COMMENTS ON SUBMISSIONS RELATING TO THE QCA'S PROPOSED WACC FOR THE SEQ ENTITIES

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31 March 2011

1. Introduction

The QCA has recently issued a draft report concerned with interim price monitoring for the SEQ entities (QCA, 2011). This has given rise to submissions from Grundy (2011a), Grundy (2011b), and CEG (2011) on the QCA's proposed WACC for the SEQ entities. This paper seeks to review those submissions in so far as they relate to my earlier reports on the WACC for the SEQ Entities and QR Network (Lally, 2010a, 2010b, 2010c).

2. Comments on Grundy: The Calculation of the Cost of Capital

Grundy (2011a, para 1-36) argues for the Black (1972) version of the CAPM over the Sharpe-Lintner version (Sharpe, 1964; Lintner, 1965). However, this issue is not relevant to my work for the QCA and I therefore do not comment on it.

Grundy (2011a, para 37-40) argues that the equity risk premium for a firm must be at least 2.66 times its debt risk premium. The analysis commences with Figure 18.5 in Grundy, which shows the (vanilla) WACC independent of leverage. For this to be possible in a world of default risk, the cost of debt must be defined as the expected rate of return rather than the promised rate. This issue will be raised later because CEG invoke this analysis.

3. Comments on Grundy: Determination of WACC for a Five Year Regulatory Cycle

Grundy (2011b, sections 1 and 2) argues that the appropriate term for the risk-free rate, the debt margin and equity risk premium when determining the WACC of a regulated firm should match the debt term of comparable unregulated firms, irrespective of the length of the regulatory cycle. Grundy asserts that a firm's WACC is independent of its debt term in perfect capital markets, by analogy with the MM propositions, i.e., any reduction in the cost of debt arising from the use of shorter term debt (due to a lower debt term premium) will be perfectly offset by an increase in the cost of equity (presumably via the asset beta in the CAPM). Recognition of the costs of managing temporary cash surpluses and also of transaction costs (on debt issues and the premature liquidation of long-term bonds, with the latter passed through to firms via debt term premiums) then leads to an optimal debt term for unregulated firms (T years) and a regulator should use this to set the term of the risk free rate, the debt margin and the equity risk premium; any other choice will overstate the WACC

(inclusive of transaction costs and the costs of managing temporary cash surpluses) for a unregulated firm and therefore also for a regulated firm.

I have a number of concerns with these arguments. Firstly, Grundy's belief that a firm's WACC is independent of its debt term in perfect capital markets (because lower term premiums on shorter-term debt are offset by a higher asset beta) is not supported by any proof; Grundy's analogy with the MM propositions does not constitute a proof because these propositions arise from the fact that the aggregate risks arising from a firm's cash flows (and transmitted to its capital suppliers) are not affected by how these cash flows are allocated between various capital suppliers whereas the choice of debt term introduces entirely new risks (such as the interest rate risk faced by the holders of long-term bonds). Any proof of Grundy's assertion would require a beta gearing formula that reflected the choice of debt term, in the spirit of Hamada (1972) or Conine (1980). Secondly, even if the analogy with the MM propositions were accurate, Grundy's definition of an optimal debt policy (that which minimizes WACC inclusive of transaction costs and the costs of managing temporary cash surpluses) fails to consider two crucial features of a firm's debt maturity decision: refinancing risk and interest rate risk. Refinancing risk (the risk of debt markets partially or completely freezing up) prompts regulated firms to borrow for a long term (longer than the regulatory cycle of three years) and a concern about interest rate risk (arising from revenues being triennially determined by prevailing interest rates at the regulatory reset points) would then lead a regulated firm to contemplate issuing three year debt or swapping its longer-term debt into three year debt. Thus, prima facie, the optimal debt policy for a firm subject to a three year regulatory cycle is three year debt (by borrowing for that term or swapping longer term debt into it) whilst that for an unregulated firm might be longer. Thirdly, even if these additional risks were not important to regulated firms, Grundy fails to examine whether his proposed WACC (involving the T year risk free rate, debt margin and equity risk premium) would satisfy the NPV = 0 test. However, he still seems to consider this test to be significant and asserts that various WACC options considered in Lally (2010a) fail this test, but he does not provide any proof of these claims.

Grundy (2011b, section 3) also claims to have identified an error in Lally's (2010a) analysis concerned with the NPV = 0 principle and relating to valuation expressions of the following form

$$V_0 = \frac{E(X_1)}{1+k} \tag{1}$$

in which X_1 is an uncertain cash flow arising in one year, E is the expectation of it, k is the appropriate discount rate on it, and V_0 is the value now of the cash flow. Grundy claims (correctly) that Lally's analysis involves negative values for X_1. Grundy also claims that valuation expressions of this form require that X_1 cannot take on negative values and goes on to present an example that he claims to support his point. However, the claim is wrong and his example instead illustrates a quite different point. Valuation expressions of the form shown in equation (1) derive from the definition of a rate of return (R) as follows:

$$R = \frac{X_1}{V_0} - 1 \tag{2}$$

The expected rate of return is then as follows:

$$E(R) = \frac{E(X_1)}{V_0} - 1$$

Solving this equation for V_0 then yields the following:

$$V_0 = \frac{E(X_1)}{1+E(R)}$$

Since V_0 is a market price, at which there is no "free lunch", the expected rate of return when purchasing at that price must be the rate that just compensates for risk, and this is called the discount rate (k). So, we then have equation (1). Accordingly, if the rate of return definition shown in equation (2) above allows negative values for X_1, the same must apply to equation (1). Naturally, equation (1) allows negative values for X_1. For example, suppose that an investor purchases an asset for \$100 and the possible outcomes are -\$50, \$200 and \$300. If these possible outcomes are equally likely then the expected outcome is \$150. If the appropriate discount rate is k = 10%, then the value now of this future payoff is as follows:

$$V_0 = \frac{E(X_1)}{1+k} = \frac{\$150}{1.1} = \$136$$

So, Grundy's claim that X_1 cannot take on negative vales is incorrect and his resulting analysis is therefore incorrect.

Grundy's example has the very special feature that V_0 is zero, i.e., the value now of the future payoff is zero. In such a case, the rate of return as shown in equation (2) is undefined and therefore any expression of the type shown in equation (1) is meaningless. Thus, Grundy's example supports a quite different point to that claimed by him and is therefore irrelevant.

Grundy (2011b, section 3) also argues that the analysis in Lally (2010a, Appendix 2) relating to the NPV = 0 principle is inconsistent because it seeks to assess the impact upon the future cash flows received by a regulated business from the possibility of future risk free rates and debt premiums diverging from the current values whilst adopting the usual practice in discounting cash flows of treating future costs of equity as both certain and equal to the current value. The principal issue here relates to treating future costs of equity as certain, and there is no inconsistency here. The standard practice in discounting cash flows (of treating future costs of equity as certain) does not require that future costs of equity are in fact certain but only that investors ignore this possibility in choosing their portfolios, i.e., investors are myopic. This assumption about investors underlies all single-periods versions of the CAPM including the Officer (1994) model, which the QCA adopts, and the Black (1972) model, which Grundy (2011a, para 1-36) favours. Thus, given that both the QCA and Grundy favour the use of single-period versions of the CAPM, there can be no objection to the standard assumption that investors treat future costs of equity as certain when valuing a given future cash flow distribution. However nothing in this necessarily precludes an analyst from examining how uncertainty surrounding future costs of equity affects the cash flows received by a regulated business, with the standard assumption concerning investors then being invoked in the course of valuing the resulting cash flow distribution.

4. Comments on CEG

CEG (2011, paras 27-42) argues that the risk free rate used within the first term of the CAPM should match that used within the definition of the MRP, notes that the QCA has estimated

the MRP relative to ten year bonds, and therefore argues that the first term within the CAPM must also be the ten year risk free rate. CEG acknowledge that defining the MRP relative to three year bonds (in order to be consistent with the use of three year bonds within the first term of the CAPM) will also resolve the inconsistency issue but argues that doing so will raise the MRP by at least 0.50% to at least 6.50%. In support of this, they present data showing that the Ibbotson estimate of the MRP would rise by 0.50%, and the forward-looking estimate of the MRP would rise by 0.63%, in switching from ten to three year bonds. However, as discussed in Lally (2010a, pp. 20-21), it is necessary to adjust the unrounded estimates from four estimation methods, determine the median result, and then round it. Lally reports the QCA's unrounded results using ten year bonds at 6.99% for the Ibbotson method, 5.27% for the Siegel method, 5.68% for the Cornell forward-looking approach, and 6.00% for the survey method; the median is 5.84%, which is rounded to 6.0% by the QCA. CEG presents adjustments for only the first and third of these methods, raising them by 0.50% and 0.63% respectively, to 7.49% and 6.31% respectively. However, the adjustment to the Siegel method raises the figure only slightly from 5.27% to 5.43% and no adjustment is possible to the survey result of 6.00% (as discussed in Lally, 2010a, pp. 20-21). So, in switching from ten to three year bonds, the new median would be 6.16%, which still rounds to 6.0% if the estimate is rounded to the nearest 0.50%.

CEG (2011, para 43) argues that the current situation involves price monitoring rather than price setting and therefore conclusions arising from the NPV = 0 principle are irrelevant. However the purpose of monitoring is to identify firms whose prices are excessive in relation to their costs, in the NPV sense. As discussed in Lally (2010b, pp. 6-9) this leads to the same conclusion as with price setting: the risk free rate term chosen by the regulator must match the regulatory cycle. CEG do not address this analysis.

CEG (2011, para 44) argues that, if the switch from the ten to the three year risk free rate does not justify a change in the rounded estimate of the MRP, it follows that the term premiums within the term structure of interest rates must be zero, in which case use of the ten year rate rather than the three year rate would not over-compensate regulated businesses. However CEG's conclusion here does not follow from their premise; term premiums can be positive without inducing a change in the rounded MRP estimate (as shown in the penultimate paragraph). Furthermore, term premiums are clearly positive and therefore use

of the ten rather than the three year risk free rate within the first term of the CAPM will over-compensate regulated businesses subject to a three yearly regulatory regime.

CEG (2011, paras 46-50) notes that the ten year risk free rate is more volatile than the three year rate and therefore argues that the ten year rate is preferable. However, if volatility is a concern, the fundamental concern must be with volatility in regulated prices (to which risk free rates are only one contributor) and the solution to this is to lengthen the regulatory cycle. Doing this raises risk to regulated firms and therefore requires higher prices in compensation. Thus the choice of regulatory cycle trades off price volatility against average price.

CEG (2011, paras 51-63) argues that, even if the use of the three year risk free rate is correct, the use of this rate in conjunction with a long-run estimate of the MRP will lead to a cost of equity that is too low during the Global Financial Crisis (and too high in other cases); accordingly, using the ten year risk free rate will ameliorate this problem. However, the use of the ten year rate will only ameliorate the problem in periods when the MRP has been underestimated and will otherwise aggravate the problem. Use of this approach will lead to a cost of equity that will be too high on average over time because the ten year rate generally exceeds the three year rate. A better approach is to use the correct risk free rate (the three year rate); in conjunction with an estimate of the market risk premium that is correct on average over time, the resulting cost of equity will be correct on average over time.

CEG (2011, paras 64-66) refers to an ACT decision in support of its preference for the use of the ten year risk free rate. However, the relevant part of the ACT's decision was concerned with the period over which the risk free rate was averaged rather than the choice of the term for the risk free rate.

CEG (2011, para 67) argues that the ten year risk free rate is preferable to the three year rate because it is less likely to underestimate the cost of equity. However, this argument presumes that there is some uncertainty about the correct term and there is none; the correct choice is the three year rate if the regulatory cycle is three years.

CEG (2011, paras 68-70) argues that the ten year risk free rate is preferred over the three year rate because it better reflects the risks faced by investors in regulatory assets. However investors in long term bonds face significant interest rate risk because the payoffs on the

bonds are fixed whilst equity investors in long-term assets subject to regulation are subject to less interest rate risk by the periodic resetting of the firm's output price (in accordance with prevailing interest rates). Thus, if a regulator uses a risk free rate that matches the regulatory cycle, the interest rate risk on these bonds matches that for equity holders of the regulated assets.

CEG (2011, paras 73-92) argues that the NPV = 0 test (leading to the conclusion that the correct risk free rate matches the regulatory cycle) is based on a number of assumptions (that capital markets are free of transactions costs, perfectly liquid, and that there is no regulatory regime risk), that these assumptions are unrealistic, and therefore the ten year risk free rate is preferred. However, whilst these assumptions do underlie the NPV = 0 test, any concern that they do not hold would support premiums for these particular issues rather than use of the ten year risk free rate (which will sometimes be less than the three year rate and therefore could not compensate for these issues). Similarly one could note that the QCA invokes the Officer version of the CAPM, detail the assumptions underlying this model, and observe that many such assumptions are unrealistic. However, it would not follow that the ten year risk free rate was appropriate. Interestingly, CEG (2011, para 75) acknowledges that the NPV = 0 test would be appropriate if the three assumptions noted above were valid, and this contradicts most of the arguments presented by them and as described above. For example, CEG's claim that the greater volatility in the three compared to the ten year risk free rate supports use of the ten year rate (ibid, paras 46-50) is contradicted by this acknowledgement in their para 75.

CEG (2011, paras 93-96) argues that producing the most accurate estimate of the cost of equity is more important than satisfying the NPV = 0 test. This argument is also inconsistent with CEG's claim that the NPV = 0 test would be appropriate if the conditions referred to in the previous paragraph prevailed. Furthermore, there is no inconsistency between the NPV = 0 test and producing the most accurate estimate of the cost of equity, because the most accurate estimate of the cost of equity will be that which satisfies the NPV = 0 test. So, if the regulatory cycle were three years, the correct discount rate on risk free cash flows would necessarily be the three year rate and therefore a regulator must in that case set the cost of equity equal to the three year risk free rate in order to satisfy the NPV = 0 test. If cash flows are subject to risks arising from demand or cost shocks, a premium must then be added to this risk free rate and the need to estimate this premium leads to use of the CAPM. However, any

recourse to the CAPM must not lead to use of a risk free rate other than the three year rate or it will not accurately deal with the valuation problem.

CEG (2011, paras 94-95) also reproduces a quote from Lally (2010a) and characterizes it as claiming that "the most accurate estimate of the cost of equity may require the use of the ten year risk free rate within the CAPM". This characterization is not correct. The quote from Lally actually highlights a possible conflict between the CAPM and the NPV = 0 test, arising from the possibility that the period to which the CAPM applies does not match the regulatory situation. In such a situation, the output from the CAPM would be irrelevant to the regulatory situation rather than "the most accurate estimate of the cost of equity" for the regulatory situation and the CAPM should then be modified so as to be consistent with the regulatory situation. For example, suppose the period underlying the CAPM is ten years (i.e., investors select portfolios now, hold them for ten years and then consume the payoffs at that point) and the regulatory cycle is also ten years. In this case, the CAPM will provide the correct cost of equity for the regulatory situation but it would fail to do so if the regulatory cycle were three years. In the latter case, the CAPM would have to be modified and consideration of the NPV = 0 test reveals the nature of the required modification: the first term within the CAPM would now have to be the three year risk free rate.

CEG (2011, paras 97-102) argues that the NPV = 0 test requires that the MRP estimate be reset at the beginning of each regulatory cycle to reflect prevailing conditions, that the QCA instead estimates a long-run MRP, and therefore the risk free rate should be a long-run value rather than the value prevailing at the beginning of the regulatory cycle. However this line of argument supports a long-run estimate of the three year risk free rate rather than the ten year rate favoured by CEG. Thus, their line of argument conflicts with their own parameter value. Furthermore, the QCA does not use a long-run estimate of the MRP. Mindful that this parameter is difficult to estimate, it draws upon estimates from four different approaches. Two of these approaches (the Ibbotson and Siegel methods) use long-term average data, and are therefore not very sensitive to short-term fluctuations in the MRP, whilst the other two methods (the Cornell and survey methods) are very sensitive to such fluctuations. However the latter two methods have other shortcomings and therefore recourse to all four methods is sensible. This approach does not constitute reliance by the QCA on a long-run estimate of the MRP, merely a reliance on a range of estimation methods that are each subject to various disadvantages.

CEG (2011, paras 103-106) argues that a regulatory business must have appropriate incentives to invest within each year of the regulatory cycle as well as at the beginning of the regulatory cycle. However, this claim is not linked to their belief that the appropriate risk free rate is the ten year rate. Furthermore the fact that a regulated business subject to a three year regulatory cycle might undertake an investment part way through a regulatory cycle does not imply that the ten year risk free rate is appropriate. As demonstrated in Lally (2010a, pp. 29-30), in the presence of investment part way through a regulatory cycle, the appropriate risk free rate differs from that matching the regulatory cycle but the error from using the rate corresponding to the regulatory cycle is in general trivial.

CEG (2011, paras 107-109) argues that the NPV = 0 test must be invalid because it would lead to the absurd conclusion that the appropriate risk free rate was the one day rate in the event that the regulatory cycle was one day. Again, this argument contradicts CEG's acknowledgement that the NPV = 0 test would be valid under the three conditions specified in their para 75. Furthermore, whilst the scenario hypothesised by CEG is bizarre, the source of the problem is the choice of the regulatory cycle (one day) rather than the matching of the risk free rate term to the regulatory cycle. Similarly, if person X is required to faithfully follow person Y everywhere, and Y elects to walk over a cliff, X is not the source of the resulting problem.

CEG (2011, paras 110-113) argues that the NPV = 0 test (even if valid) should lead to use of a risk free rate that matched the price control cycle that replaced price monitoring rather than the price monitoring cycle. However the purpose of price monitoring is to identify firms whose prices are excessive in relation to their costs, in the NPV sense. As discussed in Lally (2010b, pp. 6-9) this leads to the same conclusion as with price setting: the risk free rate term chosen by the regulator should match the regulatory cycle. So, if the price monitoring regime has a term of three years, the correct risk free rate should be the three year rate rather than the rate corresponding to the term of any price control regime that might follow the price monitoring period. Failure to act in this way will undermine the ability of the price monitoring process to detect situations in which the firm's prices are excessive in relation to its costs. The term of any regulatory cycle that replaces price monitoring is a different issue and should lead at that time (rather than earlier) to a risk free rate matching the regulatory

cycle. Similarly, if the length of the regulatory cycle is changed at a later date, the risk free rate used by the regulator should change at that later point.

CEG (2011, paras 114-120) raises concerns relating to estimation of the cost of credit default swap contracts. This analysis does not relate to my advice to the QCA and I therefore do not comment on it.

CEG (2011, paras 123-129) argues that there is an inconsistency between the interest rate swap contract assumed by Lally (2010a, 2010b), involving the use of government bond rates, and the transaction costs provided by Evans and Peck, involving the use of BBSW rates. In addition, CEG claims that the divergence in these two sets of interest rates is 20-30 basis points during the GFC, provides Figure 2 in support of this, and concludes that this hedging strategy has the potential to increase rather than reduce risk. However, Lally (2010a, 2010b) does not specify the exact form of the interest rate swap contract and that referred to in Lally (2010c), involving BBSW rates, is the industry norm. Furthermore, whilst it is true that use of the BBSW swap contracts will not provide a perfect hedge for the interest rate risk faced by a regulated firm, the difference is approximately zero over the time period shown in CEG's Figure 2 and does not exceed 0.40%. Thus, the imperfection in the hedge is not substantial and this situation is typical of hedging contracts. By contrast, if a regulated firm did not engage in such hedges, their potential loss could be vastly in excess of 0.40%. For example, suppose a regulated firm borrowed for ten years at 8% and five years later (at the regulatory reset point) interest rates had fallen to 6%, leading a regulator to cut the firm's price cap accordingly; the firm would then face a shortfall in its revenues relative to its costs of 2.0% of the amount borrowed.

CEG (2011, para 131) argues that the hedging strategy assumed by the QCA (swapping ten into three year debt) is inconsistent with the lack of certainty about the period for which the price monitoring regime will prevail. However, if a firm undertook the hedging strategy proposed by the QCA, it would have the flexibility to react to unexpected changes in the regulatory regime. For example, suppose a firm borrows for ten years, swaps it into three year debt, and in three years time is unexpectedly confronted by a new five year regulatory period rather than a three year one. The swap contracts involve the firm swapping its ten year fixed rate debt into floating rate debt coupled with simultaneously swapping floating rate debt into three year debt. In three years time, the firm expects to undertake another swap of

floating rate debt into three year debt. However, if in three years time the regulatory cycle is reset for five years, the firm simply swaps floating into five year debt rather than three year debt. Thus, the concern raised by CEG is unwarranted.

CEG (2011, para 132) argues that the hedging strategy assumed by the QCA may not correspond to the actual behavior of firms. However, the actual behavior of firms is irrelevant. If they fail to undertake such hedging arrangements, they will have chosen to speculate on interest rate movements and a regulator has no duty to modify its behaviour for these reasons. Furthermore, there is no regulatory strategy (consistent with price resetting every three years) that could protect a firm from interest rate risk if that firm borrows for ten years and does not hedge in the way proposed here.

CEG (2011, para 133) argues that the hedging strategy assumed by the QCA exposes businesses to volatility in short-term interest rates. This is not correct; the hedging strategy protects the businesses from volatility in short term (three year) rates. In the absence of such a hedging strategy, a business borrowing for ten years and not swapping it into three year debt would be exposed to a fall in interest rates after three years reducing its revenues (in accordance with the regulatory price resetting after three years) but not its costs, with a resulting risk of bankruptcy. These points appear to be conceded in the third sentence of CEG's para 133.

CEG (2011, para 133) also argues that a three year regulatory cycle exposes businesses and consumers to more volatile prices. This is correct but the increased volatility in prices that are received by businesses can be hedged by them whilst the increased volatility in prices paid by consumers is an argument for a longer regulatory cycle rather than a different approach to WACC estimation within the context of given regulatory cycle.

CEG (2011, para 133) also argues that there is a risk of regulators not passing on high interest rates and this favours use of the ten rather than the three year risk free rate.[1] However, CEG's recommendation relates to what regulators should do every three years and therefore cannot deal with the possibility that they fail to carry out their announced policy.

[1] CEG refers to "a tendency amongst regulators to pass on very high interest rates". However, the context suggests that they meant to include the word "not" prior to the word "pass".

CEG (2011, para 134) argues that it is inconsistent to estimate the equity betas for regulated businesses from data for other firms that have not entered into the hedging arrangements assumed by the QCA, and therefore such hedging arrangements should not be assumed by the QCA. However comparators are never perfect for a variety of reasons. So, if the comparators that were chosen did not undertake the hedging contracts in question, this would not be grounds for ignoring these contracts in the course of regulating the firm in question. To act otherwise would be to allow the tail to wag the dog, i.e., to adopt for regulatory purposes whatever arrangements were present in the comparator firms and could affect their betas.

CEG (2011, para 136) states that they agree with Grundy's conclusion that the appropriate term for the risk free rate, the debt margin and the equity risk premium is that matching the term for which comparable unregulated firms borrow. However, this contradicts virtually everything CEG has previously argued for. For example, if the debt term for comparable unregulated firms were eight years, all CEG's arguments in support of using the ten year debt term would be contradicted. Alternatively, if the debt term for comparable unregulated firms were currently ten years, but changed tomorrow to eight years, all CEG's arguments in support of using the ten year debt term would again be contradicted. This is one of a large number of cases in which CEG's arguments are contradictory.

CEG (2011, paras 137-138) reiterates a number of the points made in Grundy (2011b). These arguments from Grundy have already been examined in section 3 above.

CEG (2011, paras 139-145) concur with the QCA's use of the Bloomberg data, which is also used in Lally (2010c). Therefore, no comment is required here.

CEG (2011, para 154) notes that the data used in Lally's (2010c) beta estimates is up to three years old, with the estimates from Henry (2009) spanning the period 1990-1998 and 2002-2008 and those from PwC (2009) spanning the period 2004-2009; CEG argues that these estimates are inferior to estimates based on more recent data (2008-2011 for US electric and gas utilities and 2006-2011 for the water firms). However, CEG's estimated asset betas for the US electric and gas utilities (based on 2008-2011 data) are much higher than the estimates drawn from Henry (based on 1990-1998 and 2002-2008 data), and the latter estimates span a much longer period than CEG's estimates. This suggests strongly that CEG's estimates are

too high. Furthermore, Henry's estimates delete the 1998-2002 period on the grounds that utility beta estimates from this period are unusually low; a consistent approach to unusual periods therefore also supports disregarding the 2008-2011 results because this period generates unusually high beta estimates. Furthermore, regulated firms and their advisers have repeatedly advised against the use of data from the 1998-2002 period (because it yields unusually low results); having done so, it would be not now be consistent to favour the exclusive use of data from a subsequent and comparatively short period that yields unusually high results. Similar considerations apply to the US and UK water firms, with the PwC results from 2004-2009 that are reported by Lally (2010c) largely excluding both extreme periods whilst CEG's results from 2006-2011 incorporate the unusually high period but not also the unusually low period from 1998-2002. Consequently, although CEG's results for the water firms use a more recent period than PwC's and the two periods are of equal length, the PwC estimates are likely to be superior to CEG's estimates.[2]

CEG (2011, paras 155-158) argues that the set of beta comparators used by Lally (2010c) is small and inferior to a larger set of firms identified by them. However the number of firms considered by Lally (2010c) is 32, which is not small in this context. Furthermore, even if inclusion of all of the additional firms identified by CEG were warranted, it does not seem that their inclusion would materially alter the results: using the data periods favoured by CEG (to permit the comparison to be made), the additional US electric and gas utilities raise the estimated asset beta by 0.08 (CEG, Table 5), the additional UK water firms lower the estimated asset beta by 0.10 (CEG, Table 6), and the additional US water firms raise the estimated asset beta by 0.05 (CEG, Table 6). So, the principal source of difference between CEG's results and those presented in Lally (2010c) lies in the periods used rather than the number of firms.

CEG (2011, paras 161-162) argues that the use of weekly returns data is superior to the monthly returns data underlying the results presented in Lally (2010c), on the grounds of lower volatility in the resulting beta estimates. However, the principal results reported in Lally (2010c) are drawn from Henry (2009), who reports results using both monthly and weekly returns (ibid, Tables 4.1, 4.2, 6.5 and 6.6) and the use of monthly returns produces slightly higher beta estimates in general than the use of weekly returns. Thus, regardless of

[2] Better still would be a much longer period but results for such are not readily accessible.

the merits of CEG's argument, Lally's use of Henry's results based upon monthly data is favorable to the SEQ entities.

CEG (2011, para 165) claims that their Figures 6-8 show that the betas for water businesses peaked in 2009 and this supports the use of recent data. However, CEG do not provide a time-series of equity betas that peaked in 2009. They instead provide a time-series of *estimated* equity betas that peak in 2009. Estimated betas fluctuate over time even if the true betas have not changed and the fluctuations are more pronounced the shorter the estimation period. It would be no more sensible to conclude from CEG's Figures 6-8 that the true betas peaked in 2009 (and use the recent estimates) than it would be to conclude in 2002 that the true betas reached a trough in 2001 and use those low estimates for WACC estimates. Furthermore, the wide variation over time in CEG's results (shown in Figures 6-8) supports the case for estimates based upon a long time-series of data (as Henry has done but CEG have not).

CEG (2011, paras 166-171) argues for a debt beta of zero. Since this matches the recommendation in Lally (2010c), I have no comments here.

CEG (2011, paras 172-173) claims to have identified an error in Lally (2010c) relating to the re-levering process for betas. The error is acknowledged and raises the estimated asset betas for the US electric utilities to 0.36 and 0.41 at debt betas of 0 and 0.11 respectively, as shown in CEG's Table 7. However, across the four sets of companies shown in that table, the means are 0.29 and 0.33 at debt betas of 0 and 0.11 respectively rather than the figures of 0.31 and 0.33 shown in CEG's Table 7. If the UK firms are excluded, these figures rise to 0.32 and 0.37 as correctly reported in CEG's Table 7. Thus, if an asset beta cannot be reliably estimated to a precision greater than 0.05, the appropriate estimates for the asset betas are still 0.30 and 0.35 at debt betas of 0 and 0.11 respectively.

CEG (2011, paras 176-179) argues in favour of the Black (1972) version of the CAPM over the Sharpe-Lintner version (Sharpe, 1964; Lintner, 1965). However, this issue is not relevant to my work for the QCA and I therefore do not comment on it.

CEG (2011, paras 180-183) argues that the level of gearing for the market has been unusually high in the last five years, and therefore the estimated asset beta for regulated utilities

(measured at constant notional gearing) will be unusually low. Thus, if market leverage declines over the next regulatory cycle and the notional gearing remains unchanged, the asset beta will rise and therefore the current estimate will be too low, which suggests that the estimate based on the last five years data is a lower bound. These arguments are correct in principle, and formal analysis in support of this is provided by Lally (1998). However, the conclusions presume that the beta has been estimated using data over the past five years (or a shorter period). By contrast, the QCA's estimate is drawn from Lally (2010c), and this primarily relies upon estimates from Henry based upon data from 1990-1998 and 2002-2008. Furthermore, even if the data used were sufficiently recent to support CEG's conclusion, any such adjustment would have to be made consistently over time and the variation in results (whose average would tend to zero over time) may not justify the additional effort.

CEG (2011, paras 184-189) undertakes a DGM analysis on six Australian utility firms for June 2010 and concludes that the average risk premium relative to three year government bonds ranges from 7.0% to 11.1% using long-run expected growth rates in dividends per share (DPS) of 0 and 5.5% respectively. By contrast, the equity risk premium proposed by the QCA for the SEQ entities is 4.0% (an MRP of 6.0% and an equity beta of 0.66). Accordingly, CEG argues that either the MRP proposed by the QCA or the equity beta is too low. However, CEG's use of the DGM to deduce estimates of the equity risk premiums of these firms effectively constitutes use of the DGM to estimate the cost of equity of these firms, and such an approach is not in accord with the use of the Officer CAPM, which has been adopted by both the QCA and CEG. Furthermore, the inconsistency between the DGM results and the parameter values proposed by the QCA may lie in the limitations of the DGM when applied at the individual firm level rather than in the QCA's parameter values. Finally, since plausible estimates for the long-run expected growth rate in DPS should lie between the CPI inflation rate and the nominal growth rate in the economy (for an average firm), then the relevant DGM results in CEG's Table 8 are those for expected growth rates in DPS of 2.50% and 5.50%, and the resulting average estimates for the equity risk premium on these firms are 8.8% and 11.1% respectively. The midpoint of these two estimates is 10.0%, which is well above CEG's estimated equity risk premium of 7.0% for the SEQ entities (an MRP of 7.0% and an equity beta of 1). So, even CEG implicitly rejects the results from this DGM approach. Having themselves implicitly rejected the results from this approach, there is little persuasive value in using the same results to critique the equity risk premium estimate adopted by the QCA.

CEG (2011, paras 190-196) argues that the equity risk premium is at least 2.66 times the debt risk premium and, coupled with the debt risk premium of 4.0%, this yields an equity risk premium in excess of that proposed by the QCA of 4.0%, which suggests that the QCA's figure is far too low. However the ratio of 2.66 is drawn from Grundy (2011a, paras 37-40) and, as noted in section 2, Grundy's analysis implicitly defines the debt risk premium as the expected margin over the risk free rate whereas CEG are clearly interpreting it as the promised margin (consistent with estimating it at 4.0%). Since the promised margin on debt exceeds the expected margin (the difference being compensation for expected default losses), and probably by a very significant level at the present time, the conclusions drawn by CEG about the equity risk premium will be wrong. So, in short, this entire analysis by Grundy and CEG is not useful.

CEG (2011, paras 202-205) argues for a gamma value less than that proposed by the QCA. This issue is not relevant to my work for the QCA and I therefore do not comment on it.

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