REPORT TO THE AER

THE RELATIONSHIP BETWEEN THE COST OF DEBT AND THE COST OF EQUITY

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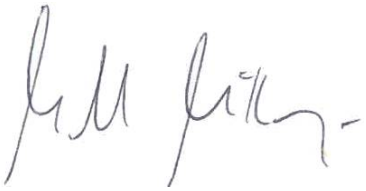
Expert Witness Compliance Declaration

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. Critically review the material by SFG on the relationship between increased default risk, the debt risk premium and the market risk premium. Explain whether you agree or disagree with SFG's reasoning, setting out the reasons for your position. In particular:

    a. Does an increase in default risk equally affect the debt risk premium and the equity risk premium? If the effect is not equal, how can the relative impact be assessed?

    b. Does the AER need to adjust its current methodology for estimating the return on debt so as to account for default risk? In particular, comment on whether the regulatory assessment of the benchmark firm incorporates a material likelihood of default. Identify the costs for consumers of a default event and the extent to which it is in the consumers' interest to eliminate this risk.

    c. Does the AER need to adjust its current methodology for estimating the return on equity so as to account for default risk?

2. Critically review the material by SFG on the current level of the debt risk premium and its implications for the market risk premium. Explain whether you agree with SFG's reasoning, setting out the reasons for your position. In particular:

    a. Considering any relevant factors (including but not limited to default risk as noted in the previous question) can the DRP and MRP move independently? How can the relationship between the DRP and MRP best be modelled, and how much uncertainty is there around this relationship?

    b. Would your answer to (a) change in the context of the overall cost of debt and the overall cost of equity? That is, can the overall cost of debt and overall cost of equity move independently? How can the relationship between the overall cost of debt and the overall cost of equity best be modelled, and how much uncertainty is there around this relationship?

    c. How should the tax effect of the interest shield on debt be accounted for in these type of comparisons between debt and equity? In particular, the AER implements a nominal vanilla WACC formula that includes a pre-company-tax cost of debt and a post-company-tax cost of equity, with a separate cash flow

adjustment for the interest shield (in the tax building block). Is it appropriate to compare the pre-company-tax cost of debt and post-company-tax cost of equity from this nominal vanilla WACC formula?

d. In view of current debt market conditions (a debt risk premium around 3.3 per cent and the risk free rate around 3.2 per cent) is an MRP of 6 per cent implausible?

The key documents for this part are:

- AER, *Draft decision Envestra: Appendices*, September 2012, p. 44–45, 47, 49–50, 64–66
- McKenzie and Partington, *Supplementary report on MRP*, March 2012, pp. 21–23
- SFG, *Return on equity response*, November 2012, pp. 7–8, 11–13, 35–38, 39–45
- CEG, *Update on MRP and RFR consistency*, November 2012, pp. 11–14

Executive Summary

Since the credit spread is an increasing function of the probability of default of the individual firm, simple logic suggest that an increase in default risk leads to a higher debt risk premium. It is tempting to extend this argument to also suggest that the equity risk premium must also increase in response to an increase in default risk. To do so would be incorrect however, as there is no default risk adjustment in the CAPM. Rather, a change in default risk, affects the value of equity by changing investors' estimates of the expected cash flow, but it does not change the required return on equity based on expected cash flows.

This does not, however, rule out stocks with higher default risk having higher betas, nor does it rule out periods of increasing default risk being associated with an increase in risk aversion in the equity market, or an increase in the market price of risk, and either could lead to an increase in the MRP. Indeed, via this mechanism, we think it likely that there could be a relationship between the MRP and credit spreads. The question, however, is whether the strength and stability of this correlation is either strong or stable enough to form a convincing basis for adjusting the MRP.

To address this issue, we survey the evidence provided by the literature. We discuss possible theoretical justifications for a positive relationship and summarise the empirical support for this relationship. Most interestingly, we find that the empirical literature produces evidence of a negative, flat, or even hump-shaped relationship. This is somewhat puzzling as, if credit risk is a systematic risk, it should be captured in a higher beta for the stock. Under the CAPM, if the beta is higher, then a higher return is also expected. However, if systematic risk is not higher, then there should be no return differential across stocks due to credit risk. The empirical evidence of a negative credit risk-return relation is unexpected and we survey some of the reasons which have been put forward to explain this anomaly.

To understand these diametrically opposed results, we look more widely at the literature in this area and find that evidence that equity markets may be a factor in determining default risk. This evidence raises a much bigger question as to whether the relationships we are interested in may be more complicated and more intertwined than has been considered so far – ie. the general economy, stock and bond markets may all be inter-related by time-varying and nonlinear relationships. This suggests the need to model markets in a unifying framework that relates the equity risk premium and credit spreads to risks in macroeconomic fundamentals. This is an area of contemporary research and it is premature to draw any conclusions as to what the exact nature of the relationships may be.

1. **Critically review the material by SFG on the relationship between increased default risk, the debt risk premium and the market risk premium. Explain whether you agree or disagree with SFG's reasoning, setting out the reasons for your position.**

SFG (2012, pp. 36 to 37) demonstrate that the credit spread[1] can be substantial even if the default risk is small. Recall that the result you derive depends on what you assume – for example, if it is assumed that risky debt has substantial systematic risk, then the risk premium on the debt will be primarily determined by the systematic risk. This is this case with the SFG analysis as they assume that the debt beta is 0.59, which is an extraordinarily high beta for debt. By way of contrast, the AER and SFG have previously assumed the debt beta to be zero. In our opinion, while a zero debt beta is too low, it is probably closer to reality than a value of 0.59.

Indeed, if the debt beta for regulated utilities was 0.59 then it would be the logical outcome that the premium of equity over debt for the regulated businesses would not be very large. We illustrate this point using the current 10 year government bond rate of about 3.4% and a 6% market risk premium. Given a beta of 0.8 for equity then the CAPM required return is 8.2%. If the beta for debt is 0.59 then the CAPM required return on debt is 6.94%. In this case, the premium of equity over debt in terms of *expected* returns is 1.26%. In SFG's example, the default risk is small (a 1 in 200 year chance of default) and only raises the promised return on debt by 21 basis points. We have not specified the payoff structure and probability of default in the preceding example, but if we allowed an effect of 21 basis points, the difference between the *promised* return on debt and the *expected* return on equity would be 1.05%.

The general point is that if we take the credit spread and assume it is composed of systematic (beta) risk and default risk, then for a given credit spread there is a trade off between the two sources of risk. As the example above demonstrates, increasing the systematic risk component will lead to a narrowing of the spread between debt and equity. On the other hand, if the default risk component of the credit spread is substantial, then making inferences about the cost of equity from the credit spread is problematic (as we demonstrate in our response to Question 1a in this report,).

In our opinion, the systematic component of the credit spread is likely to be small. There are two reasons for this. First, debt betas tend to be small. Second, to the extent that there is systematic risk in debt returns, there is likely to be some commonality in the systematic risk of government bonds and risky debt. Consequently, any systematic risk component in the credit spread is only the systematic component over and above the component that the risky bonds share with government bonds. We therefore conclude that the credit spread

[1] We use the term credit spread to describe the difference between the yield on government bonds and the yield on risky debt because this is the standard terminology. SFG (2011) in a previous submission used the term default spread, but now use they the term DRP analogous with MRP.

will have a substantial default risk component. In other words, the credit spread is called the credit spread for a reason - it reflects the risk that creditors will lose some or all of their money.

Another argument that SFG (2012) advance is that equity investors will demand a higher return in response to an increase in default risk. For example, they state:

> *If actual equity investors were told that the risk of their investment becoming worthless had increased to 20%, they would require a higher return commensurate with the higher risk. It is simply implausible to suggest that the required return on equity would be independent of the probability of that equity becoming worthless.* (p.35)

This is a seductive argument, as intuitively it seems very reasonable. However, the argument is fundamentally misleading as it relies on the implicit assumption that the adjustment for default risk must apply to the discount rate (ie. the required returns). This is not true, however, as there is no default risk adjustment in the CAPM. When we are measuring required equity returns as expected returns in equilibrium[2], as in this case, the default risk adjustment is made by downward revisions in the cash flow. In other words, the expected returns are the returns you expect to get *after* allowing for default risk in the cash flow.

In our answer to Question 1.a. below, we provide a numerical illustration of the adjustment for an increase in default risk, which shows that an increase in the required return on equity is not a foregone conclusion. It may be helpful here to outline the nature of the process by which an increase in default risk leads to a new equilibrium with the same required return on equity – recall, an increase in default risk means an increased the probability of a zero payoff to shareholders. Consequently, the expected cash flow to shareholders is reduced. As a result of the decline in the expected cash flow, the value of the shares falls. This means that existing shareholders will have suffered a capital loss, but this does not mean that they must subsequently earn a higher return. To the contrary, the lower value of the shares restores the equilibrium and at this new lower price, the shares offer the original required return.

a. Does an increase in default risk equally affect the debt risk premium and the equity risk premium? If the effect is not equal, how can the relative impact be assessed?

To answer this question, it is important to understand that the returns on debt and equity are measured in fundamentally different ways. Specifically, the required return on debt is based on measurement of the debt's yield, which is a promised return. In contrast, the required return on equity is based upon the expected return to equity.

This difference in the way in which returns are measured is important as it means that a change in the default risk will affect the measurement of the debt and equity risk premium

[2] In equilibrium expected and required returns are equal.

quite differently. While the debt risk premium is expected to rise when default risk rises, the equity risk premium may well be unaffected by any change in the default risk.

Let us provide a simple illustration of this point. Consider an asset which generates a perpetual cash flow of *C* and note that the value of a perpetuity is given by *C/r*, where r is the required rate of return. Let us also suppose the asset is worth $100.

First, assume that the asset is a debt security. In this case, *C* is a promised coupon payment of $10, with a probability of receiving the coupon of 80% and a 20% probability of default resulting in a coupon of zero. Solving for *r* in the equation 100= 10/*r* gives the cost debt using the *promised* cash flow as 10%.

Now assume the asset is a share. In this case, the cash flow is either a dividend of $10 with a probability of 80% or a dividend of zero with a probability of 20%. In this case, the expected cash flow is $8 (=10*0.8 + 0*0.2). Solving for *r* in the equation 100= 8/*r* gives the cost equity using the expected cash flow as 8%. At first sight it may seem strange that the cost of equity is below the cost of debt, but this result arises because the two costs are not directly comparable due to the different ways in which they are measured.

Assume the probability of default on the asset increases to 40% and that as a consequence of this change, the value of the asset drops to $75. Solving 75=10/r for the cost of debt gives 13.33%, which represents a significant increase in the cost of debt and also the debt risk premium. The change in default risk reduces the *expected* cash flow to $6 (=10*06 + 0*0.4) and solving 75=6/r shows the cost of equity to be unchanged at 8%.

This example serves to highlight the point that a change in default risk is captured via changes in the cost of debt. For equity, however, a change in default risk is captured via changes in the expected cash flow. This is a critical point, so it bears repeating that changing default risk is likely to affect the value of equity by changing investors' estimates of the expected cash flow, but does not change the required return on equity based on expected cash flows.

In practice, the observed yield on debt is typically less than the required return on equity. This is because the debt-holders typically face substantially less risk than the shareholders. In contrast to the example above, the debt-holders are insulated from the risk of the assets by the capital that the shareholders provide. Consequently, regardless of whether the cost of debt is measured as a promised return, or an expected return, we generally expect the cost of debt to be lower than the cost of equity. However, as default risk increases it would be natural to observe a narrowing in the spread between the cost of equity and the cost of debt. The reasons for this are simple. When debt is risk free, the debt-holders by definition face no risk. The shareholders thus bear all of the business risk, plus the financial risk of contractual payments to the debt holders. When the debt has default risk, however, the shareholders no longer bear all of the business risk as they are now sharing it with the debt-

holders. Thus, the shareholders' share of business risk declines as the default risk increases. The shareholders still bear the financial risk of the contractual payments to the debt-holders, but that risk is now limited by their option to default, an option that becomes increasingly valuable as the default risk rises.

In the context of the CAPM, default risk is accounted for by using expected cash flows and it is well understood that default risk does not enter into the computation of CAPM required returns.[3] This does not, however, rule out periods of increasing default risk being associated with an increase in risk aversion in the equity market, or an increase in the market price of risk, and either could lead to an increase in the MRP. Indeed, via this mechanism, we think it likely that there could be a relationship between the MRP and credit spreads. The question, however, is whether the strength and stability of this correlation is either strong or stable enough to form a convincing basis for adjusting the MRP. To answer this question, we must consider the evidence provided by the literature. An overview of the relevant empirical and theoretic work is presented in the following section and, in brief, the answer is clearly negative.

In conclusion, while the argument of SFG that higher default risk increases the returns demanded by equity investors is plausible, the fundamental problem is firstly one of obtaining reliable evidence of an MRP change. In the event that there is convincing evidence of a change, the second problem is in making a sufficiently precise measurement of the magnitude of the change and ensuring that it is substantive enough to overcome the imperative for stability in the parameters used in the regulatory process. Thus, while the survey evidence tends to suggest that an MRP of 6% may be too high we do not advocate reducing the MRP, because in our judgement the weight of evidence in favour of a reduction is not strong enough. Equally, we do not find the argument that low interest rates and high credit spreads must mean a higher MRP, to be convincing evidence in favour of increasing the MRP.

Our general point is that moving to change the established MRP by some process of adjustment carries a substantial risk of error and therefore the case for such a move needs to be particularly strong. We note that it is not just our view that adjusting the parameters that go into the regulatory cost of capital carries significant risks. Gregory (2011), for example, points to the possible dangers of interest rate adjustments and uplift factors associated with volatility in determining regulated returns. More generally, Gregory (2011) argues that these and other factors have led to an overstatement of the MRP and cost of capital by UK utility regulators. In his view the long run historical MRP is too high. This accords with the thrust of our prior reports (McKenzie and Partington, 2011, 2012) that while 6% was a justifiable estimate of the MRP, if anything, it was more likely to be too high rather than too low.

[3] This position is a fairly standard assumption in corporate finance textbooks. For example, See Weston and Copeland (1986) "Managerial Finance", 8th Ed., pp 431 – 436 and 448 - 450.

A Survey of the Relationship Between Default Risk, Debt and Equity

Note that while the question at hand specifically makes reference to the relationship between the default risk and the debt risk premium and equity risk premium, the following survey of the literature collectively considers the evidence on both the debt risk premium and the equity risk premium as well as the cost of debt and equity. This choice was guided by the need to cohesively present the literature in a manner that would allow each issue (*in italicised text below*) to be fully explored.

To summarise what follows, we find that there are competing theoretical and empirical models which support both positive and non-positive relations between the debt risk premium and the equity risk premium. There is no clear consensus, but the weight of evidence may somewhat favour a non-positive relation. What is clear, given the mixed evidence, is that the relation is not strong and stable. Furthermore, it may be contingent on the nature of the firm, for example the relationship may differ between firms approaching financial distress and other firms.

Garlappi et al (2008, p. 2743) defines default risk as:

> "... the likelihood that a levered firm will not be able to pay the contractual interest or principal on its debt obligations."

Since the majority of firms declare bankruptcy in a recession, default risk is argued to be strongly counter-cyclical, ie. default risk is at its lowest when the economy is doing well and vice versa.

How are Default Risk and the Debt Risk Premium Related?

It is uncontroversial to suggest that default risk and the debt risk premium are positively related. For example, Vassalou and Xing (2004, p. 831) state:

> "Default risk induces lenders to require from borrowers a spread over the risk-free rate of interest. This spread is an increasing function of the probability of default of the individual firm."

The literature has attempted to empirically validate this theoretical positive relationship between debt risk premiums and default risk. The problem is that default risk is not directly observable and so the use of proxies is called for. The variables used to represent default risk were selected based on their ability to capture information on the business cycle and the yield curve was a common choice in the early literature. For example, Fama and French (1989) and Chen (1991) are two well known examples of this literature and, as expected, they found a positive relationship between the yield spread and bond returns.

More recently, macroeconomic factors have been a common choice to capture information on the business cycle. For example, in the context of the debt markets, Korajczyk and Levy

(2003), Hackbarth, Miao, and Morellec (2006), Ludvidson and Ng (2007), David (2008) and Cooper and Priestly (2009) show that macroeconomic uncertainty is one of the main determinants of the bond risk premia demanded by investors. For example, Ludvidson and Ng (2007) make the observation that the literature provides little direct evidence of a link between business cycle activity in macroeconomic variables and risk premia in bond markets. Their paper aims to fill this gap and the results indicate that macroeconomic fundamentals are useful in forecasting excess bond returns and, most importantly, they find evidence of countercyclical variation in bond risk premia, ie. the risk premium is highest when the economy is at its weakest. Korajczyk and Levy (2003) show that dynamic corporate financing decisions, and so credit spreads, are likely to be influenced by macroeconomic factors.

How are Default Risk and the Equity Risk Premium Related?

Turning our attention to consider the default risk and the equity risk premium, we find that it is far from clear what the relationship may be.[4] In their study of Australian equities, Chan, Faff and Kofman (2011, p. 219) note that:

> "The asset-pricing literature testing for the existence of a default risk ... factor is somewhat sparse".

Further, Vassalou and Xing (2004) comment that:

> "... we still know very little about how default risk affects equity returns." (p. 832) and "(t)he effect that default risk may have on equity returns is not obvious..." (p. 831)

Default Risk and the Equity Risk Premium - A Positive Relationship.

The idea of a positive relationship between default risk and market risk premiums can be traced back to the introduction of consumption-based asset pricing models in the late 1970's and early 1980's.[5] These models showed that risk premiums may vary over time and this variation could be related to business cycles. The logic was that agents prefer a steady flow of consumption and that assets act as a hedge against consumption risk - consumers thus require lower (higher) expected returns when the economy is doing well (poorly) as the marginal utility of additional consumption is low (high). To the extent that default risk is greatest during recessions, both default risk and equity risk premiums should vary counter-cyclically with the business cycle (see Darolles, Eychenne and Martinetti, 2010, for a survey of this early literature).

[4] In the very early literature, Samuelson (1965) showed that the risk premiums required by investors in order to buy risky assets are a constant.

[5] See Rubinstein (1976), Lucas (1978), Grossman and Shiller (1981) and Hansen and Singleton (1983). Merton (1990) provides a summary.

A positive relationship between default risk and the equity risk premium has also been derived in the context of the CAPM. For example, Chava and Purnanandam (2010, p. 2523) state:

> "(i)f default risk is systematic, then investors should demand a positive risk-premium for bearing this risk."

The merit of this argument then, clearly rests on whether or not default risk is diversifiable and a great deal of uncertainty exists as to the answer. For example, Denis and Denis (1995) and Vassalou and Xing (2004) both show that default risk is systematic. On the other hand, Opler and Titman (1994) and Asquith, Gertner, and Sharfstein (1994), find that bankruptcy is related to idiosyncratic factors and therefore, does not represent systematic risk.

Breig and Elsas (2007) argue that, while default risk is primarily a diversifiable firm-specific risk factor, it may also contain a systematic component. In testing, however, Breig and Elsas (2007) conclude that the general association between individual default risk and the sensitivity to non-diversifiable market default risk is weak.

Campbell, Hilscher, and Szilagyi (2011) argue that default risk may be systematic as corporate failures will be correlated for at least some firms due to either deteriorating investment opportunities or declines in unmeasured components of wealth such as debt securities (see Ferguson and Shockley, 2003). Fama and French (1996) suggest that human capital may be another unmeasured component of wealth, where a firm's 'relative distress' can affect an investors human capital and ultimately, asset prices in the cross section.

It is worth noting that default risk has been found to explain, at least part of, the small stock and value stock premium, which are central to the Fama-French three-factor model (see Chan, Chen, and Hsieh, 1985, Chen, Roll, and Ross, 1986, Chan and Chen, 1991, and Fama and French, 1992). These studies implicitly assume that investors demand a positive premium for holding stocks that have a high probability of default and this may have helped to shape the perception that a positive relationship exists. The role of default risk in the Fama and French model is still being explored. For example, Chan, Faff and Kofman (2011) argue that the relationship between stock returns and default risk is likely to be affected by the firm's exposure to the business cycle. Thus, it may be difficult to establish a significant positive relationship as most stock markets reflect a mixture of leading and lagging sectors and the business cycle phases are aperiodic. Chan, Faff and Kofman (2011) undertake an empirical study using the Fama-French model and find that the default factor is priced and cannot be explained by other known factors such as size and style.[6]

A limited number of empirical papers have found evidence of a positive relationship between default risk and the equity risk premium. Chan et al. (1985) and Chen et al. (1986)

[6] To the best of our knowledge, the only other Australian evidence on this issue comes from Gharghori et al. (2007, 2009), who find no evidence of a relationship between default risk and stock returns.

provided some of the first contributions in this area and found evidence of stocks with a high default risk producing high average returns. Further, Ng (1991) found that the market risk premium fluctuates with the phases of the business cycle. More recently, Vassalou and Xing (2004) show that stocks with large increases in their default risk earn significantly higher subsequent returns than stocks with large decreases in their default risk. This is consistent with investors requiring a higher return to hold stocks with higher default risk, however, as the effect was found to be confined to small-value stocks, it cannot be considered systematic. Chava and Purnanandam (2010) also document a positive relationship between expected stock returns and default risk, which they attribute to their use of ex ante return estimates based on the implied cost of capital. Finally, Anginer and Yildizhan (2010) find that stocks with higher credit risk premia (measured using corporate credit spreads) have higher expected equity returns.

Default Risk and the Equity Risk Premium - A Negative Relationship.

The empirical papers discussed in the final paragraph of the previous section represent only a part of the body of evidence on this issue. Other papers have been published that provide an interesting contrast as they suggest that the relationship between default risk and the equity risk premium may be negative, flat, or even hump-shaped - but not positive. As the work summarised in this section is empirical in nature, the relationship considered in most cases is to realised returns. However, assuming expectations are unbiased, then realised returns will reflect expected returns.

Dichev (1998), Griffin and Lemmon (2002), George and Hwang (2010) all use accounting-based bankruptcy scores as a proxy for default risk to test the relationship to the market risk premium. Dichev (1998) finds that bankruptcy risk is not rewarded by higher returns, in fact, he documents a negative relationship between stock returns and default probability. Griffin and Lemmon (2002) build on these results and find that this pattern is stronger for firms with low book-to-market ratios. George and Hwang (2010) find that any positive relationship between default risk and the equity risk premium inverts once low-price stocks are excluded. It is worth noting that Vassalou and Xing (2004) highlight two main concerns about the use of accounting models in estimating the default risk of equities: first, accounting models use information derived from financial statements, which is inherently backward looking; and second, accounting models do not take into account the volatility of a firm's assets in estimating its risk of default.

Other risk proxies have been used in a range of papers and none support a positive relationship between default risk and the market risk premium. For example, Campbell et al. (2008, 2011) use proxies for default risk derived from a reduced-form model (a Logit failure indicator model estimated on accounting and equity market variables) to capture default risk and show that stocks with a high risk of failure deliver anomalously low average returns. This result is particularly strong for small-size firms characterized by low analyst

coverage, institutional ownership and turnover. Garlappi et al. (2008) use Moody's KMV expected default frequencies as a default probability measure and find no evidence of a significant positive relation between returns and default risk. They also note a particularly strong negative relation between returns and default risk in concentrated industries. Finally, Avramov et al. (2009) use proxies for default risk derived from credit ratings and find that low credit risk firms realize higher returns than high credit risk firms. Further, they find that a significant negative relationship only exists three months before and after credit rating downgrades. Further, they argue that this relationship is attributable to the lowest-rated firms in financial distress.

Default Risk and the Equity Risk Premium – Explanations of the Negative Relationship.

As Avramov et al (2009) point out, if credit risk is a systematic risk, it should be priced. If it is not, then there should be no return differential due to credit risk. The empirical evidence of a negative credit risk-return relation is thus unexpected and is considered by some as "puzzles under frictionless capital markets" (George and Hwang, 2010, p. 56).

A number of explanations for this anomaly have been put forward and many are based on the view that these perverse results are caused by market imperfections. For example, Garlappi et al. (2008) and Garlappi and Yan (2011) argue that the ability of stockholders to strategically default leads to distressed stocks attracting low systematic risk and, therefore, low expected returns. George and Hwang (2010) assume that managers trade off the tax shield of debt against the deadweight costs of financial distress when choosing an optimal leverage ratio. In this model, a firm with high distress costs has high systematic risk and can only slightly reduce this risk by optimally choosing a low leverage ratio. This implies a negative relation between default risk and expected equity return. Johnson et al. (2011) show that the negative relation derived in George and Hwang (2010) is between default risk and asset returns, while the relation between default risk and stock returns is still positive. However, Johnson et al. (2011) also show that a negative relation can be achieved when asset volatility drives the capital structure decision.

The negative default risk premium is explained by O'Doherty (2010) as arising from the increases in information uncertainty that coincide with distress. In this paper, a theoretical model is derived in which a levered firm's equity beta is negatively related to uncertainty about the unobserved value of its underlying assets. As a result, the author argues that portfolios of distressed stocks have conditional betas that are highly volatile and exhibit a negative relationship with the market risk premium. As such, distressed stocks have relatively low exposure to market risk during bad economic times, ie. low market betas, with a corresponding low expectation of returns. Empirical tests support the main predictions of this theory.

Aretz (2013) notes that most previous models of the relation between default risk and the expected equity return focus on an equity financed firm, whereas a more appropriate model

would specify a firm that has both debt and equity. Further, Aretz (2013) also argues that a firm's default risk depends on not only how strongly its asset payments are correlated with consumption, but also on more firm-specific factors (for example, its profitability or leverage ratio). Taking both of these factors into account, Aretz (2013) produces a model in which the firm's default risk depends on the expectation *and variance* of future asset payments and on the future debt repayment. The model suggests that default risk decreases in the expected asset payment and increases in the debt repayment. Moreover, default risk increases in asset volatility for firms with a low default probability, but decreases in asset volatility for firms with a high default probability. Thus, the relationship may be far more complex than has been previously suggested.

Default Risk and the Equity Risk Premium – What is the Causality?

The preceding discussion has taken a somewhat linear view of the question at hand by looking at the evidence on the impact of default risk on the equity risk premium or equity returns. If we look more widely at the literature in this area, however, evidence exists which suggests that equity markets may, in fact, determine default risk. In this case, the issues of estimation and inference become far more complex.

Examples of this literature include Bouwman, Sojli and Tham (2011), who find evidence to suggest that stock market illiquidity is a significant macroeconomic risk factor. Thus, illiquidity is argued to provide important information about expected future business and macroeconomic conditions, which in turn are thought to be a prime determinant of default risk. Giesecke, Longstaff, Schaefer and Strebulaev (2001) also link the stock market to default rates. They examine a long history of corporate bond data and find that changes in GDP, stock returns and stock volatility are strong predictors of default rates, while credit spreads are not. This is surprising, but even more surprising is the result of Elton et al. (2001) that much of the information in the default spread is unrelated to actual default risk.

Evidence of a bidirectional relationship between default risk and stock market returns is provided in Vassalou, Chen and Zhou (2006). Specifically, high default risk stocks are found to always earn higher returns than low default risk stocks. Further, evidence is found of the existence of a two way causal relation between default risk and stock market returns.

The evidence that stock market returns may have some influence over default rates, or that there may even be a bidirectional relationship, raises a much bigger question as to whether the relationships we are interested in may be more complicated and more intertwined than has been considered so far.

Default Risk, Debt and Equity Markets – What is the Causality?

Elkamhi and Ericsson (2008, p. 2) make the point that theoretically,

> "... a given firm's equity and bond returns should be closely related."

Both Campbell and Taksler (2003) and Elkamhi and Ericsson (2008) however, find that actual market data does not provide evidence of any such relationship. Rather, they tend to move independently. For example, Campbell and Taksler (2003) observe that during the late 1990s, stock prices rose strongly, while corporate bonds performed poorly. They argue that there are a number of reasons why this may be the case. First, heightened optimism about the future of a company benefits stock prices, while bondholders receive no more than the promised payments albeit with a reduced expectation of the probability of default. Second, if corporate bonds are issued by different companies than those that dominate the equity indexes, there may be a composition effect. Third, an increase in the liquidity premium on corporate bonds relative to Treasury bonds might drive down corporate bond prices without any effect on equity prices. Finally, volatility in the value of the firm has opposite effects on stock and bond prices as for a given level of expected profits, volatility increases the probability of default to the detriment of bond holders, while having a positive effect for equity holders.

Some evidence of the complexity of this relationship can be found in Bansal and Yaron (2004), who show that a substantial fraction of the equity risk premium could stem from exposure to long-run fluctuations in macroeconomic growth rates (which in turn may drive default risk and so debt risk premiums). Other papers that have linked macroeconomic measures of the state of the economy to stock prices include Cochrane (1991 - the investment/capital ratio), Menzly et al. (2004 - the ratio of labour income to total income), Piazzesi et al. (2007 - the ratio of housing to total consumption), Cooper and Priestley (2005 - the output gap) and Lettau and Ludvigson (2001 - the ratio of consumption to wealth).

In contrast, Campbell and Taksler (2003) present evidence that equity volatility and credit ratings each explain about a third of the variation in corporate bond yield spreads. On a similar theme, Elkamhi and Ericsson (2008) find that equity returns are in fact useful in explaining bond risk premia when financial leverage, operating risk as well as bond specific characteristics are taken into account. They also show that as distress becomes more likely, uncertainty about the arrival of default decreases, as do risk premia.

A unifying framework which relates the equity risk premium and credit spreads to risks in macroeconomic fundamentals is presented by Bhamra, Kuehn and Strebulaev (2009). This is a consumption based model, in which consumption growth is dependent on the state of the economy. Their model endogenously generates a realistic time series of actual default probabilities and credit spreads, together with an equity risk premium, which varies with macroeconomic conditions.

There is work which provides a direct link between return predictability in stock and bond markets and economic fundamentals. Fama and French (1993) identify five common risk factors that explain average returns on stocks and bonds. Cooper and Priestly (2009)

empirically demonstrates that the output gap predicts stock and bond market returns both in- and out-of-sample.

The correlation between corporate bond and equity returns is examined empirically by Monkerud, Nieto and Rodríguez (2012). They find that the correlations between assets are time-varying and persistent and investigate the determinants of these correlations. The results show that the correlations are large and negative during recessions and a significant part of the time variation is captured by the volatility of consumption growth. They also find that the correlations are generally positive and increase with firm's risk. Thus, aggregate consumption and firm risk are both found to be a common determinant for both stock and corporate bond prices.

b. Does the AER need to adjust its current methodology for estimating the return on debt so as to account for default risk? In particular, comment on whether the regulatory assessment of the benchmark firm incorporates a material likelihood of default. Identify the costs for consumers of a default event and the extent to which it is in the consumers' interest to eliminate this risk.

In our view, no adjustment is required for default risk in the return on debt. The allowance for the credit spread for BBB grade debt accounts for default risk. As we argue in this report, the credit spread is likely to contain a substantial component that reflects default risk. Currently, the BBB credit spread is quite large, which in turn indicates that the regulatory assessment implicitly incorporates a material allowance for the likelihood of default. This allowance is probably greater than is strictly required for regulated utilities, as they probably have less default risk than most BBB rated debt. Regulated utilities are more likely to stay in their rating grade than are other firms, Kadam and Lenk (2008). Therefore, the probability of regulated utilities migrating from BBB to the default grade are going to be lower in comparison to other firms in the BBB grade.

We note that the AER allows the regulated businesses to earn the promised cost of debt. This allowance of the promised cost of debt gives the cash flow assuming no default - if there is no default, the cash flow will be higher than debt-holders expected or required. While this gives debt investors a windfall, it may be justified on the basis that allowing the promised cost of debt is what is required to provide sufficient cash flow to avoid default and allow shareholders their equilibrium expected return. If the allowed cost of debt were lowered, then in order to avoid default, shareholders would have to accept reduced returns.

In our opinion, the *expected* cost of default to consumers is in the range of very low to negligible. This is because the cost in the event of default has to be multiplied by the probability of default and we expect neither of these numbers to be large. The probability of default is unlikely to be large as the debt is investment grade and, as we explain above, regulated utilities probably have less default risk than typical BBB debt.

Even in the event of default, the cost to consumers is unlikely to be large. We take the main cost to be disruption of supply of the regulated services. Regulated businesses typically have substantial assets, but they have highly specific uses so their value arises from their value in use not their value in liquidation. Consequently, in the event of a default, it is not in the interests of creditors to disrupt supply as this would damage the value of the assets from which they could make recoveries. The best interest of creditors would likely be served by a minimal loss of goodwill and selling the assets as a going concern. This implies avoiding disruption to supply as any disruption to supply not only means reduced cash flow but would also be likely to entail substantial loss of goodwill. Furthermore, in the event that disruptions threatened, such disruptions would likely have substantial economic externalities, and thus we believe that there would be substantial incentives for government to intervene in order to prevent this outcome.

c. Does the AER need to adjust its current methodology for estimating the return on equity so as to account for default risk?

SFG (2012) argue that that if default risk increases the regulator should increase the allowable return on investors to compensate. They state:

> *In the event of insolvency and default, the equity becomes worthless and the return on equity is -100%. For example, suppose the CAPM estimate of the expected return on equity is 12% and there is a 5% chance of default. In this case, the regulated firm should be allowed to charge prices that would be sufficient to provide a return to shareholders of 18%. Thus shareholders would receive a return of 18% if the firm remains solvent (95% probability) and would lose their investment if it does not. Shareholders would thus face an expected return of 12%, consistent with the CAPM estimate.* (p. 8)

This is just a reframing of SFG's (2012) arguments that rely on the default risk adjustment being made to the discount rate. We repeat that under the CAPM, there is no default risk adjustment to the discount rate. The effect of default risk is to reduce the expected cash flow. Provided that valuations are being done using expected cash flows no further adjustments are required.

In relation to the SFG example above, if the 5% chance of a zero return was evident at the time of the initial purchase, shareholders would have paid a price for the shares that would result in a 12% expected return. If the 5% default risk arose after the shareholder had purchased the shares, the expected cash flow would be reduced. When the expected cash flow dropped the value of the firm would fall and the shareholders would suffer a capital loss. There is no necessity for the regulator to compensate shareholders for the capital loss by subsequently offering shareholders a higher return. If the regulator allowed a 12% return

following any increase in default risk, this would give the cash flow required to return 12% on the reduced value of the shares.

2. Critically review the material by SFG on the current level of the debt risk premium and its implications for the market risk premium. Explain whether you agree with SFG's reasoning, setting out the reasons for your position. In particular:

a. Considering any relevant factors (including but not limited to default risk as noted in the previous question) can the DRP and MRP move independently? How can the relationship between the DRP and MRP best be modelled, and how much uncertainty is there around this relationship?

The survey of the literature presented in our response to Question 1.a., highlights that the DRP and MRP can move independently. In brief, there is a great deal of uncertainty regarding this relationship – an increase in the default risk will likely cause the DRP to go up but MRP might be unchanged, they might both go up together, or they might move in opposite directions. Commonality in systematic risk suggests that both going up together may be more likely, but the variability in the empirical evidence suggests that correlation is weak, if it exists at all, and the relation is highly unstable. Our survey of the literature provides no clear guidance on the appropriate manner with which to model the relationship.

b. Would your answer to (a) change in the context of the overall cost of debt and the overall cost of equity? That is, can the overall cost of debt and overall cost of equity move independently? How can the relationship between the overall cost of debt and the overall cost of equity best be modelled, and how much uncertainty is there around this relationship?

The survey of the literature presented in our response to Question 1.a., highlights that the cost of debt and the cost of equity can move independently. There is likely to be some commonality in the overall cost of debt and equity since the risk free rate is the benchmark for both. However, that relationship is weak, if it exists at all, and the relation is highly unstable. Our survey of the literature provides no clear guidance on the appropriate manner with which to model the relationship.

c. How should the tax effect of the interest shield on debt be accounted for in these type of comparisons between debt and equity? In particular, the AER implements a nominal vanilla WACC formula that includes a pre-company-tax cost of debt and a post-company-tax cost of equity, with a separate cash flow adjustment for the interest shield (in the tax building block). Is it appropriate to compare the pre-company-tax cost of debt and post-company-tax cost of equity from this nominal vanilla WACC formula?

The cost of equity is generally measured as the expected return after corporate tax and before personal tax (as used by the AER), while the cost of debt is generally measured as either the promised return on debt before any tax (as used by the AER), or the promised return on debt after corporate tax and before personal tax. The former measurement of the

cost of debt reflects the promised return that investors' require before personal tax, and the latter reflects the cash flow the firm has to generate after corporate tax in order to give debt investors the promised return. The after tax cost of debt is usually calculated as r_d x (1-T_c) where T_c is the corporate tax rate and r_d is the promised return on debt.

The question posed above can therefore be restated as follows. Is it appropriate to compare the promised return on debt before any tax to the expected return on equity after corporate tax but before personal tax? On the basis of the discussion in response to question 1a above it is clear that if the costs of debt and equity are to be examined on a comparable basis then it is the expected return to equity and expected return to debt that should be considered. However the substantive question to be addressed here is taxation, in particular what constitutes measurement in a comparable dimension with respect to taxes?

Measurement of the cost of debt and the cost of equity either on a before all taxes (both corporate and personal) basis, or on an after all taxes basis, would provide measurements on a comparable basis. Unfortunately, neither of these alternatives is practical. There are substantial problems in converting an after corporate tax cost of equity to a before all taxes cost of equity both because of potential inconsistency between the measurement of cash flow and the discount rate[7], and also because of problems in adjusting discount rates for tax affects (see Dempsey, McKenzie and Partington, 2010). Thus comparing the cost of equity and debt on a before all taxes basis is not recommended. Neither is it feasible to compare the cost of debt and equity on an after all taxes basis unless we know the tax rate for the marginal investor. Therefore, measuring the cost of debt and cost of equity after corporate tax is likely to be the best way to place the two cost measurements on a comparable tax basis. This gives a comparison of costs of equity and debt from the perspective of the firm. These costs of equity and debt reflect the cash flows that the firm has to generate in order to service its capital base.

If, however, the objective is to compare the returns that investors require on debt and equity before personal tax, then the appropriate comparison is between the cost of debt before all taxes and the cost of equity after corporate tax and before personal tax. However it must be remembered that the promised return on risky debt is not the return investors expect and require. If they get the promised return they have typically done better than expected.

The effect of the imputation tax system further complicates the comparison between the cost of debt and the cost of equity. The effect of Imputation is to reduce the effective corporate tax rate reducing the tax benefit of debt and increasing cash flow to shareholders. Adjustment for imputation is a contentious issue that can become quite complex and its

[7] The problem is that you cannot simply scale up both the after tax cash flow and the after tax discount rate by 1 - T_c.

discussion is beyond our current brief. In any event imputation is likely to play a secondary role in explaining the difference between the returns on debt and equity, the more so assuming the comparatively low value being ascribed to imputation tax credits in the regulatory arena.

d. In view of current debt market conditions (a debt risk premium around 3.3 per cent and the risk free rate around 3.2 per cent) is an MRP of 6 per cent implausible?

Based on the evidence presented in this and our previous reports, we view a MRP of 6% as entirely plausible.

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