REPORT TO THE AER

SUPPLEMENTARY REPORT ON THE EQUITY MARKET RISK PREMIUM

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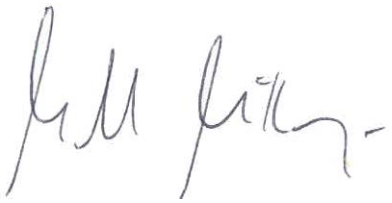
Expert Witness Compliance Declaration

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 a previous report to the AER, Mckenzie and Partington (2011) we provided advice on the measurement of the market risk premium(MRP). We have been asked by the AER to provide a supplementary report after reviewing the following documents:

- Envestra decision process:
    - Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT 3 (File ACT 7 of 2011)*, 11 January 2012, paragraphs 124–167.

      Available at <http://www.austlii.edu.au/au/cases/cth/ACompT/2012/>
    - Michael McKenzie and Graham Partington, *Report to Corrs Chambers Westgarth—Equity Market Risk Premium*, 21 December 2011.
- Aurora decision process:
    - Aurora, *Regulatory proposal 2012–2017*, May 2011, p.177. Available at <http://www.aer.gov.au/content/index.phtml/itemId/747196>
    - AER, *Draft distribution determination—Aurora Energy Pty Ltd—2012–13 to 2016–17*, November 2011, pp. 26–29, 210–237, 253-257. Available at <http://www.aer.gov.au/content/index.phtml/itemId/750924>
    - Aurora, *Revised regulatory proposal 2012–2017*, January 2012, pp. 91-98 Available at <http://www.aer.gov.au/content/index.phtml/itemId/752028>
    - Aurora, *Revised regulatory proposal 2012-2017—Attachment AE110—Supporting information: Return on capital (WACC)*, January 2012, pp.9-23.

      Available at <http://www.aer.gov.au/content/index.phtml/itemId/752030>
    - Energy Networks Association (ENA) submission—Attachment A: *PWC, Gilbert + Tobin, NERA, Assessment of the AER's proposed WACC framework—A joint report for the ENA*, 8 December 2011, pp.9-15.

      Available at <http://www.aemc.gov.au/Electricity/Rule-changes/Open/Economic-Regulation-of-Network-Service-Providers-.html>
- APTPPL decision process:
    - APTPPL, *Access arrangement submission—Effective 12 April 2012 – 30 June 2017*, October 2011, pp. 50–56 Available at <http://www.aer.gov.au/content/index.phtml/itemId/750330>
    - APTPPL attachment 6.2: SFG, *Market risk premium—Report for APT Petroleum Pipelines Ltd*, 11 October 2011 Available at <http://www.aer.gov.au/content/index.phtml/itemId/750330>
- AER WACC review process:
    - AER, *Final decision—Electricity transmission and distribution network service providers—Review of the WACC parameters*, May 2009, pp.43-47, 50-101, 170-171, 175-238.

      Available at <http://www.aer.gov.au/content/index.phtml/itemId/722190>

- CEG, *Forward looking estimates of the equity premium—For regulated businesses and the market as a whole—A report for the JIA*, January 2009, pp.20-25.

  Available at <http://www.aer.gov.au/content/index.phtml/itemId/726694>

Summary

We have reviewed the documents as listed above. We consider that our main report, McKenzie and Partington (2011), engages with most of the issues raised in these documents. Significant exceptions are in relation to the Harvard case study on the choice between arithmetic and geometric averages and in relation to the choice of MRP and risk free rate when yields are low. There are also some matters that would benefit from recapitulation and in some cases more extensive discussion as these matters relate to recurrent topics in the documents reviewed. We find no basis in the material reviewed to change the conclusions of our main report regarding the use of 6% as the MRP, which we take to represent the unconditional MRP. We make it clear that the unbiased estimator of the MRP lies between the arithmetic average and the geometric average. We also endorse the AER's use of the current ten year bond yield as the benchmark return used as a proxy for the risk free rate. Given the recurrence of topics in the documents reviewed we have organised our report by these themes.

Geometric averages arithmetic averages and the Harvard case study

The teaching note for a Harvard Business School case study is used to support the proposition that geometric averages have no place in considering the market risk premium and that only arithmetic averages are relevant. The problem with this proposition is that the teaching note for the Harvard case study assumes away the source of bias in arithmetic averages. In the teaching note for the case study the probability distribution of returns is known,[1] so there is no uncertainty about the mean of the distribution. Since the mean (arithmetic average) of the returns is known exactly, the problems of measuring the MRP largely go away. There is no standard error to worry about as it is zero. In such a case, we can confidently say the average

[1] In the teaching note a two period distribution of returns is used, but the time period is not important in the current context. The result in the teaching note only depends on exact knowledge of the probability distribution.

risk premium is 6%, or whatever it happens to be. If this fortunate state of affairs prevailed in reality it would obviate the need for the current regulatory debate about the magnitude of the MRP.

Unfortunately reality is rather different and the market risk premium is measured with a substantial standard error. As Blume (1974) shows, when compounding the arithmetic average over time, it is the sampling error in the measurement of the arithmetic average return that causes the upward bias in the expected return. If we assume, as in the teaching note for the Harvard case study, that there is no sampling error in the measurement of arithmetic returns then there is no bias. There would also be no bias if the sample of returns was of infinite size. The reality is that we have a finite sample of returns and we do have sampling error. The consequence, as Blume clearly shows, is upward bias when the arithmetic average is compounded over more than one period. It is also well understood that the geometric average *normally* gives a downward biased measurement of expected returns.

The teaching note for the Harvard case study points out that a problem arises as the sample period expands and it becomes less likely that returns are drawn from a stable distribution through time. The use of the arithmetic average is predicated on independent and identically distributed (iid) returns over time. Relaxing the iid assumption, Indro and Lee (1997) assume a return process that has a conditional mean which reverts to the unconditional mean (returns are negatively auto correlated). They conclude that arithmetic returns are upward biased and geometric returns are downward biased. Jacquier, Kane and Marcus (2003) reach the same conclusion.[2] Hence, the upward bias of the arithmetic average and the downward bias of the geometric average is a robust result. The evidence solidly supports the AER's position that over the ten year regulatory period the unbiased MRP lies somewhere between the arithmetic

[2] They note that academics favour the arithmetic return while practitioners favour the geometric return.

average and the geometric average of annual returns. This is consistent with the position set out in paragraph 152 of the Envestra Tribunal decision.[3]

There has been work to develop improved estimators of the historic MRP. Such work includes Hasbrouck (1983), Cheng (1984), Cooper (1996), and Indro and Lee (1997). Unfortunately, the results are not conclusive. Cheng's estimator was presented nearly 30 years ago, but has not found its way into common use so it seems to have failed the test of time. Hasbrouck notes the computational effort involved in his most efficient estimator is unlikely to justify the benefits obtained. Cooper (1996, p.165) concludes that, "It may be that the correct model of returns is more complex than analysed here". In a simulation, Indro and Lee find that the best estimator depends on the assumed level of autocorrelation (mean reversion), the time horizon, and the variance of returns. While the best estimator varies with conditions, Indro and Lee favour a horizon weighted average of arithmetic and geometric returns, as suggested by Blume (1974). Jacquier Kane and Marcus (2003) also favour a horizon weighted estimator.

A distinct aspect of Cooper's (1996) work is his focus on providing unbiased estimators of the discount factor ($1/(1+\text{discount rate})^n$) rather than the discount rate itself. His estimators are designed to correct for both estimation error and for serial correlation. In his numerical examples, the corrected estimators give returns closer to the arithmetic mean rather than the geometric mean. However, the return estimates lie below the arithmetic mean and the range of differences from the arithmetic mean is 0.3% to 0.6%.

If a single method of estimation were to be chosen for an unbiased estimator, the weight of the literature is in favour of a horizon weighted average of the geometric and arithmetic returns. The simplest weighting scheme as suggested by Jacquier, Kane and Marcus (2003) is

[3] Australian Competition Tribunal, *Application by Envestra Ltd (No 2) [2012] ACompT 3 (File ACT 7 of 2011)*, 11 January 2012.

a weight on the geometric average equal to the ratio of the investment horizon to the sample estimation period.[4] So with a ten year horizon and a 100 year estimation period, the weight on the geometric average would be 10% and the weight on the arithmetic average would be 90%.

We have focussed on unbiasedness, but another consideration is the efficiency of the estimator. The question then becomes one of trading off bias and efficiency. Efficient estimators are more precise (have lower standard errors). Thus it is possible to have an estimator that is biased, but that gets closer to the true value because it is more precise than the unbiased estimator. Jacquier, Kane and Marcus (2005) argue that compounding using the estimated arithmetic average return gives results that are not only upward biased, but also highly inefficient. Their analysis considers both an unbiased estimator and a more efficient but biased estimator and they find that: "The unbiased estimator, which is far lower than the compounded arithmetic average, is still very inefficient, often more so than a simple geometric estimator known to practitioners. Our small-sample efficient estimator is even lower." (p.37). They conclude that "Strong cases are made in recent studies that the estimate of the market risk premium should be revised downward. Our result compounds this by stating that even these lower estimates of mean return should be adjusted further downward when used to predict long-term returns." We note that in order to implement the Jacquier, Kane and Marcus (2005) approach an estimate of the variance of returns is required. This introduces another parameter to estimate, the magnitude of which is open to debate.

In our opinion there is no indisputable single best estimator for long run returns. The widespread current practice is to use unadjusted geometric and arithmetic averages. Given the current state of knowledge, we see no strong case to depart from this common practice and

[4] The alternative suggested by Indro and Lee (1997) is to subtract one from both the investment horizon (N) and the estimation horizon (T) and use these values to compute the weighting on the geometric average as (N-1)/(T-1).

recommend that the use of both of these metrics, tempered by an understanding of their inherent biases.

Low risk free rates and the MRP

There is a joint proposition in the reviewed documents[5] that the yields on government securities are abnormally low at a time when risk is high in which case a higher MRP is required. Essentially two arguments are being advanced, one is about low yields and the other is about risk consequent to the GFC. The latter issue is a common theme across the documents reviewed. Here we address the argument about yields on government securities.

As a consequence of a flight to quality (to low default risk instruments) and also the actions of monetary authorities in response to the GFC, yields on government securities are currently quite low (most notably in the USA). In Australia, however, we note that they are not as low as elsewhere in the developed world. We also note that the actions of the Reserve Bank are mostly felt at the short end of the yield curve; since it is short-term interest rates (the cash rate) that they target. So a low ten year yield on government bonds is substantially attributed to a flight to quality.

The argument is that as a consequence of lower government security yields there would have been a compensating increase in the MRP. It is argued therefore, that the AER should adjust their MRP estimate upwards. The corollary of this argument is that if the currently low yields rise then the MRP will fall. Thus the AER should adjust their MRP estimate downwards. We wonder how enthusiastically the regulated businesses would embrace this corollary?

The standard analysis is that when yields on government securities go down, other things equal, asset prices go up, so current realised returns on assets increase. Required returns

[5] See for example, Aurora, *Revised regulatory proposal 2012-2017—Attachment AE110—Supporting information: Return on capital (WACC)*, January 2012.

(equal expected returns in equilibrium) are lower due to a reduction in the time value of money. If this also involved an increase in the MRP, then asset prices would not go up as much and required returns would not fall as much.

The implication of the argument to increase the MRP is that there is a negative correlation between the MRP and the yield on government securities. There is empirical evidence of a negative correlation between the nominal government yield and future nominal excess returns on the market, particularly for the government bill yield.[6] The effect tends to be weaker as the time horizon gets longer. However, it is not clear whether this relationship is due to variation in required returns or due to predictable shocks to realised returns in an inefficient market. It is also the case that the explanatory power of the regressions for this relation are low.

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. Further, if the relation is a consequence of predictable return variation in an inefficient market, then the relation would contain no information about the required MRP. In this case the returns change in a way that is predictable, but the market participants have not taken this predictability into account when setting the current price. Consequently, low interest rates would be followed by a pleasant surprise of higher than expected equity returns. The higher returns in this case are not a consequence of an increased MRP. Thus, it is not at all clear whether any adjustment to the MRP for low interest rates is warranted, and if it is warranted it is not clear what that adjustment should be.

[6] See for example, Breen, Glosten, and Jagannathan (1989).

The regression of future returns on government bill yields is part of a class of predictive models of return. There is a concern that such models suffer from the problem of spurious regression, which we discuss in the section below on conditioning variables. If there is a spurious regression problem then the relation between yields and future return is a statistical illusion rather than a true causal relationship.

If a MRP conditioned on government security yields were to be adopted then the MRP would need to be moved up *and* down as yields on government securities changed. It is not clear to us that this would be universally welcomed, particularly as the changes could be quite frequent. It is clear to us that it would likely be an endless source of debate about the threshold movement in yields that should trigger a revision in the MRP and how large each revision should be.

If there is to be a switch from an unconditional MRP to an MRP conditioned on government security yields, then there needs to be a strong and clear case to do so and a clear and reliable basis for determining the magnitude of the effect. In our opinion these conditions are not met and thus we recommend retaining the unconditional MRP of 6%.

In support of the argument for an increased risk premium associated with low government security yields, there was some reference to the widening of credit spreads. As we explain below in the section on debt yields and the MRP, such arguments can be very misleading. We also explain in the section on debt yields how it is possible and rational for the expected return on a firm's equity to be less than the yield on its debt.

There seems to be an implication in some of the submissions that there is something wrong with using the government bond rate as the risk free rate when government bond rates are low. The fundamental point to be made is that the government bond rate sets the current benchmark that a risky project has to beat. Clearly there is little point in taking on a risky

project if you can get the same or higher return by investing in a government bond. The government bond thus sets a benchmark; the time value of money. At the time of writing investors can invest in a 10 year government bond at yield of 3.84%. So a ten year project that offers say 4.5% is worth considering if the risk is low enough. The question is how risky is the investment and what is the required risk premium? The fact that government bond yields were higher in the past does not make 4.5% a bad deal, or 3.84% too low a benchmark. We see no reason to switch from using the current 10 year government bond yield as the proxy for the risk free rate.

The AER's approach seems well aligned with the practice of expert valuers, at least according to Bishop (2009). Bishop (2009, p.2) reports "All but one expert used the 10 year treasury bond rate as the risk free rate in the CAPM. The other stated that a long term risk free rate was used. The spot rate was the most prevalent source of the rate used but a large minority used an average usually over one month or less."

Dividend yields, share price growth models and expectations

There is a strong implication in some of the documents reviewed[7] that the decline in share prices consequent to the GFC is due to a rise in discount rates, which in turn reflects an increase in the market risk premium. This is misleading. The decline in share prices can be due to either an increase in required returns, or a decline in expected cash flows (dividends), or a combination of the two. In our opinion, it is highly likely that expected dividends and the expectation of underlying corporate cash flows declined as a consequence of the GFC and we expect such expectations remained depressed post-GFC. It is also very likely that required returns were elevated during the GFC, but it is not at all clear that they have remained elevated.

[7] See for example, APTPPL attachment 6.2: SFG, *Market risk premium—Report for APT Petroleum Pipelines Ltd*, 11 October 2011.

It also seems that higher dividend yields are being presented as evidence that required returns and the MRP have increased. We usually interpret a higher dividend yield arising from a declining stock price accompanied by a dividend cut, or dividend omission, as reflecting reduced expectations of future growth. Declining stock prices accompanied by dividend cuts and dividend omissions was the experience during the GFC. Consequently, our opinion is that reduced growth expectations are a substantial part of the explanation for the equity price decline precipitated by the GFC. This is particularly the case with respect to the very high dividend yields being offered by some stocks. Indeed, we interpret very high dividend yields as a signal of an expected reduction in dividends. For example, Jun, Gallagher and Partington (2011) find that Australian institutional equity funds are attracted to dividend paying stocks, but are significantly underweight in the highest dividend yield quintiles. They explain that this is because these dividends appear to be unsustainable.

We point out that high dividend yields are not a new phenomenon. Historically it was not at all unusual for dividend yields to exceed the yields on debt. The phenomenon of dividend yields less than debt yields emerged in the latter half of the twentieth century. In the 1960s and early1970s, the puzzle was to explain what was labelled the reverse yield gap, dividend yields below debt yields. The explanation was that investors were expecting relatively more of their returns to come from capital gains. These capital gains were delivered as a consequence of expectations of growing dividends and an expansion in the magnitude of PE ratios. We may now be seeing a reversal of this process with higher dividend yields signalling reduced expectations of dividend growth, and negative dividend growth in some cases and little or no expectation of expansion of PE ratios. In this case a high dividend yield is required as dividends represent an increased component, or in some case the lion’s share, of expected returns.

In the current context, the sustainability of utility dividends is an interesting question as utilities are traditionally viewed as income rather than growth stocks. In an intriguing study of water utilities in the UK, Armitage (2011) shows that these utilities are distributing dividends that cannot be sustained from free cash flows, in which case dividends for these utilities are likely to experience negative growth. It is beyond the scope of the current report to investigate whether similar behaviour is present in any Australian utilities, but it is an interesting question and critical to utility valuations based on the dividend growth model.

We make clear for reasons extensively discussed in our main report that we would only use implied cost of capital estimates, such as those derived from the dividend growth model as a reasonableness check and even then we would be circumspect in our use of such models. For example, Credit Suisse (2011) uses a free cash flow model, aggregates the implied cost of capital across Australian firms and estimates the discount rate for Australian equities as 5%, implying a very low MRP. In our opinion, this estimate should be interpreted with caution.

A key problem in the specific context of the dividend growth model is the assumption about the growth rate. The problem lies both in estimating the magnitude of expected growth and that this growth rate is assumed constant in perpetuity. To quote from our main report: "Hathaway (2005, p3) says of the Gordon growth model, '(i)t is a perpetuity model that has constant assumptions but it is applied in an ever changing world. The poor thing is not up to the task.' Indeed, Hathaway obtains some estimates of the MRP which are negative, a clear indicator of the ridiculous results that can be obtained when estimating an implied MRP."

Another issue with the dividend growth model is that it assumes a constant discount rate. There is some inconsistency in regulated businesses on the one hand arguing for time varying

discount rates and a conditional MRP and on the other hand supporting that case with the dividend growth model which has a constant discount rate.[8]

As previously discussed, growth expectations have likely fallen and may be zero or even negative in some cases, so it is not clear exactly what the growth expectations are. If they were clear there would be nothing to debate. It is clear, however, that if the argument of the regulated businesses focuses on the difficulties for equities posed by the GFC and European sovereign debt problems, then consistency requires low expected growth rates in the dividend growth model.

We point out briefly in our main report that a potential problem when forecasting growth is neglecting to allow for the new capital required to support the growth. This point is worthy of some amplification. For example, it is clearly an important issue where the dividend growth rate is assumed to be the growth rate of GNP. The growth in GNP needs to be supported by investment and not all of this investment will be financed by profit retention from existing firms. There will be a need for existing firms to raise some new capital and completely new firms will be also be created with new capital. Without this new capital, growth would be slower. All of the growth in GNP therefore does not accrue to the existing shares.[9] In conclusion, this effect will substantially reduce the projected growth rate for the shares currently on issue.

[8] See for example, CEG, *Forward looking estimates of the equity premium—For regulated businesses and the market as a whole—A report for the JIA*, January 2009.
[9] Another way to view this is that in terms of cash flow to shareholders, the injection of new equity capital is like a negative dividend.

Survey results and their reliability

There is discussion at several points in the documents reviewed on the reliability of surveys.[10] We begin by noting that the issues of survey reliability do not seem to have been a big feature when regulated businesses have used survey evidence to argue that imputation credits are little used in valuations and hence have little or no value. Yet, the same surveys, such as Truong Partington and Peat (2008), KPMG (2005), also provide evidence on the MRP, as can be found in our main report. Are we to conclude that the regulated businesses believe that survey evidence on imputation credits is reliable, but that survey evidence on the MRP is not?

For example, a submission by Aurora[11] is critical of the use of surveys to estimate the MRP, but immediately after this criticism uses the survey by Truong, Partington and Peat (2008) to support the point that there is little adjustment for imputation credits in project evaluation. There is, however, some merit in Aurora's questioning whether the survey respondents allow for the effect of gamma (value of imputation credits) in their estimate of the market risk premium. The short answer is that we don't really know.

On the one hand, the survey evidence suggests that imputation credits are not typically allowed for in project evaluation or expert valuations, so it would seem unlikely that they would typically be added to the market risk premium. On the other hand, as Truong, Partington and Peat (2008) show, there are several reasons why respondents do not adjust for imputation, including a belief that it is already taken into account in the cost of capital estimate. Finally, the respondents to surveys may use their understanding of long run historic average returns in forming their MRP estimates. If so, the adjustment for imputation credits is

[10] See for example, Aurora, *Revised regulatory proposal 2012-2017—Attachment AE110—Supporting information: Return on capital (WACC)*, January 2012, and APTPPL attachment 6.2: SFG, *Market risk premium—Report for APT Petroleum Pipelines Ltd*, 11 October 2011.
[11] Aurora, *Revised regulatory proposal 2012-2017—Attachment AE110—Supporting information: Return on capital (WACC)*, January 2012.

only required if respondents attach significant weight to the post imputation period and if the estimate of average returns for that period is lower due to the effect of imputation credits.

Given that we don't really know whether survey responses do, or do not, allow for imputation credits and given that any adjustment for imputation would likely lie within the margin of measurement error, it seems best to take the survey evidence at face value, but tempered by the uncertainty about whether an imputation adjustment is needed.

The Aurora submission is also critical of the Fernandez (2010) survey with only 7 respondents for Australia, which gives an MRP of 5.4%. We agree that this is too small a sample and we do not cite the Fernandez (2010) survey in our main report. It is interesting to note, however, that the result we do cite, Fernandez (2011) with 40 respondents, gave an MRP of 5.8%, so the results are similar across the two surveys. This illustrates a more general point where we take issue with Aurora's claim that looking across surveys the "results present ranges that are wildly divergent from one survey to the next." (p.21). In our experience surveys provide remarkably consistent evidence and indeed it is the triangulation across surveys that enhances our confidence in their results.

In our opinion, there are many issues that threaten the reliability of survey evidence and we make this clear in our main report. The first requirement is that the target population are in a position to make informed judgements about the MRP. In the case of the surveys that we cite, this criterion is likely to be met, since the survey populations are drawn from senior financial managers (CFOs), expert valuers, actuaries, and finance academics.

Clearly the correct wording of the questions is also an important issue. This is a more difficult matter to judge as the wording of the questionnaire is not always disclosed and in any event there is a subjective element in judging whether the given wording is adequate. Therefore, there is often little choice but to rely on the quality of the researcher. Confidence

can be enhanced when the work is published in a refereed academic journal, or when the survey is repeated. In the former case, the work has been subject to peer review. In the latter case, a stable set of questions allows comparisons of response through time. With repeated surveys, the observed changes through time are less susceptible to issues in the wording of the questions. Furthermore, in the event of significant problems with wording and interpretation of questions by respondents this may be detected and corrected over time. Most of the surveys that we cite are published in refereed journals and/or repeated through time. We also note that two of the surveys that we cite did not rely on asking respondents what they thought the MRP was, but rather observed what MRP was actually used by expert valuers.

Even with the correct target population and a perfect wording of the questionnaire, we would place little value on the results if there are too few respondents. What constitutes a sufficiently large sample is an open question. It is a subjective judgement, but we would expect a representative sample of 30 respondents to be adequate (statistically speaking, a sample size of more than 30 is considered sufficiently large) and we would be concerned if sample size dropped below twenty. We are not particularly concerned about sample sizes in the surveys that we cite. The bigger question is representativeness. In other words is there a problem of non-response bias?

The first question is whether there might be a reason for non-respondents to *systematically* favour a higher or lower MRP than the respondents to the survey. We can think of no reason why this might be the case, but we cannot rule it out. Since by definition we do not know the responses of the non-respondents checking for response bias is difficult. One technique, as used by Graham and Harvey (2010) is to compare response of early and late respondents. The idea is that late respondents, relative to early respondents, are more likely to be like non-respondents.

Graham and Harvey (2010, p. 2) do a particularly good job of dealing with response bias as the following quote from their paper reveals: “The response rate of 5-8% could potentially lead to a non-response bias. There are five reasons why we are not overly concerned with the response rate. First, our response rate is within the range that is documented in many other survey studies. Second, Graham and Harvey (2001) conduct a standard test for non-response biases (which involves comparing the results of those that fill out the survey early to the ones that fill it out late) and find no evidence of bias. Third, Brav, Graham, Harvey and Michaely (2005) conduct a captured sample survey at a national conference in addition to an Internet survey. The captured survey responses (to which over two-thirds participated) are qualitatively identical to those for the Internet survey (to which 8% responded), indicating that non-response bias does not significantly affect their results. Fourth, Brav et al. contrast survey responses to archival data from Compustat and find archival evidence for the universe of Compustat firms that is consistent with the responses from the survey sample. Fifth, Campello, Graham, and Harvey(2010) show that the December 2008 response sample is fairly representative of the firms included in the commonly used Compustat database.” The other surveys that we cite do not match the efforts of Graham and Harvey (2010), but for reasons we explain below, we are not particularly concerned about non-response bias.

Despite the potential problems, we give significant weight to the survey evidence. One reason for this, as we point out in the main report, is that there is triangulation of the survey evidence. Let us explain why this helps. Suppose the proposition is that surveys systematically understate the market risk premium due to non-response bias, or some other form of response bias, or due to the target population of the survey, or the way the survey was conducted. Downward bias might be the case for a specific survey, although we have seen no

compelling demonstration of it.[12] However, it is much less likely that this would be a consistent problem across surveys with diverse methods and different target populations.

Let us consider an illustration of triangulation in action. The KPMG survey looks at the market risk premiums used in expert reports. This might be criticised on the basis that the same expert might have produced many reports and thus that one expert's views are overweighted. If that expert's view is divergent from other experts, then the result will be a biased estimate of the MRP for the expert sample. The effect is analogous to non-response bias in a traditional questionnaire survey. Bishop (2009) addresses this problem by surveying experts' reports and collecting the MRP by expert, so each expert's opinion is equally weighted. Bishop also uses a different, although probably overlapping, sample of reports to KPMG. Both studies give an MRP of 6%, thus confidence is enhanced that the MRP used by experts is 6%.

As our main report shows, Australian surveys using different methods and different target populations suggest an MRP of about 6%. This triangulation leads to greater confidence in the results. It does not guarantee that the surveys give the right answer, but it substantially increases the probability that they do.

As we discuss in our main report, the surveys by Graham and Harvey (2010) specifically address the issues that threaten survey reliability and so we have some confidence in their results. The post-GFC surveys, Graham and Harvey for the USA, Fernandez (2011) for the USA and Australia, and Asher (2011) for Australia, also provide triangulation of the survey evidence that the MRP has not increased following the GFC.

In this context, it is also relevant to report the results of a recent Chartered Financial Analyst publication (CFA, 2011) on the equity risk premium. In this report there are eleven papers in

[12] It does appear, however, that there is upward bias in surveys of individual investors.

which leading academics and practitioners examine the issue of setting the equity risk premium. The analysis is mainly based on US data, but also draws on data from the rest of the world, in order to give estimates of the MRP[13] for the next decade. Several rather different approaches to the analysis are taken but in relation to the MRP "most agree that it is in the 4 percent range" CFA (2011), p8. This is roughly consistent with the historic long run 4.4% geometric average and the shorter run 4.2% geometric average for the USA given in our main report. This data reinforces the view that post-GFC the MRP is not higher.

Debt Yields and the MRP

A point strongly made in the reviewed documents is that because of a widening credit spread there are substantially increased yields on risky debt, so the MRP must have correspondingly increased.[14] We show with a numerical example in our main report that such arguments can be very misleading. We expand on this point below and in particular explain why comparing the yield on debt and the MRP is problematic.

The widening credit spreads during the GFC were substantially driven by increasing concern about the risk of default. There was also a drying up of liquidity in debt markets caused by extreme concerns about default risk. Thus, it was a combination of default premiums and liquidity premiums that drove up returns in debt markets.

The SFG (2011)[15] report calls the credit spread the default spread, reflecting the close link between the credit spread and the risk of default. An increase in credit spreads due to increased default risk does not automatically require a shift in the MRP. Here we make the important point that the MRP is an *expected return* and the yields on debt are a *promised*

[13] The CFA publication use the term ERP (Expected Risk Premium) which is equal to the required MRP in equilibrium.
[14] See for example, APTPPL attachment 6.2: SFG, *Market risk premium—Report for APT Petroleum Pipelines Ltd*, 11 October 2011.
[15] APTPPL attachment 6.2: SFG, *Market risk premium—Report for APT Petroleum Pipelines Ltd*, 11 October 2011.

return. The promised return is only same as the expected return for debt where there is no default risk. For all other debt the promised return is higher than the expected return. Because the debt yield and the MRP measure different things, effectively they are measured in different dimensions, they are not constrained to move in a similar fashion and comparisons between them can be misleading.

An increase in default risk will show up in higher promised yields on debt and will likely also show up as a reduction in share prices as expected cash flows to equity are likely to be revised downwards. However, there need not necessarily be any change in the MRP applied to those equity cash flows.

To make the debt yield and the MRP comparable we must convert the promised return on debt to an expected return. To do this we must adjust the promised cash flows to debt holders for the probability of default. For highly rated firms in normal times the promised and expected returns are not much different, particularly at shorter maturities. However, for lower rated debt, in bad times and for longer maturities the difference between the expected and promised cash flows can be substantial. The more so during the GFC when confidence in credit ratings was likely to have been somewhat shaken. Indeed, consequent to the GFC it is possible that the expected return on a stock could be less than the yield on its debt. This would be an unusual situation, but it would not be unreasonable provided that after adjusting for default risk the expected return on the debt was less than the expected return on the stock.

As a consequence of the GFC it might reasonably be expected that the default risk component of the credit spread increased. Consequently, we would expect that much of the change in debt yields during and consequent to the GFC is due to a changed assessment of default risk. We would expect an increase in default risk on debt to spill over into equity markets via a reduction in expected cash flows and dividends resulting in falling share prices. It is also

likely that the crisis environment of the GFC led to an increase in investor risk aversion and to an increased perception of systematic risk and so it is likely that there was some increase in the MRP at that time. This latter point is corroborated by the survey evidence of Graham and Harvey (2010) shows. We would also expect that as the crisis atmosphere subsided, the MRP would fall. The survey evidence of Graham and Harvey, Fernadez (2011) and Asher (2011) suggest that this has happened and that the MRP has returned to normal levels, or perhaps even lower.

Conditional returns and conditioning variables

SFG (2011) presents the dividend yield as a conditioning variable as though it were established fact. In contrast, in our main report we begin by excluding consideration of predictive models based on dividend yield. This is because in our view, this is still a developing area of research, rather than a well developed practical tool. We are not alone in this view as it is shared by others such as Dimson, Marsh and Staunton (2011), who are leading scholars in the area of the MRP. With respect to the predictability of returns, they comment: “Yet, despite extensive research this debate is far from settled.” (p.49). In our opinion there is also considerable merit to their view that, “ ...although sharply lower (or higher) stock prices may have an impact on immediate returns, the effect on long term performance will be diluted. Moreover, volatility does not usually stay at abnormally high levels for long, and investor sentiment is also mean reverting. For practical purposes, therefore, and consistent with our discussion here, we conclude that when forecasting the long run equity premium, it is hard to improve on evidence that reflects the longest worldwide history, that is available at the time the forecast is made.” (p.50).

In this context, it is relevant to examine the evidence of Brailsford, Handley and Maheswaran (2012), as it is the longest detailed history of Australian returns available.[16] They examine the historic return in Australia post-GFC. Their results neatly illustrate the point made above about dilution of extreme events. The effects of the GFC pretty much wash out and the conclusion is "there appears to be no material adjustment required as a result of the GFC." (p.242). We present their results for the nominal arithmetic average equity premium measured relative to 10 year government bonds. From 1883 to 2010, they report an equity premium of 6.1% and from 1958 to 2010, a period where they argue there is a sharp improvement in the quality of the data, they also find the equity premium is 6.1%, this rises to 6.5% grossed up for distributed imputation credits valued at 50 cents in the dollar. For the period covered by the imputation system, from 1988 to 2010 the equity premium is 5% and this rises to 5.9% after grossing up for distributed imputation credits valued at 50 cents in the dollar. There is solid support here for an unconditional MRP of about 6%.

The case for using variables such as dividend yield and yields on government securities to derive a conditional MRP arises from regressions that predict returns. A particular problem that can arise with predictive regressions is the issue of spurious regression. The implication is that the relation between the conditioning variables and returns is in reality not statistically significant and there is then no case for using the variables to condition the MRP.

It is well understood that the standard errors in predictive regressions for stock returns are likely to be downward biased and consequently the statistical significance of the results is overstated (see Stambaugh, 1999). Various techniques have been proposed and used to correct for this. The problem, however, is somewhat complex and it is not clear that the bias reduction is entirely successful. Min (2011) applies a block jackknife technique to correct for the bias and finds that using the usual approach of ordinary least squares regression, both

[16] Their results are almost identical to Handley (2011).

dividend yields and the treasury bill rate are significant in predicting returns. However, after the block jackknife technique is applied these variables have no statistical significance. We do not claim this evidence is conclusive, but it does indicate the ongoing question mark over predictive regressions. Until this is resolved we consider it premature to adjust the MRP using conditioning variables.

As discussed in our main report there are good reasons for regulators to use the unconditional market risk premium. Not least of which is the impossibility of knowing what that conditional market risk premium should be. In our opinion, therefore, there needs to be a very compelling case to switch to a conditional MRP. Also, as the required adjustment is uncertain, a switch to a conditional risk premium takes us onto dangerous ground. Consequently, while it takes a compelling case to switch to a conditional MRP, in our opinion much less evidence is required to justify a retreat to the safer ground of the unconditional MRP.

There is no doubt that the GFC was a period that dramatically disturbed the equilibrium of financial markets. It is therefore understandable that in response to the GFC the AER increased the MRP above the accepted benchmark for the unconditional mean of 6% to a 6.5% mean conditional on the crisis. It is not clear whether an adjustment of 0.5% was an adjustment of the right magnitude. However, with the benefit of hindsight we are of the view that assuming that adjustment will hold over a ten year horizon is a mistake. It is clear that the crisis has now eased, market volatility has fallen and survey evidence suggests that the MRP has fallen back to pre-GFC levels. We therefore consider it appropriate for the AER to exercise its discretion and return to the unconditional benchmark MRP of 6%.

Implied volatility and the glide path.

Our view of the implied volatility and glide path approach can be succinctly summarised as follows. In this approach, we have a market risk premium measured with error, divided by an average volatility also measured with error, then multiplied with an implied volatility measured with both error and upward bias relative to the true volatility and then an adjustment made according to a glide path, which has not really been measured at all, but is more of a subjective assessment. Further work on this technique might be warranted, but given the current state of play it could hardly be regarded as a validated method, let alone an accurate and reliable adjustment to the MRP.

Let us illustrate a couple of the problems with this approach. In the original paper by Bishop, Fitzsimmons and Officer (2011a), two different measures of average volatility are used. One, a standard deviation of 14%, is used to calculate the risk premium required per unit of standard deviation, 43 basis points (6%/14%). The other standard deviation, of just under 20%, is the average of implied volatility. This is used to assess the durations of above average implied volatility and thus choose the length of the glide path. A difference of 6% in the standard deviation is a sizeable difference for what should be much the same parameter. If we made both standard deviations 14%, most of the implied volatility through time would then be above this level and so we would have a very long glide path. If we set both standard deviations to 20% the risk premium drops to 30 basis points. So, the result is sensitive to what you take as your standard deviation.

The standard deviation of 14% also seems a bit low and if so the risk premium per unit of standard deviation would be inflated. Credit Suisse (2011), for example, gives the standard deviation of real equity returns from 1900 to 2010 as 18.2%. While using the returns data from the appendix to Brailsford, Handley and Maheswaran (2012) for the period 1988 to

2010, the standard deviation of nominal equity returns is 19%. The point is that the results of the volatility adjustment depend on what standard deviation is used and there is no consensus on this issue.

Hall (2011) is very critical of the implied volatility approach, arguing that the paper by Bishop, Fitzsimons and Officer (2011a) has an underlying inconsistency, materially overstates the size of the MRP shift, makes an inappropriate comparison with debt spreads, fails to consider other factors influencing markets and is inconsistent in its measures of historic and implied volatility. We will not rehearse all of Hall's arguments here, nor detail the rejoinder by Bishop, Fitzsimons and Officer (2011b). Suffice it to say, much more work needs to be done before the implied volatility approach can be taken seriously as a practical tool.

We do highlight one point that Hall (2011) makes. He points out that the overestimation of volatility inherent in implied volatility measures was exacerbated during the GFC for two reasons. First, increases in margin arrangements served to increase the costs of option writers. Second, there would have been an increase in demand in the risky environment of the GFC, as investors sought the insurance protection that option contracts provide. Both of these factors would tend to push up option prices, which in turn would further inflate estimates of implied volatility. Since implied volatility tends to overestimate actual volatility, its use in relation to estimating the MRP is problematic.

Macro commentary

As stated in our main report we view macro-commentary as a survey with a sample size of one. Of course, the source of the macro commentary and the supporting detail is important. For example, commentary by the Reserve Bank of Australia (RBA) is clearly commentary with some substance behind it. However, unless the macro commentary makes specific

reference to returns in equity markets the link between the commentary and the MRP is in the eye of the beholder. At best such commentary might give comfort to a particular view. We would not give much weight to macro-commentary.

Changes Post-GFC and the MRP

At the time of writing, there are reports of celebrations on the NYSE as the Dow Jones Industrial Average broke through the 13000 level, a level not seen since before the collapse of Lehman Brothers and the full fury of the GFC took hold. The index level of 13000 represents a doubling of value from the post-GFC low. This is a positive sign for both the American and World economies

While the Australian equity market has recovered some of the GFC losses, it did lose value during 2011. Commenting on current Australian equity market conditions in its February 2012 Statement, the RBA stated: "The ASX 200 has increased by 3 per cent since the previous *Statement*, underperforming global equity markets (Graph 4.17). Consumer discretionary stocks have underperformed the ASX 200, weighed down by a large fall in some retailers stocks following some downward revisions to profit forecasts. Share prices of Australian financials underperformed slightly, with the insurance sector showing a fall of 4 per cent; QBE announced that earnings would be 50 per cent lower than in 2010 due to record catastrophe claims and weak investment returns." This is broadly consistent with our previously stated view, that concerns about cash flow and dividend growth are having a depressing effect on Australian equity prices. (p.56).

Implied volatility on the ASX has fallen sharply since the peaks observed during the GFC. We do note that there was an increase in implied volatility in the second half of 2011, but it dropped back over the last quarter of the year and continued to drop through January 2012 to about 20% per annum, which is consistent with the long run average for implied volatility. In

its February 2012 Statement the RBA comments on Australian equity market volatility as follows: “Conditions have been more settled in equity markets in the past couple of months, with volatility returning to average levels, following relatively high volatility at times during the second half of 2011.” (p.56)

The potential for a European sovereign debt crisis remains, although the most pressing issue of the Greek refunding crisis has been eased somewhat with the approval of a bailout package at the time of writing. Only time will tell if this is a situation that resolves itself without too much further damage or whether there will be an on-going sequence of European funding crises. It is clear that if such crises arise they will have a serious impact on debt markets. How much they will spill over into the real economy and equity markets is less clear, but it is a reason to be conservative in dividend growth forecasts.

It is clear that risk has fallen post the GFC and that conditions in capital markets in general have improved. The crisis has now eased and currently volatility has fallen back to normal levels. We would expect the MRP to have risen during the GFC and now to have fallen back. The survey evidence is that the MRP did rise during the GFC (see Graham and Harvey (2010)), but has now fallen back (see the post-GFC surveys, Graham and Harvey(2010) for the USA, Fernandez (2011) for the USA and Australia, Asher (2011) for Australia and also the Chartered Financial Analysts publication on the MRP, CFA (2011)).

We further consider that the decision to increase the MRP by 0.5% for a ten year regulatory period was not well justified as we would not expect the crisis conditions and extreme volatility to extend over such a long period. With the benefit of observing what has happened post-GFC it is appropriate for the AER to move back to the relatively safe ground of the unconditional MRP of 6%, rather than persist with the conditional MRP of 6.5%. To put it

another way the conditions justifying the shift to a conditional MRP have substantially abated so there is good reason to move back to the unconditional MRP.

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