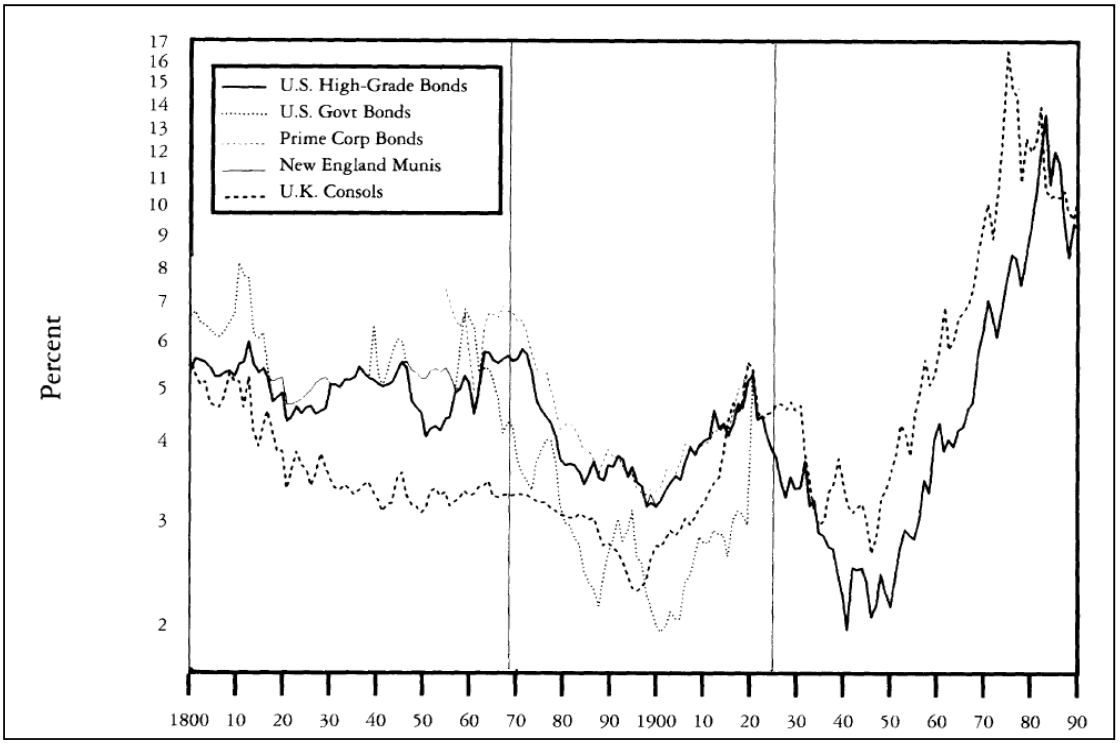
after the post-war period. The financial deregulation of the 1980's saw a rapid escalation in bond yields and this clearly constitutes an anomalous period of high interest rates relative to the rest of the data. Siegel (2002) reports an annual geometric real rates of return for bonds equal to 2.8% for 1871 to 2001 which triples to 8.5% for 1982 to 2001

Long Term US Government Bond Returns

Period	Nominal Return (%)		Real Return (%)	
	Arithmetic	Geometric	Arithmetic	Geometric
1802 – 1990	4.8	4.7	3.7	3.4
1871 – 1990	4.7	4.5	2.8	2.5
1926 – 1990	4.9	4.6	1.8	1.4
1946 – 1990	4.9	4.5	0.5	-0.1
1966 – 1990	7.4	6.8	1.6	0.9
1982 – 1990	15.7	14.9	11.3	10.5

Source : Siegel (1992, Table II, p. 31)

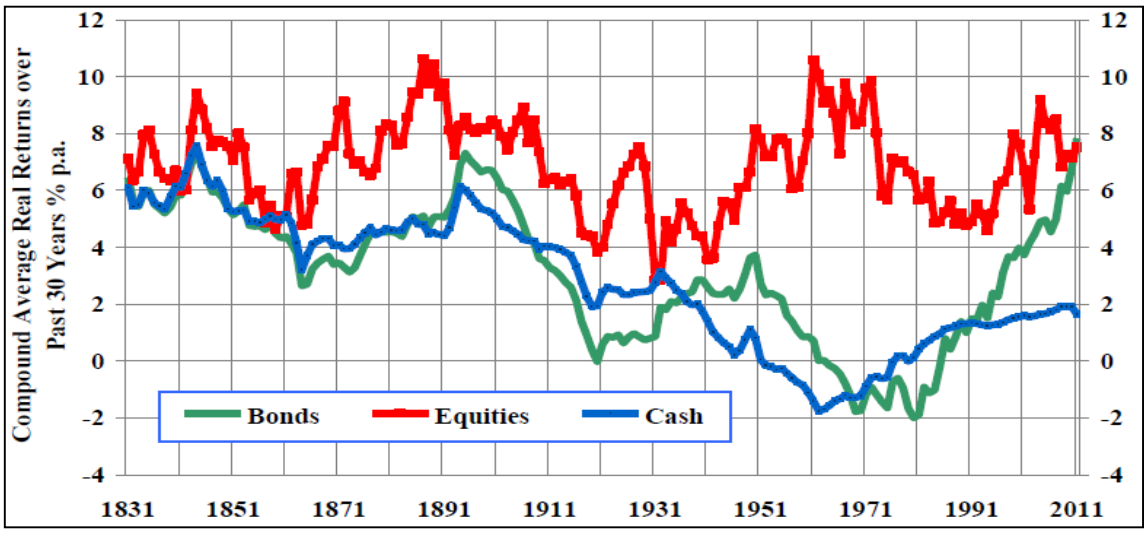
Siegel (1992) presents a plot of various long term interest rates over the same period covering both US debt and UK debt (reproduced below). This figure suggests that government bond rates were actually in a general state of decline through most of the 19th century. Further, the high interest rates of the 1980's are clearly a stand out feature of this figure.



Source : Figure B in Siegel (1992)

Wright (Nov, 2012, p. 5) presents the following chart, which is an update of a figure in the Smithers report based on the updated data provided by Siegel. It shows realised real rolling 30-year returns on US equities, long-dated government bonds, and "cash" (i.e., short-dated government bills) for more than 200 years' worth of data. The pattern in this data suggests declining real returns on bonds over the twentieth century, until the 1970s when there was a sharp reversal of this trend.

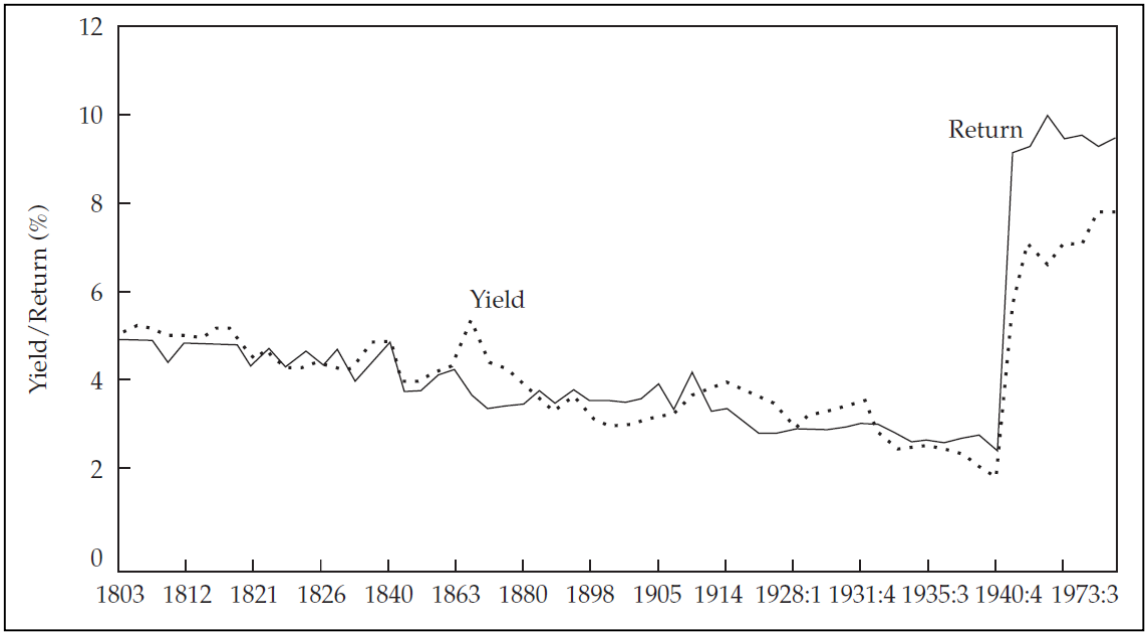
30 Year Rolling Returns on Stocks, Bonds and Cash since 1830



Source: Wright (Nov., 2012, p. 5)

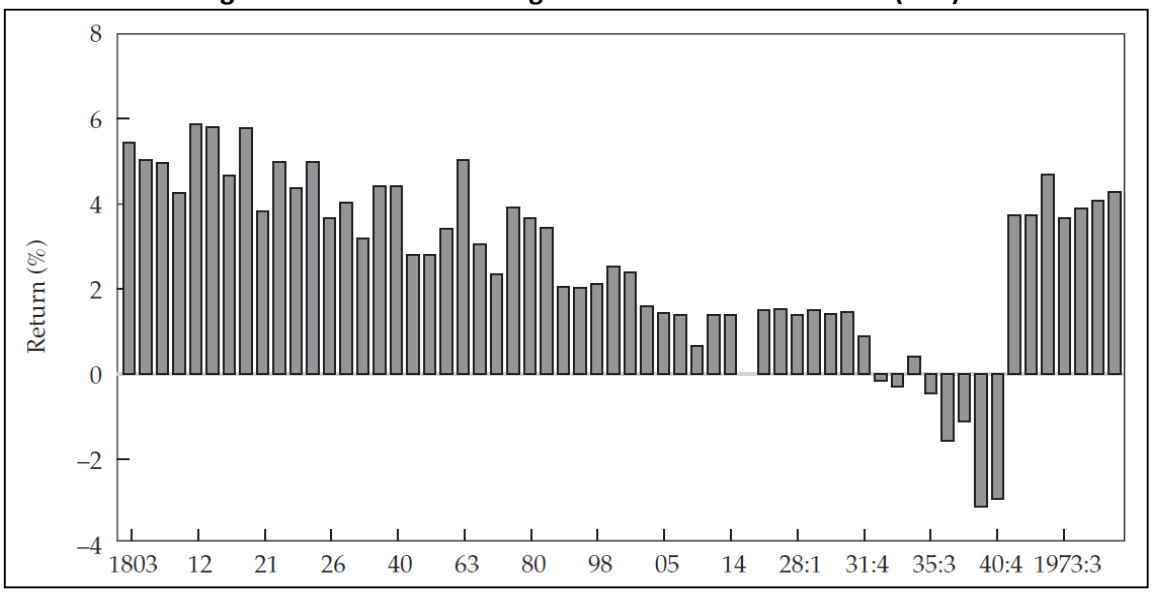
Bernstein (1997) argues that long term rates of return must be estimated independent of changes in valuation. As such, Bernstein considers American government bond data in which yields were (near) identical, across nearly 200 years worth of price information. For bonds, 63 valuation episodes produced a nominal return of 4.9% with a standard deviation of 2.3%. This result is consistent with the estimates of Siegel (1992). Most interestingly, Bernstein (1997) provides more evidence of a long term downward trend in bond yields, which was dramatically reversed in the post-war period. The figures below are reproduced from Bernstein (1997) and this change is clearly visible in both real and nominal returns. Bernstein (1997) also notes that the Ibbotson Associates database reports the long-run total rate of return on long U.S. Treasury bonds has been 5.2% over the period 1925 to the mid-1990's.

Long-Term US Bond Yield and Long-Run Bond Returns - 1803 to 1976 (nominal)



Source: Figure 3 in Bernstein (1997)

Long-Run Returns on US Long-Term Bonds - 1803 to 1976 (real)



Source: Figure 4 in Bernstein (1997)

Comparing the above results from Bernstein (1997) and Wright (Nov, 2012), there are differences in the observed behaviour of real interest rates. For instance, Bernstien's data shows real yields on bonds never go above 6%, whereas in Wright's data bond real bond returns do go above 6% and the patterns in variation also differs between the charts. Our

point is simple - what you get depends on what data you have and how you use it. For example, where you start and end your time-series, what smoothing process, if any, that you use and, where several data sets are used to form the time series, how you combine them, can all have a bearing on the outcome. Thus, it is important to consider the data from multiple points of view to ensure that there is a consistent story.

Australian bond data

Perhaps the best known global financial history database is provided by Dimson, Marsh and Staunton (DMS), which is published annually as the Credit Suisse Global Investment Returns Yearbook. The 2009 report covered the period up to the onset of the financial crisis (1900 to 2008), and shows the compound geometric rate of return earned by investors in Australian 10 year government bonds has been 5.5% in nominal terms and 1.5% in real terms. The most recent 2012 report includes the period of heavy government intervention in the cash rate, and shows that the long run rate of return to 10 year Australian government bonds unchanged in nominal terms at 5.5% and slightly higher in real terms at 1.6%.

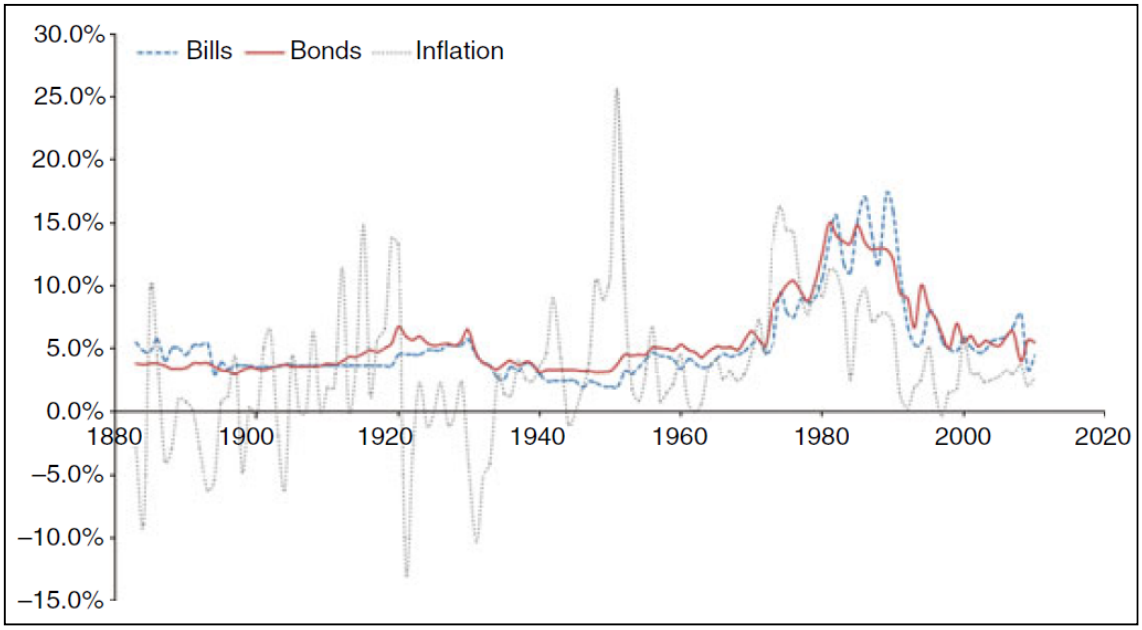
DMS analyse geometric averages, but Gregory (2012a, p. 6) reports arithmetic averages using the latest DMS data. These arithmetic averages are based on a widely used approximation.[1] Gregory reports that for 1900-2011, the long run arithmetic average real rate of return for bonds is 2.4%. The real compound bond return as reported by DMS is given by the geometric average of 1.6%,.

Brailsford et al (2012) updates their Australian long run financial data series first introduced in Brailsford (2008) (note this data is also used in Handley, 2012). They report average nominal and real[2] government bond yields of 5.65% and 2.31% respectively, over their entire sample period of 1883 to 2010. They also present the following figure, which again highlights the period following the mid-1970's as anomalous relative to historical interest rates observed over a much longer time horizon. From the beginning of the sample period

[1] Assuming that returns are lognormal the arithmetic average can be approximated by the adding half the variance of returns to the geometric average return.

[2] Our reported real estimate is calculated using the simple approximation discussed in Section 4, ie. the bond return minus the inflation rate, averaged across the entire sample period.

until 1972, the average nominal and real government bond yields were 4.23% and 1.98% respectively.



Source: Figure 1 in Brailsford et al. (2012)

We stated at the beginning of this section that for an interest rate to be unusually low, it must be relative to some benchmark, for example, interest rates over the last 10, 20 or 100 years. If we take the benchmark to be the very long run, then the average government bond return is 5.5% as reported in DMS or 5.65% as reported in Brailsford et al. (2012). At the time of writing the nominal interest rate on 10 year government bonds is approximately 3.4%. This difference between the current rate and the long run average is even less pronounced if the recent high interest rate period is excluded - the average return over the period 1883 to 1972 is 4.23% for the Brailsford et al. (2012) data.

We do not attempt to estimate the current real yield on ten year government bonds as to do so requires knowledge of the inflationary expectations built into the nominal yield. Estimating the expectations of inflation built into bond yields is problematic and we doubt that it can be done with sufficient precision to make sensible comparisons with historic real returns. For example, if we assume a two percent reduction in current nominal yields for the effect of inflation then the current real yield would be estimated at 1.48%, very close to the 1.5% long run average real yield for Australia as reported by DMS. However, if we assume a three percent reduction for inflation then the real yield would only be 0.48%, less than a

third of the long run average. Our point is that a one percentage point difference in the inflation adjustment suggests a quite different story, and we very much doubt that anyone can estimate the inflation adjustment to that level of accuracy for a ten year forecast horizon.

The evidence provided by the data suggests that the more recent history of interest rates is not truly representative of the long run in this market. For both the U.S., UK and Australian markets, evidence exists which suggests that bond yields were stable (and possibly even falling) in the long run. The more recent history is anomalous and the high interest rates observed during this period are clearly not representative of the longer time series.[3] As such, one conclusion may be that the current environment is nothing more than a return to the 'normal' long run interest rate regime. On the other hand, it could be argued that there is a new normal and the GFC represents a true regime shift for global financial markets. It is difficult to determine whether this is the case or not - only in the fullness of time will we be able to comment on this with any certainty.

1.2 Is the cost of equity stable over time?

The key issue in this debate is whether the cost of equity is approximately constant over time. By definition, a stable cost of equity implies that changes in interest rates are offset by changes in the risk premium.

It is helpful to begin our analysis by formally stating the equation for determining the present value (*PV*) of an asset:

$$PV = \frac{\sum_{t=1}^{n} C_t}{\prod_{t=1}^{n} (1 + r_t)} \tag{1}$$

where C_t are a sequence of n cashflows occurring at time t and r_t represents the discount rate to be applied to each cash flow at time t. Equation (1) is more commonly written as

[3] Just because interest rates were high does not imply that historic excess returns (MRP) were low. The period of high interest rates was generally a period of high returns for equity investors. Indeed, following the arguements of Siegel (1992, 1999) and Gregory (2011) ,discussed section 1.2.1, the high levels of inflation accompanying the high interest rates may well have contributed to an overestimate of the MRP.

$$PV = \sum_{t=1}^{n} \frac{C_t}{(1+r)^t} \tag{2}$$

In order to move from Equation 1 to Equation 2, the required return is either assumed constant over the future life of the project, or it is assumed to satisfy Equation 3 below. If the latter, then discounting with a single discount rate gives the same valuation as using the time varying vector of discount rates. The use of a single discount rate is usually a matter of practical convenience. In most cases it is simply too difficult to forecast how the required return will vary in the future.

$$\prod_{t=1}^{n}(1+r_t) = (1+r)^t \tag{3}$$

The key point of this analysis is that the discount rate in the present value equation is not constrained to be constant. It may vary through time and this applies whether we are looking forward into the future, or backward into history. The common use of a single discount rate is largely a matter of practicality and convenience, rather than being based on theory, or evidence, that the discount rate is constant through time.

It is also obvious from Equations 1 and/or 2 that if the value of an asset changes this may be because investors' forecast of the expected cash flows has changed, or because their required rates of return have changed. This is entirely uncontroversial. As the seminal work by Campbell and Shiller (1988) suggests, unexpected asset returns can be attributed to the arrival of information about discount rates and/or cash flows. See also Campbell (1991) for a decomposition of unexpected returns into these two components.

1.2.1 Do discount rates and/or expectations of cash flows change?

The view implicit in Shiller (1981) was that changes in equity values were largely driven by changes in expected cash flows, rather than changes in the cost of equity. Both Shiller (1981) and LeRoy and Porter (1981), observed that stock prices are more volatile than company dividends in what has come to be known as the excess volatility puzzle [4](Campbell and Shiller, 1988, Cochrane, 1992, 2001, 2008, Campbell, 1996, and van Binsbergen and

[4] Gregory (2011) argues that in the presence of excess volatility the likely result is regulatory estimates of the cost of equity capital in the UK that are too high.

Koijen, 2010, discuss this excess volatility, its causes, and its implications). This puzzle led researchers to consider whether the time variation in the cost of equity was a significant cause of changes in equity values (see Campbell and Cochrane, 1999, Cecchetti, Lam and Mark, 1990, 1993, and Kandel and Stambaugh, 1990).

There is an active literature on both sides of the debate. The role of cash flows is emphasised in a number of recent theoretical (see Abel and Eberly, 2011) and empirical contributions (see *inter alia* Evans, 1998, Hall, 2001a,b, Robertson and Wright, 2006, and Larrain and Yogo, 2008). The problems in finding variables that accurately capture both discount rate and cash flow news is discussed in Chen and Zhao (2009). They argue that these difficulties mean that the importance of cash flow news is most likely understated and make a case in its favour as the primary explanator of returns.

Cochrane (2012) take the opposite view and provides an excellent summary of the case for the importance of changes in the discount rate. He even goes so far as to suggest that Fama's (1970) taxonomy of market efficiency based on information on expected cash flows, would be better replaced by a framework that focuses on discount rates. Rather than the old paradigm of assuming that price changes only reveal cash flow news, Cochrane (2012, p. 1091) argues that "(m)ost of the puzzles and anomalies that we face amount to discount rate variation we do not understand" and concludes that "(d)iscount rates vary a lot more than we thought".

A clear theoretical imperative to support a time varying cost of equity is given by Rapach and Zhou (2012). They argue that:

> "(t)heoretically, asset returns are functions of the state variables of the real economy, and the real economy itself displays significant business-cycle fluctuations. If the quantity and price of aggregate risk are linked to economic fluctuations, then we should ***expect time-varying expected returns*** and return predictability, even in an efficient market. For instance, if agents become more risk averse during economic contractions when consumption and income levels are depressed, then they will require a higher expected return on stocks near business-cycle troughs to be willing to take on the risk associated with holding stocks; variables that measure and/or predict the

> state of the economy should thus help to predict returns." (p. 2, emphasis added)

Whether expected real returns time vary in this particular fashion is an open question - the important point of the argument is that expected real returns are likely to vary over time with changes in the real economy. This might, for example, be as argued in the quote above because investors become more risk averse in recessions and demand higher real returns and vice-versa in booms, or it might be that observing generally low real returns in recessions investors accept that low real returns are all they can expect and vice-versa in booms.

In our opinion there may be times when it is changes in expected cash flow that largely drive changes in equity values and there may be times when it is changes in the cost of equity that largely drive changes in equity values, and it is likely that there are times when equity values change because of changes in both the expected cash flow and the cost of equity. There is little doubt that understanding the relative importance of discount rate and cash flow news in asset pricing is a crucial and unresolved issue. However, it is implausible that the overall cost of equity is a constant in either nominal or real terms.

Our conclusion is that the cost of equity varies in nominal and real terms. It would be fair to say that this is the modern, although not universal, view in the research literature and with respect to realised returns it is clearly evident in the data. Consider, for example, the plot reproduced from Wright (2012) in Section 1.1. It is clear from this plot that there is variation in real equity returns through time even after the data smoothed by using a 30 year moving average.

Our conclusion is at odds with some of the consultants who make the case for constant real returns. This alternative view reflects either an assumption as to the nature of discount rates or a conclusion based on an historical analysis of a long history of data. This view is exemplified in the following quotes from Wright (Oct, 2012):

> "Both the real market cost of equity and the MRP are inherently unobservable. But of necessity regulators have to commit themselves to a particular set of *assumptions* about these unobservable magnitudes. My

> view, in line with the UK regulators, is that regulators should work on the assumption that the real market cost of equity is constant. This approach is supported by quite strong evidence." (p. 2)
>
> "Furthermore, Mason et al noted, there was strong evidence ... that the realised real aggregate stock market returns and by implication ... the expected real market return ... has been remarkably stable, both over long historical samples, and in a wide range of markets. By comparison, Mason et al also noted, there was very much weaker evidence of stability of the risk-free return (at any horizon), and hence of the MRP." (p. 5)

CEG (2012a), makes the case that.

> "There is ... a basis for assuming that over the long term the required market return on equity will be reasonably stable. (p. 63)

Even the main proponent of a stable real return on the market is constant, Wright (Oct 2012), concedes that it is not really stable, rather he argues that it will be more stable than the MRP. Further, arguing that we have to assume one of these variables to be constant, Wright contends that it better to assume the real return on the market to be constant than to assume the MRP to be constant. However, assuming that the real return on the market is constant is not a view which is widely held. For example, Siegel (1992, 1999), whose data is used in part by Wright (Oct., 2012), supplies the evidence that real returns on equity are more stable than real returns on debt. However, he does not suggest that we switch to using a constant mean real return on equity to estimate required returns. Rather, he argues, that volatility in real bond returns over the twentieth century was driven by unanticipated inflation and this results in an upward bias in historic estimates of the MRP. Gregory (2011) makes much the same point as one of the arguments in support of his view that the regulatory rate of return in the UK has been too high. He argues that a comparison of realised bond returns unprotected from inflation with realised and equity returns that have some protection from inflation is likely to overstate the MRP.

In the context of the real return on equity and the MRP, our view is that it is better to make assumptions that approximate reality. Thus, we assume that neither the real market return

nor the MRP are constant.[5] Consequently, if there is compelling, reliable and reasonably precise evidence that the current MRP has changed substantively then the regulatory MRP should be adjusted. The problem is in obtaining reliable and precise evidence on the magnitude of any change and ensuring it is substantive enough to overcome the imperative for stability in the parameters used in the regulatory process. For example, we think there is merit in the arguments of Siegel (1992, 2002) and Gregory (2011), discussed above, that the historic estimate of the MRP is biased upwards. Since it is not clear what the precise magnitude of the bias is, however, we do not recommend adjusting the historic estimate downwards when it is to be used as an input to determining the current regulatory MRP.

1.2.2 What drives changes in the cost of equity

Recall that the cost of equity is composed of the risk free rate and the market risk premium (MRP). If the cost of equity does change over time, the next logical question is to ask what is driving this variation, ie. are the risk free rate and/or the MRP themselves constant or variable.

a. The risk free rate

There seems to be little debate over whether the risk free rate varies across time. Gregory (2012a, p. 5) for example, observed that:

> "The Smithers Report is absolutely unequivocal on this point ... (t)he real risk free rate does not have a stable mean, based on both the international evidence on the cross-section of real risk free rates, and on a very long run analysis that uses Siegel's (1998) US data set."

Bernstein (1997) presents nominal and real rates of return to long run bonds (reproduced above in section 1.1) and states that the real return figure makes it clear that:

> "... little credence can be attached to what anybody has to say about what the real long-term rate of interest should be, has been, or will be in the future over the long run. No number is a representative average over this history." (p. 25)

[5] We discuss variation in the MRP in more detail below.

In our view, there is little debate to be had over this point. Both nominal and real interest rates clearly vary over time. Exactly how and why they vary, however, is an open question.

b. The market risk premium

We have argued above that the return on equity varies through time, which it clearly does for realised returns in both nominal and real terms. We have also argued that real and nominal interest rates vary through time. Unless these variations in equity returns and interest rates are perfectly negatively correlated, which is not plausible, then it must be the case that the MRP varies through time. It is our opinion, therefore, that the MRP does vary through time, in both nominal and real terms. This is clearly the case for the realised MRP, but we also believe it to be the case for equilibrium expected MRP. Cochrane (2001, p. 460) describes the considerable uncertainty about the equity risk premium as a 'surprisingly underappreciated problem'. The difficulty is that there is no reliable way to estimate what the variation in the MRP is at a specific point in time. Hence the recommendation in our prior reports on the market risk premium that, with respect to historic data, the objective should be to estimate the unconditional mean MRP, but that this should be supplemented by triangulation and reasonableness checks using alternative approaches in determining the current MRP to be used in regulatory decisions.[6]

The literature on return predictability, has not yet reached a point where the unconditional mean MRP can be replaced by time-varying estimates.[7] A recent example of this was provided by Goyal and Welch (2008) who re-examined the performance of variables that have been suggested by the academic literature to be good predictors of the equity premium. They find that these models typically produce poor in- and out-of-sample forecasts and are highly unstable and conclude that they would not have helped an investor to profitably time the market.

The poor forecasts reflect the difficulties of the task at hand. As we stated in McKenzie and Partington (2012, p.10):

[6] See McKenzie and Partington (2011) "Equity Market Risk Premium", Report to Corrs Chambers Westgarth, December, and McKenzie. M.D. and Partington, G. (2012) "Supplementary report on the MRP", February 2012.

[7] Papers on time-series predictability of stock returns include Campbell (1987), Campbell and Shiller (1988), Fama and French (1988), Fama and French (1989), Ferson and Harvey (1991), Keim and Stambaugh (1986) and Pesaran and Timmermann (1995).

> "Low explanatory power is usual for equations that predict returns, but in the current case it does mean that the effect of the yield is readily offset by random variation in other factors. In other words, random variation represents most of the excess returns. It also seems that the relation is not particularly stable. A consequence of low explanatory power and instability is that the regression between yields and excess returns is unlikely to provide a reliable forecast of excess returns."

However, research is continuing on return prediction and recent literature shows more promise with respect to out-of-sample forecasts. For example, Pettenuzzo, Timmermann and Valkanov (2012) find that employing economically motivated constraints in the prediction model yielded substantial improvements in their forecasts of stock returns. The first constraint limits the conditional mean of the equity premium to be non-negative. The second constraint requires the conditional Sharpe ratio[8] to lie between zero and a predetermined upper bound. Campbell and Thompson (2008) also employ restrictions in their model to improve forecasting performance. They show that many predictive regressions beat the historical average return, once weak restrictions are imposed on the signs of coefficients and return forecasts. The out-of-sample explanatory power is small, but nonetheless is economically meaningful for investors who pick portfolios based on the mean and variance of returns.

Given that the predictability of returns is a much contested area, it is premature to adopt predictive regressions as a basis for adjusting the MRP. However, it is worthy of a watching brief.

1.3 What is the relationship between the risk free rate and the MRP?

1.3.1 The consultants view

The consultants seem to be particularly enamoured with the idea that a negative relationship exists between the risk free rate and the MRP. However, the recent empirical work of Bekaert, Hoerova and Scheicher (2009) finds no evidence of a negative relationship between short term risk free rates and the equity risk premium. While, Damodoran (2012,

[8] The conditional Sharpe ratio is a measure of the return relative to the risk.

p. 77 - 79) points out that, "in much of valuation and corporate finance practice, we assume that the equity risk premium ... is unrelated to the level of interest rates."

The consultants' view is typically based on some combination of empirical analysis, assumption and personal preference. The following quotes are typical of the arguments being made.

> NERA (2012, p. 18) "... in certain circumstances the risk free rate element has an inverse relationship with the forward looking MRP element. Such circumstances arise from the likelihood that investors' appetite for holding risky assets will fluctuate from time to time, causing the relative demand for risky – as distinct from risk free – assets to shift as aggregate investor sentiment changes."
>
> Wright (2012, Nov, p. 2) states "... my preferred approach ... implies that, by construction, the assumed MRP moves point for point, with opposite sign, with the risk-free rate."
>
> Wright (2012, Nov, p. 8-9) "... I cite evidence that predicted excess returns (i.e., econometric estimates of risk premia) have historically tended to be counter-cyclical. The implication of the predictability literature is therefore that, to the extent that the expected market return does change, it typically moves counter-cyclically, rather than pro-cyclically."
>
> Lally (2012, p. 7.) "Although there is nothing in finance theory that supports (or rejects) a negative relationship between the CGS rate and the MRP, a negative relationship is plausible because the market risk premium is compensation for bearing equity risk (Merton, 1980), equity risk (volatility) seems to be greatest in depressed economic conditions (French et al, 1987, Figure 1a), and the risk free rate also tends to be lowest in depressed economic conditions."

In particular, CEG (2012b, p. 8) boldly make the claim that:

> "...there is a general consensus that the market risk premium tends to move in the opposite direction to the risk free rate...",

despite the fact that no such consensus exists. CEG (2012a, p. 64) exaggerates the weight of their own evidence by stating:

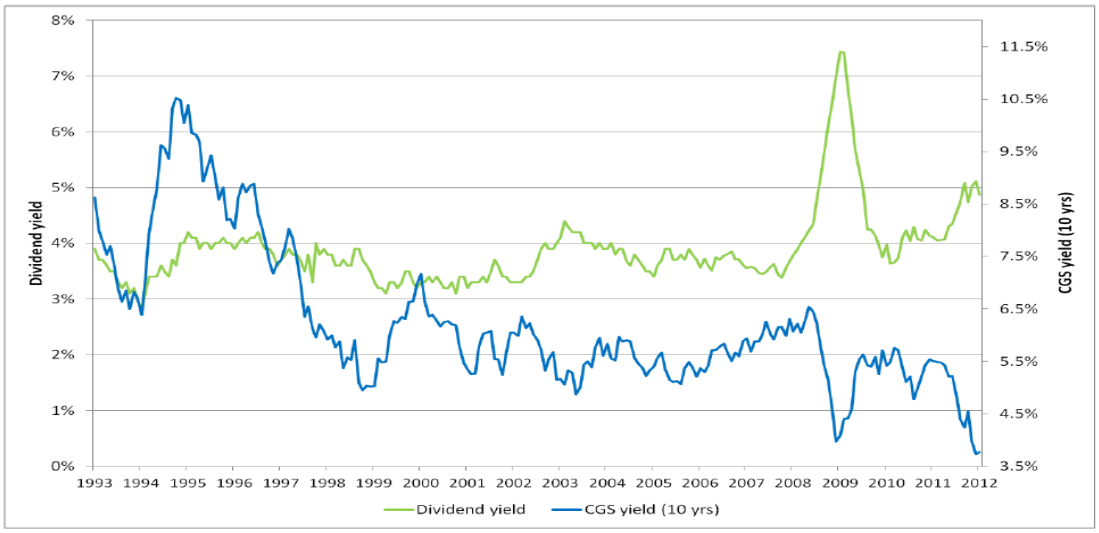
> "I do put forward evidence that there is, in general, a negative relationship between these variables ..."

Although they do moderate this claim with the caveat:

> "I do not claim to have shown that the risk free rate and the MRP are deterministically negatively related over all periods of time."

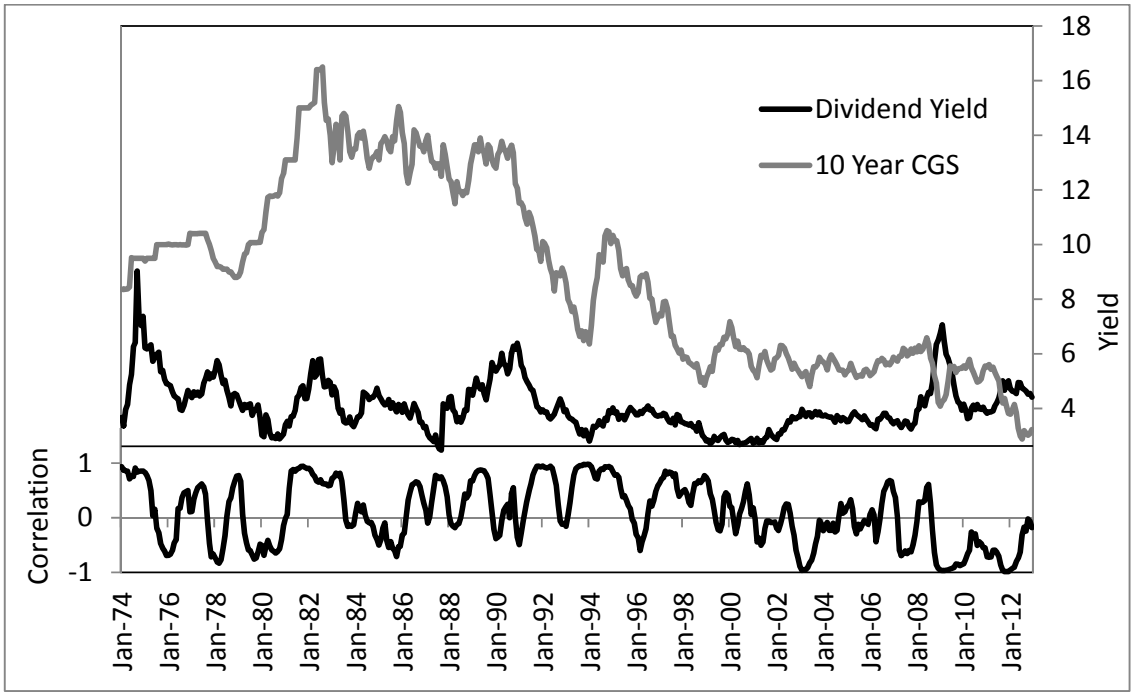
Some of the evidence that CEG use to support these claims comes from the Lettau and Ludvigson (2001) paper. Given that the weaknesses of this support for the CEG proposition have already been documented by Lally (2012, p. 7-8), we will forgo any further discussion on this particular piece of evidence.

Other evidence used to support CEG's view can be found in CEG (2012b, p. 16), which provides a plot (reproduced below) of the average dividend yield on Australian listed equities and the corresponding yield on 10 year CGS. It is stated that, "...there has been a clear negative relationship between dividend yields and CGS yields – most noticeable in the 2008/09 financial crisis and most recently since mid 2011."



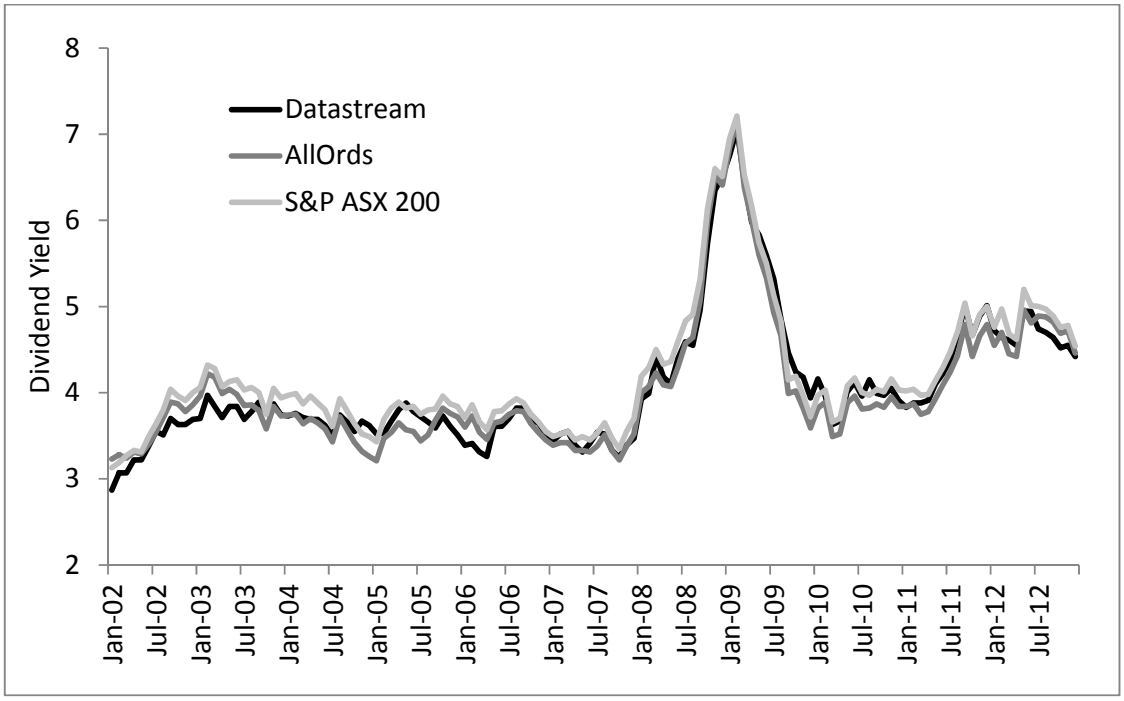
Source: Figure 7 in CEG (2012b)

To pick out a few data points that support an argument and present it as proof positive of a hypothesis hardly provides compelling evidence. Indeed it is possible to use this same data to show that, if anything, the opposite of CEG's proposition is true. To this end, the following figure presents the 10 year CGS yield from the RBA website and also shows the Australian market dividend yield for Datastream's proprietary country indices. These data are sampled at the end of each month for the period January, 1973 to December, 2012. A 12-month rolling correlation between the two series is estimated and plotted at the bottom of the figure. The choice of a 12 month window is entirely arbitrary, but the conclusion that follows is not contingent on this choice of window. The correlation information shows that the 'relationship' is positive for 256 observations (ie. 55% of the sample) and negative for 213 observations (ie. 45% of the sample). Thus, it is unjustifed for CEG to state that a negative relationship exists as the evidence suggests that if anything the reverse case is true. Note also the rapid swings from positive to negative correlations. A relationship exhibiting this level of reversals is not an appropriate basis for making decisions in a regulatory environment where stability is a desirable attribute



Source: RBA and Datastream

The decision to use Datasteam dividend yield data in the above analysis was made so as to provide as long a sample of data as possible. To confirm the validity of this data, we can compare the Datastream data to the Bloomberg Net aggregate dividend yield estimate for the All Ordinaries index and the S&P ASX 200, which are only available since 2002. All three data series are presented in the figure below and the correlation between Datastream and the Bloomberg data is approximately 0.98.



1.3.2 A broader perspective – the view of the academic literature

(a) A counter-cyclical MRP, ie. a negative relationship

Consistent with the consultants' views, the academic literature does provide some evidence in support of a negative relationship between the market risk premium and the risk free rate.

Some of the papers supporting the counter-cyclical view are theoretical. For example, Campbell and Cochrane (1999) develop a model based on utility functions that depend on consumption and find that people become more risk averse in recessions, which leads to higher expected equity returns (other consumption based models that show a similar result

include Lettau and Ludvigson, 2001, Li, 2001, Bansal and Yaron, 2004 and Bhamra, Kuehn and Strebulaev, 2010). Alternatively, other papers explicitly model time variation in the risk parameters and find evidence of counter-cyclicality (see Menzly, Santos, and Veronesi, 2004, Bekaert, Engstrom, and Xing, 2009, Guvenen, 2009, Verdelhan, 2010, and Jouini and Napp, 2011).

A number of papers appeal to market outcomes to produce empirical evidence of counter-cyclicality in the MRP. For example, Harvey (1989) showed that US equity risk premia are higher at business cycle troughs than they are at peaks and the results of Li (2001) confirm these findings. Ang and Bekaert (2007) find a negative relationship between short term risk free rates and the equity risk premium. The general message of Ang and Bekaert's work, however, is that "… predictability is mainly a short-horizon, not a long-horizon phenomenon" (p.696). Their implication is that predictive regressions might help forecast market returns at say a one year horizon, but are little use at say a ten year horizon. Finally, Henkel, Martin Nardari (2011) estimate that the market risk premium is higher during recessions across a range of countries. Most interestingly, they find that the performance of aggregate return predictors is only significant in periods of economic contraction.

(b) A Pro-cyclical MRP, ie. a positive relationship

A positive relationship between interest rates and the MRP stands in direct contrast to the evidence of the previous section. Theoretical contributions in this area come from Li (2007), who uses a variant of the consumption-based representative agent model in Campbell and Cochrane (1999) to show that a counter-cyclical variation of risk aversion drives a pro-cyclical conditional risk premium. Kim and Lee (2008) use an extended Autoregressive Conditional Heteroskedasticity (ARCH) model to study how stock returns, volatility and risk aversion change over the business cycle. Their empirical findings infer that investors become more risk-averse during boom periods, which they confirm using a calibration of a simple equilibrium model.

Damodoran (2012) directly addresses this issue and poses the question "do equity risk premiums increase as the risk free rate increases or are they unaffected?". Through some simple empirical analysis, Damodoran (2012, p. 77 - 79) finds that there is a positive relationship between interest rates and equity risk premiums and actually goes on to

suggest that equity risk premiums could be estimated using the level of interest rates. The caveat however, is that "the noise in the ratios is too high ... to develop a reliable rule of thumb", which limits the potential usefulness of this approach.

We regard the evidence of Amromin and Sharpe (2009), and the recently updated version of this paper Amromin and Sharpe (2012), as particularly relevant to this discussion. The authors use data obtained from monthly Gallup/UBS surveys from 1998-2007 and from a special supplement to the Michigan Surveys of Consumer Attitudes from 2000-2005. This data is unique as it contains information about the revealed preferences of actual investors, rather than the mathematical outcomes of a representative agent model, or broad based conclusions from studying aggregated return information. Amromin and Sharpe show, for example, that investors expectations and portfolio choices are clearly linked. Their portfolio equity positions tend to be higher for those respondents that anticipate higher expected returns, or lower uncertainty. Of particular relevance in the current context, is the finding that when investors believe macroeconomic conditions are more expansionary, they tend to expect both higher returns and lower volatility. This result directly challenges the canonical view that expected returns on stocks rise during recessions to compensate household investors for increased exposure or sensitivity to macroeconomic risks.

A recent contribution from the behavioural finance literature by Greenwood and Shleifer (2013) provides further evidence of a pro-cyclical relationship. In this paper the authors analyse a long history of investor expectations of future stock market returns over the period 1963 to 2011. They find that investor expectations are highly positively correlated with past stock returns and the level of the stock market. Greenwood provided an intuitive interpretation of these results in an interview with the Wall Street Journal – "Find any survey that you can get your hands on, and they will all tell you the same thing. When prices are high and stock markets perform well, investors expect it to continue going up".[9]

The evidence from surveying managers also indicates that there is a positive correlation between the expected equity risk premium and real interest rates (see Graham and Harvey,

[9] Light, J. (2013) "Wealth Manager: Is All This Stock Market Optimism a Red Flag?" Wall Street Journal, 19 January, available at online.wsj.com/article/SB10001424127887323783704578247790148637234.html. Further See also Gavyn Davies Financial Times Blog (blogs.ft.com/gavyndavies/2013/01/20/are-we-seeing-the-great-rotation-from-bonds-to-stocks/) and a recent article in the Economist magazine (www.economist.com/blogs/freeexchange/2013/01/investing) for market commentary on this article.

2005). However, the post GFC evidence for this relationship is weaker (see Graham and Harvey, 2010).

Prior to closing this discussion of the research literature, we should point out that it is entirely possible that the relationship between the market risk premium and the risk free rate could be either pro- or counter-cyclical and that this relationship may even oscillate over time. For example, De Paoli and Zabczyk (2009) shows that the MRP can be either pro- or counter-cyclical and investors' assessment of future prospects is crucial in determining its behaviour. Under their model, if agents believe that changes in economic conditions are persistent, the risk premia is likely to be counter-cyclical.

Based on the foregoing discussion, we conclude that the relation between the MRP and the level of interest rates is an open question and that the relation, if any, is not sufficiently well established to form the basis for a regulatory adjustment to the MRP. Finally we raise a question. If it is the case that when interests go down the MRP goes up, the corollary is that when interest rates go up the MRP goes down. We wonder if during the period that government bond rates were about 14% or 15% the consultants would have argued for a negative risk premium and if they had, would this view have been accepted by the regulated businesses?

1.4 Real versus Nominal

In general, we do not favour working with real rates of return. To do so, just adds another dimension of difficulty to the return measurement task as we have to estimate what adjustments to make to nominal returns for the effect of inflation. This requires us to decide on both the magnitude of inflation and how the inflation adjustment to returns should be made.[10]

Of course, it is easier to observe what past inflation has been than it is to estimate what it will be in the future. However, even measuring past inflation has its challenges and in long time series there is the added complication that the basis for measuring inflation changes

[10] Of course, we still have to provide nominal estimates of cash flows for use with the nominal discount rates, so we need explicit or implicit forecasts of the inflation rate. One advantage of adjusting the cash flows is that not all cash flows inflate at the same rate, whereas adjusting the discount rate to a real rate implicitly assumes that they do.

over time. This is particularly true recently, where we have seen changes in the method of inflation measurement that distort the inflation estimate (see shadowstats.com, which provides a measure of inflation using a consistent definition).

Even supposing that we had perfect measures of inflation there remains the issue of how we use these estimates to adjust rates of return. A common practice is to subtract the rate of inflation from the return on the asset as an approximation to adjusting for inflation according to the Fisher equation. The Fisher equation is the most popular representation of the relation between nominal rates of return, real rates of return and inflation. The Fisher equation computes the nominal rate of return by compounding the real rate of return at the expected rate of inflation. However, there is by no means universal agreement that the Fisher equation provides the correct relation between the expected values of these variables. Furthermore, it is clear that the relation between realised equity returns and realised inflation is rather more complicated than the Fisher equation predicts.

By way of example, Cox, Ingersoll and Ross (1985) present theoretical evidence that inflation (and also interest) rate volatility depends on its level. Chan, Karolyi, Longstaff and Saunders (1991) provide empirical evidence that interest rate volatility clusters over time and depends on the level of interest rates. Gray (1996) provides further evidence of such non-linearity and level dependence in a regime switching model. Henry, Olekalns and Suardi (2007) document such levels effects in inflation. Taken together, this literature suggests that as interest and inflation rates rise, they become mode volatile.

In these circumstances, the usual approximation used to obtain estimated real rates of return will be unreliable. The actual Fisher relationship is:

$$(1 + R) = (1 + r)\,(1 + \pi^e)$$

A commonly used approximation defines the nominal yield (R) as the real yield (r) plus expected inflation (π^e), ie.:

$$R = r + \pi^e$$

However, this approximation relies on the the assumption that the cross product term $r\pi^e$ is zero. In low inflation environments, this approximation is likely to hold. However when

inflation is high the approximation is unlikely to hold as the cross product term deviates significantly from zero. This provides us with several issues to deal with in extracting accurate estimates of the real return. Firstly, the commonly used approximation to the Fisher relationship is unlikely to be valid in all cases. Secondly, the inflation and nominal interest rate series are prone to become more volatile as the levels of the series rise. Third, inaccuracies and revisions in the measurement of price indices used to construct inflation make construction of inflation expectations a difficult task. Thus, even if we had the correct model, correctly applied, there are still questions over the inputs to the model.

To summarise, in our opinion getting long series of bond and stock prices is error prone enough, without overlaying them with inflation estimates that also contain error and an uncertain adjustment process. We also note that both casual observation[11] and survey evidence, Bishop (2009), suggest that the use of nominal rates of return tends to be dominant in financial practice.

2. Critically evaluate whether the AER's approach to determining the cost of equity is internally consistent and whether it is consistent with the CAPM. Advise on whether the AER's approach to estimating the cost of equity (by using a prevailing risk free rate and a 6% MRP) is reasonable in current market conditions. In particular:

Conceptually, we interpret the AER's approach as combining an estimate of the current risk free rate with an estimate of the current market risk premium and this is both an internally consistent approach and consistent with finance theory. In working out the weighted average cost of capital finance theory prescribes using current market values for required returns. In turn the current market return on equity, as given by the CAPM, requires estimates of the current risk free rate and the current market risk premium. The current risk free rate is readily estimated as the current yield on CGS of appropriate maturity.

Estimating the current market risk premium, however, presents a problem as there is no reliable way to identify exactly what it is. In other words, there is an unknown distribution of possible current market risk premiums about the mean. In such a situation the mean of the distribution is the optimal estimate of the current market risk premium.[12] This underpins

[11] For example, most bonds offer nominal interest rates.
[12] Optimal in this context means the estimate with the smallest average error.

the AER's approach – essentially, the AER uses an estimate of the unconditional mean, triangulated with other evidence, as the estimate of the current market risk premium. In our view there needs to be reliable, compelling and reasonably precise evidence that the current market risk premium deviates significantly from the unconditional mean before an alternative estimate is used.

The argument of the consultants that the AER approach mixes current and historic estimates of the risk-free rate in the CAPM and the consultants' insistence that whatever is used as the estimate of the current risk free rate should also be used to estimate the market risk premium, rather misses the point. What matters is getting the best estimate of the current risk free rate and the best estimate of the current market risk premium. Using the same estimate of the risk free rate for both provides no assurance whatsoever that the best estimates will be obtained. Such 'consistency' may simply result in giving consistently the wrong estimate. In particular, using a historic average of yields on government bonds as an estimate of the current risk free rate will clearly not provide the best estimate of the current risk free rate. We further note that demanding so called consistency in the risk free rates in the CAPM, may generate a clear inconsistency with the determination of the cost of debt in the WACC.

The consultants' argument also misses the point that the 6% MRP as used by the AER is not just a choice based on the historic average of the MRP. Rather, it is based upon a broader set of evidence such as that reviewed in McKenzie and Partington (2011), who discussed historical, utility-based, survey based, and implied estimates of the equity market risk premium. Each presents its own unique set of challenges and possesses its own limitations. On balance, McKenzie and Partington (2011), conclude that there is little compelling evidence to deviate from the long standing regulatory consensus of an equity market risk premium of 6%.

a. Do you consider that the current yield on 10 year CGS is a reasonable estimate of the 10 year forward looking RFR? Explain your position.

We consider that the current yield on 10 year CGS is a reasonable estimate of the 10 year forward looking RFR. It is possible to invest at this rate at the current point in time. Thus, it is the natural benchmark with which to compare other investments over a ten year horizon.

We note that this rate is likely to be a slight overestimate of the return on a truly risk-free asset since the return on CGS is not perfectly risk free. However, the use of CGS as a proxy for the risk free rate is widely accepted in the academic literature. Furthermore, the approach used by the AER in respect of the use of the current CGS 10 year bond yield is consistent with that used by expert valuers, see Bishop (2009).

b. Do you consider that a 6 per cent MRP is a reasonable estimate of the 10 year forward looking market risk premium? Explain your position.

We consider that 6% is a reasonable estimate of the market risk premium. A detailed explanation for our reasoning behind this conclusion may be found in McKenzie and Partington (2011) and McKenzie and Partington (2012).

3. If the AER's approach is internally inconsistent or unreasonable in current market conditions, recommend the best alternative value or methodology for the risk free rate and /or MRP.

We regard the AER's approach as reasonable. We would however, like to reiterate the point made in our previous report that, although a number of different methods to estimate the equity market risk premium exist, each presents its own unique set of challenges and possesses its own limitations. As such, it is difficult to make an uncontested argument for the superiority of one method over another. Thus, we argue that it is important to triangulate across the each of the various methods when deciding on the final estimate of the MRP.

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