An analysis of implied market cost of equity for Australian regulated utilities

A report for the APIA, ENA and Grid Australia

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Executive Summary

Key conclusion

This report applies a dividend growth model (DGM) analysis to the stocks of Australian regulated energy businesses during June and July of 2008.

The key finding is that, for plausible ranges of expected future dividend growth, the market discount rate is higher than the discount rate that would be derived using the National Electricity Rules (NER) for transmission.

1. CEG has been asked to estimate the return on equity required by investors in Australian regulated utilities using the dividend growth model (DGM). A DGM starts with a forecast of future dividends expected by investors from a particular stock and works backwards from this to estimate the discount rate that equates these future dividends with the current share price. That is, a DGM estimates the unique discount rate that is consistent with the current share price and a given forecast of expected dividends.

2. DGM analysis has the great strength that it does not rely on the accuracy of a particular theoretical model of investor behaviour. That is, it measures the forward looking market return and the method it uses does not rely on any assumptions about what determines that market return.

3. Nonetheless, it is important to note the limitations of a DGM analysis in accurately determining the 'true' market cost of equity. Firstly, the market cost of equity is not a static number but moves around based on investors' perceptions of market risk and their willingness to be exposed to this risk. It may be that the timing of a DGM study happens to coincide with a period of high/low perceived risk for the market generally or for utilities specifically. That is, a DGM study estimates the cost of equity at a particular point in time – it does not imply that this is always the cost of equity. For these reasons it is appropriate to treat the DGM analysis as a cross-check on other methods for estimating the cost of capital (and *vice versa*).

4. Secondly, future dividend growth expected by investors in price-regulated businesses depends on the expected future profitability of the business which depends on, for example:

    - the path of future operational efficiencies that the business will achieve;

- the extent to which the regulator can be expected to allow the business to benefit from such efficiencies;

- the regulators' stance on other factors (such as the WACC itself). (It might be thought that this creates circularity in the analysis. This is not so because a higher expected allowed WACC will increase both future expected cash-flows and market price – leaving the DGM WACC unchanged. However, there is still a challenge in determining what the expected allowed WACC is. This is discussed in more detail in the body of the report.);

- the extent to which all of the above will give rise to sufficient economic profit that will allow the business to sustainably pay a particular dividend stream.

5. To perform a DGM analysis one must arrive at an estimate of what investors expect about all of the above over the next few years and in perpetuity. Inevitably, there will be considerable uncertainty about what investors 'should' or 'do' expect. For this reason the results of a DGM analysis are reported for a wide range of scenarios for future dividend growth that might variously be described as 'optimistic' and 'pessimistic' about the above factors.

6. The analysis examines the six ASX listed companies that rely predominantly on revenues from regulated gas[1] and electricity transport activities. As a proxy for the investors' expectations of dividends out to 2012 the mean of analysts' forecasts of dividends as reported on Bloomberg is adopted. Bloomberg only reports forecasts from analysts that Bloomberg regards as credible. These are reported in the below table along with the average market price in June and July 2008. This sampling period for equity prices matches, as must be the case in a DGM analysis, the period over which the dividend forecasts have been sampled.[2]

[1] In this context we include gas pipeline assets that have a large part, or all, of their sales under long term contracts but where those contracts are negotiated in the knowledge of actual or potential regulated tariffs.

[2] The forecasts were gathered on 23 August. While each forecast was made on a different date the middle of the range for forecasts was June and July of 2008.

Table 1: Dividend* per share forecasts for potential comparables

	Equity prices**	Dividends 2008	Dividends 2009	Dividends 2010	Dividends 2011	Dividends 2012
Aust Pipeline Trust	2.82	0.290	0.308	0.321	0.338	0.350
DUET	3.03	0.271	0.284	0.300	0.313	0.325
Envestra Limited	0.72	0.096	0.096	0.096	0.095	0.099
SP AusNet	1.14	0.120	0.120	0.120	0.125	0.130
Spark Infra. Group	1.68	0.190	0.191	0.196	0.203	0.213
Hastings Div Utils	2.28	0.280	0.290	0.300	0.310	0.330
Average growth from previous year (4.1%)		**5.1%**	**3.4%**	**3.4%**	**3.8%**	**4.6%**

* Dividends include all distributions. This includes distributions categorised as interest and repayment of debt where that debt is stapled to equity (ie, cannot be traded separately to the underlying equity)
**Average $/share closing price on in June and July 2008.

7. However, the dividends reported above are cash distributions and do not capture the value of tax benefits associated with cash dividends in the form of imputation credits or the value of other tax benefits to shareholders (such as the tax exempt status of repayments of capital associated with debt that is stapled to equity).

8. In order to adjust for this it is necessary to scale up cash distributions by an appropriate factor. The NER for transmission currently assumes that for every $1.00 of corporate income taxed at a rate of 30% there is available $0.70 for cash dividends plus $0.15 in the value of imputation credits generated by the payment of corporate tax ($0.30 multiplied by a gamma of 0.5). We adopt this assumption as a benchmark in order to test the NER cost of equity assumptions.[3] Consequently, cash dividends must be multiplied by a factor of (1+ 0.15/0.7) = 1.21. This factor is used in the DGM analysis.

9. As can be seen from Table 1, dividends are forecast to increase out to 2012 - with the average forecast rate of increase in dividends from 2008 to 2012 being 4.1% pa. However, analysts' forecasts do not extend beyond 2012. Consequently, a range of different (optimistic/pessimistic) assumptions regarding the rate of dividend growth are employed - ranging from dividend growth in line with nominal GDP (assumed to be 5.5% although it is noted that nominal GDP has grown at 7.2%pa since 2000) to negative 2% nominal dividend growth.

[3] In doing so we do not express a position on the value of tax advantages attached to dividends. All we are doing is asking what the cost of equity must be if the NER has correctly identified the value of these tax advantages.

10. The DGM discount rate is the discount rate that equates the observed equity price (first column of figures in Table 1) with the present value of future expected dividends (given by the other column of figures in Table 1 plus an assumed growth rate beyond 2012). This can then be compared with the 12.45% estimate of the cost of equity that derives from application of National Electricity Rules (NER) for transmission on 30 June 2008.[4]

Table 2: NER discount rate versus DGM discount rate

Firms	NER discount rate	Implied cost of equity with assumed nominal dividends growth rate post 2012 of:				
		GDP (5.5%)	Inflation (2.5%)	Zero (0.0%)	Negative 1%	Negative 2%
Aust Pipeline Trust	12.5%	17.0%	15.1%	13.6%	13.0%	12.4%
DUET	12.5%	15.5%	13.5%	11.8%	11.2%	10.6%
Envestra Limited	12.5%	18.7%	16.9%	15.5%	14.9%	14.4%
SP AusNet	12.5%	16.2%	14.2%	12.7%	12.1%	11.5%
Spark Infrast. Grp	12.5%	17.4%	15.5%	14.0%	13.4%	12.8%
Hastings Div Utils	12.5%	18.9%	17.2%	15.7%	15.2%	14.6%
Average	**12.5%**	**17.3%**	**15.4%**	**13.9%**	**13.3%**	**12.7%**

Source: CEG Analysis

11. Table 2 shows that, even if dividends for each firm were expected by the market to fall by 2% pa post 2012 (around 4.5% pa in real terms), the average DGM implied cost of equity would still be more than the NER assumed cost of equity. That is, in order to make the observed price of equity consistent with the NER assumed cost of equity it must be the case that dividends are expected to fall by more than 2% pa (more than 4.5% pa in real terms) post 2012. Of course, an alternative explanation is that the NER cost of equity was, during this sampling period, below the market discount rate.

12. Yet another way of conveying the same information is to ask what the market equity beta would have to be assuming all other NER transmission CAPM parameters held true (ie, the ten year bond rate is the risk free rate and the market risk premium is 6%). This is done in the table below.

[4] On the 30th of June 2008 the ten year CGS yield was 6.45%. If this is added to an equity premium of 6% (based on an equity beta of 1.0 and an MRP of 6%) a discount rate of 12.45% is derived.

Table 3: NER equity beta versus DGM equity beta

Firms	NER equity beta	Implied equity beta with assumed nominal dividends growth rate post 2012 of:				
		GDP (5.5%)	Inflation (2.5%)	Zero (0.0%)	Negative 1%	Negative 2%
Aust Pipeline Trust	1.0	1.76	1.44	1.19	1.09	0.99
DUET	1.0	1.50	1.17	0.90	0.79	0.69
Envestra Limited	1.0	2.04	1.74	1.51	1.41	1.32
SP AusNet	1.0	1.62	1.30	1.04	0.94	0.84
Spark Infrast. Grp	1.0	1.82	1.51	1.26	1.16	1.06
Hastings Div Utils	1.0	2.08	1.79	1.55	1.46	1.37
Average	**1.0**	**1.81**	**1.49**	**1.24**	**1.14**	**1.05**

Source: CEG Analysis

13. Consistent with Table 2, Table 3 shows that unless distributions post 2012 are forecast to fall at more than 2% pa, the average DGM implied equity beta is more than the NER assumed equity beta.

14. Yet another way of conveying the same information is to ask what the market risk premium (MRP) would have to be assuming all other NER transmission CAPM parameters held true (ie, the ten year bond rate is the risk free rate and the equity beta is 1.0). This is done in the table below.

Table 4: NER MRP versus DGM MRP

Firms	NER MRP	Implied MRP with assumed nominal dividends growth rate post 2012 of:				
		GDP (5.5%)	Inflation (2.5%)	Zero (0.0%)	Negative 1%	Negative 2%
Aust Pipeline Trust	6.0%	10.6%	8.7%	7.1%	6.5%	6.0%
DUET	6.0%	9.0%	7.0%	5.4%	4.8%	4.1%
Envestra Limited	6.0%	12.3%	10.5%	9.0%	8.5%	7.9%
SP AusNet	6.0%	9.7%	7.8%	6.2%	5.6%	5.0%
Spark Infrast. Grp	6.0%	10.9%	9.0%	7.5%	7.0%	6.4%
Hastings Div Utils	6.0%	12.5%	10.7%	9.3%	8.7%	8.2%
Average	**6.0%**	**10.8%**	**8.9%**	**7.4%**	**6.8%**	**6.3%**

Source: CEG Analysis

15. Consistent with Table 3, Table 4 shows that unless distributions post 2012 are forecast to fall at more than 2% pa, the average DGM implied MRP is more than the NER assumed equity beta.

16. US regulators commonly use the DGM model to establish the regulated cost of equity. This has resulted in estimates of the equity risk premium for regulated businesses roughly double the equity risk premium that would be derived if one simply 'plugged in' observed equity betas for US firms (as recently estimated by the ESCV)[5] into the Sharpe CAPM formula with a market risk premium of 6%.

17. It would be very unusual for the market to be anticipating a +4.1% pa rise in distributions out to 2012 followed by a more than 2% pa fall in dividends in every year thereafter. On this basis, it can be concluded that the DGM analysis provides:

    - strong support for the view that the NER derived cost of equity in June and July 2008 was lower than investors' cost of equity over the same period;

    - very strong support for the view that a reasonable range for the market cost of equity for regulated energy businesses extends materially above the NER derived cost of equity.

18. These conclusions are relevant to any assessment by the AER of the cost of equity. The cost of equity is an efficient cost incurred by regulated businesses and a failure to have regard to these conclusions may result in regulated businesses being denied a reasonable opportunity to recover their efficient costs.

[5] For example, see figure 10.2 on page 390 of the ESCV's 28 August 2007 Draft Decision for the Gas Access Arrangement Review 2008 to 2012.

1. Introduction

1.1. Terms of reference

19. CEG has been asked by the APIA, ENA and Grid Australia to perform a dividend growth model (DGM) analysis of the return on equity required by investors in Australian and US regulated energy businesses. This analysis requires the estimation of a market discount rate that equates observed market equity prices with forecasts of expected future dividends. It is intended that this analysis will shed light on whether the current methodology for setting the cost equity in the National Electricity Rules (NER) for electricity transmission is consistent with the cost of equity actually observed in equity markets.

1.2. Structure of report

20. The remainder of this report has the following structure.

- Section 2 sets out the conceptual basis for estimating the implied required return from current stock prices and forecasts of earnings;
- Section 3 presents the results from examining a number of Australian comparable firms;
- Section 4 compares this with the use of DGM analysis by regulators in the US
- Section 5 examines some sensitivity analysis; and
- Section 6 provides the conclusions.

2. Description of the Dividend Growth Model

21. The dividend growth model (DGM) is not an asset pricing model but rather is a logical process that works backwards from the following finance relationship:

    The market value of an asset = PV of future payments from the asset.

2.1. Formulaic description of DGM

22. In the case of equity, the future payments from the asset are in the form of dividends (D_t) paid at future points in time "t". The present value of a dividend stream is given by the following formula – where "k" is the discount rate applied to equity (which is also assumed to be constant).

$$Value\ of\ a\ series\ of\ payments\ D_t = \sum_{T=1}^{T=t} \frac{(D_t)}{(1+k)^t} \qquad (1)$$

If it is assumed that, beyond time T, dividends will grow perpetually[6] at a constant rate "g" then today's value of payments beyond T is given by :

$$Value\ of\ D\ growing\ at\ g\ beyond\ time\ T\ = \frac{D_T \times (1+g)}{(k-g)} \times \frac{1}{(1+k)^T} \qquad (2)$$

23. If we have a finite set of forecasts up to time T and a perpetually growing forecast beyond time T can estimate the value of the equity as:

- the present value of dividends D_1 to D_T from equation (1); plus
- the present value of dividends beyond D_T using equation (2).

24. This gives the following formula for the value of the equity.

[6] Note that an investor does not have to expect to hold an equity perpetually to benefit from perpetual dividend growth. They simply have to be able to sell the equity to another investor at a price that reflects the future dividends that investor will receive. Thus, the valuation of perpetual dividends is consistent with the valuation of a finite holding period followed by a sale where the sale price is determined by future dividends at that time.

$$Present\ value\ of\ all\ dividends = \left[\sum_{T=1}^{T=t} \frac{(D_t)}{(1+k)^t}\right] + \left[\frac{D_T \times (1+g)}{(k-g)} \times \frac{1}{(1+k)^T}\right] \quad (3)$$

25. The first term in square brackets on the right hand side of equation (3) is the present value of a series of dividend forecasts covering dividends from now to period t=T. The second term in square brackets is the present value of all dividends beyond time T.

26. If future dividends are forecast accurately then application of formula (3) should result in a value equal to the market price of the equity. Consequently, markets' expectations of dividends are accurately forecast then it is possible to 'back out' of equation (3) the markets' implied cost of equity (k). This simply requires solving equation (3) for a value of k that gives a present value of future dividends equal to the market price.

2.2. Limitations to DGM analysis

27. It is important to understand the limitations of a DGM analysis in accurately determining the 'true' market cost of equity. Firstly, the market cost of equity is not a static number but moves around based on investors' perceptions of market risk and their willingness to be exposed to this risk. It may be that the timing of a DGM study of regulated utilities happens to coincide with a period of high/low perceived risk for the market generally or for utilities specifically. That is, a DGM study estimates the cost of equity at a particular point in time – it does not imply that this is always the cost of equity.

28. Secondly, future dividend growth expected by investors in regulated utilities depend on the expected future profitability of the business which depends on, for example:

- the path of future operational efficiencies the business will achieve;
- the path of future exogenous cost changes including those associated with technological change;
- the extent to which the regulator will allow the business to benefit from cost reductions (and *vice versa*);
- the regulators' stance on other factors (such as the cost of capital itself);

- the extent to which all of the above will give rise to sufficient economic profit that will allow the business to sustainably pay a particular dividend stream.

29. To perform a DGM analysis one must arrive at an estimate of investors' expectations on all of the above. As described above, an important determinant of future profitability will be the stance taken by economic regulators on a range of issues.

30. One such issue is the cost of capital - with the level of expected future dividends being higher the higher the expectation of the regulatory cost of capital. This does not pose any 'circularity' problem for the DGM analysis. This is because a higher/lower expected cost of capital allowed by the regulator will translate into both higher/lower expected future dividends and a higher/lower share price today – with the effects cancelling out in the DGM analysis. Consequently, even if investors expect the regulatory cost of capital to be set below the 'true' cost of capital the DGM analysis can still be used to estimate the 'true' cost of capital.

31. Notwithstanding the absence of any circularity issues, uncertainty in the future value of the regulatory cost of capital does create a problem for the application of the DGM in the current context. This is because it makes it difficult to derive an estimate of the markets' expectations about future dividends. If the market expects the cost of capital to rise as a result of the current AER review then the forecast of future dividends used in the DGM analysis will need to be higher than if the opposite is true.

32. This uncertainty about the future inevitably means that there is uncertainty about future dividend growth. Consequently, one cannot credibly claim to estimate a single 'correct' growth path for investors' expectations. For this reason the results of the DGM analysis are reported for a wide range of scenarios for future dividend growth that might variously be described as 'optimistic' and 'pessimistic' about the above factors.

3. Application to Australian Data

33. This section describes the application of the dividend growth model to estimate the implied cost of capital for Australian equity that derives its primary revenue source from regulated energy infrastructure activities.

3.1. Stock selection and dividend forecasts to 2012

34. The businesses identified are the six that rely primarily on revenue from regulated gas or electricity infrastructure services.[7] For these companies the mean of analysts' expected dividends per share for the second half of calendar year 2008 out to 2012 is sourced from Bloomberg. Bloomberg is effectively used as a filter to ensure that only forecasts deemed credible for listing by Bloomberg are used in our analysis. The firms and the mean dividend per share forecasts are listed in Table 5 below.

Table 5: Cash dividend per share forecasts for potential comparables

	2008*	2009	2010	2011	2012
Aust Pipeline Trust	0.290	0.308	0.321	0.338	0.350
DUET	0.271	0.284	0.300	0.313	0.325
Envestra Limited	0.096	0.096	0.096	0.095	0.099
SP AusNet	0.120	0.120	0.120	0.125	0.130
Spark Infra. Group	0.190	0.191	0.196	0.203	0.213
Hastings Div Utils	0.280	0.290	0.300	0.310	0.330
Average growth from previous year (4.1%)	**5.1%**	**3.4%**	**3.4%**	**3.8%**	**4.6%**

*2008 figures reported are for a full year. Only half year figures are used in our analysis.

35. However, the dividends reported on Bloomberg are cash dividends and do not capture the value of tax benefits associated with cash dividends in the form of imputation credits or the value of other tax benefits to shareholders (such as the tax exempt status of repayments of capital associated with debt that is stapled to equity).

36. Consequently, the true value of these dividends to shareholders will be greater than the values reported in Table 5 above. In order to adjust for this it is necessary to scale up cash dividends by an appropriate factor. Based on the assumption that

[7] In this context we include gas pipeline assets that have a large part, or all, of their sales under long term contracts but where those contracts are negotiated in the knowledge of actual or potential regulated tariffs.

for every $0.70 of cash dividends there is $0.15 of tax benefits to shareholders then cash dividends must be multiplied by a factor of (1+ 0.15/0.7) = 1.21. This factor is used in the DGM analysis.

37. This is consistent with the assumption that $1.00 of corporate profits translates, at a corporate tax rate of 30%, into a fully franked dividend of $0.70 and $0.30 of imputation credits and that imputation credits are valued at 50% of their face value (ie, 'gamma' equals 0.5 as per the NER's current prescription for transmission). We do not adopt the NER valuation of tax benefits attached to cash dividends because we necessarily believe it is accurate. Rather, we adopt it in order to test whether the other NER parameters (risk free rate, equity beta and MRP) could simultaneously be true. In this regard, we note that the higher the assumed value of tax advantages attached to dividends the higher the DGM derived discount rate (other things equal).

3.2. Discounted value of dividends

38. Presented below are the present value of dividends from the second half of calendar 2008 onwards using equation (3) from section 2.1 above. The discount rate used in equation (3) is 12.45%. This is consistent with the discount rate currently prescribed in the NER for transmission and is calculated as follows:

- on the 30th of June 2008 the ten year CGS yield was 6.45%;
- add to this an equity premium of 6% (based on an NER equity beta of 1.0 and an NER MRP of 6%). This gives a cost of equity equal to 12.45%.

39. It is appropriate to adopt a range for the forecast of dividend growth beyond 2012. The range examined is from 5.5% pa to negative 2% pa (or around 3% pa real to negative 4.5%pa real assuming a 2.5% inflation rate).

40. The top end of this range is in line with expected nominal GDP growth (ie, real growth of around 3% pa and inflation of around 2.5% - although historical GDP growth since 2000 has been over 7%. This dividend growth forecast would be associated with an optimistic view concerning future regulatory stances and with the view that regulated businesses will benefit from greater scale (which would be associated with GDP growth). It is reasonable to believe that profits per share will grow with increased scale of operations if one believes that the value of potential efficiencies is proportional (or more than proportional) to the size of the business. In this regard the US Federal Energy Regulatory Commission (FERC) has recently determined that, in its own DGM analysis, gas pipeline businesses held in a

master limited partnership will be assumed to have long term growth equal to 50% of GDP growth.[8]

41. The pessimistic end of these forecasts (negative 4.5% real dividend growth across the entire sector) would, to the best of our knowledge, be unprecedented in a sector that does not face imminent technological obsolescence. To form such an expectation one would have to have a pessimistic view about the potential for future efficiencies and/or the likelihood that regulators will allow businesses to capture these. It is reasonable to assume that a reasonable range for dividend growth lies above negative 2%.

Table 6: Market value of equity versus equity value that would exist if NER assumptions were held by investors

Firms	Average equity prices ($/share) June and July 2008	Implied value of equity ($/share) using NER assumed cost of equity of 12.45% and assumed nominal dividends growth rate post 2012 of:				
		GDP (5.5%)	Inflation (2.5%)	Zero (0.0%)	Negative 1%	Negative 2%
Aust Pipeline Trust	2.82	4.69	3.60	3.09	2.94	2.81
DUET	3.03	4.35	3.34	2.87	2.73	2.61
Envestra Limited	0.72	1.35	1.04	0.90	0.85	0.82
SP AusNet	1.14	1.75	1.35	1.16	1.11	1.06
Spark Infrast. Grp	1.68	2.86	2.20	1.89	1.80	1.72
Hastings Div Utils	2.28	4.41	3.39	2.91	2.77	2.65

Source: CEG Analysis

42. The way to interpret this table is to compare the first column of figures (observed equity prices) with each of the columns to the right (implied value of equity using the NER discount rate and a given assumption about dividend growth). It can be seen that in all but two cases the implied value of equity using the NER discount rate exceeds the actually observed value of equity. This means that, if the market actually expected the relevant level of dividend growth, then the NER cost of equity must be set too low (resulting in an overestimate of the implied value of equity).

43. The important conclusion from this table is that, unless the market is expecting negative nominal dividend growth beyond 2012, the implied value of equity using the NER discount rate is greater than the observed market value of equity (with the single exception of DUET).

[8] 17 April statement of Chairman Joseph T. Keliher available at http://www.ferc.gov/news/statements-speeches/kelliher/2008/04-17-08-kelliher-G-1.asp

44. Table 6 above compares actual market prices with the implied market prices that would prevail if the NER discount rate was accurate. Where the implied value exceeds the observed value it follows that the NER discount rate is set below the true market discount rate (if one accepts the relevant dividend forecast is accurate). That is, by setting the NER discount rate lower than the market discount rate the implied value of equity is overestimated relative to the observed market value of equity.

45. The same information can be conveyed by comparing, as is done in Table 7, the NER discount rate with the DGM discount rate (being the discount rate required to equate the present value of forecast dividends with market prices). Wherever the implied value of equity in Table 6 exceeds the observed value of equity then the market discount rate estimated using the DGM must also be higher than the NER discount rate by a similar proportion.

Table 7: NER discount rate versus DGM discount rate

Firms	NER discount rate	Implied cost of equity with assumed nominal dividends growth rate post 2012 of:				
		GDP (5.5%)	Inflation (2.5%)	Zero (0.0%)	Negative 1%	Negative 2%
Aust Pipeline Trust	12.5%	17.0%	15.1%	13.6%	13.0%	12.4%
DUET	12.5%	15.5%	13.5%	11.8%	11.2%	10.6%
Envestra Limited	12.5%	18.7%	16.9%	15.5%	14.9%	14.4%
SP AusNet	12.5%	16.2%	14.2%	12.7%	12.1%	11.5%
Spark Infrast. Grp	12.5%	17.4%	15.5%	14.0%	13.4%	12.8%
Hastings Div Utils	12.5%	18.9%	17.2%	15.7%	15.2%	14.6%
Average	**12.5%**	**17.3%**	**15.4%**	**13.9%**	**13.3%**	**12.7%**

Source: CEG Analysis

46. Consistent with Table 6, Table 7 shows that, even if dividends for each firm were expected by the market to fall by 2% pa post 2012 (around 3.5% pa in real terms), the average DGM implied cost of equity would still be more than the NER assumed cost of equity.

47. Yet another way of conveying the same information is to ask what the market equity beta would have to be assuming all other NER CAPM parameters held true (ie, the ten year bond rate is the risk free rate and the market risk premium is 6%). This is done in the table below.

Table 8: NER equity beta versus DGM equity beta

Firms	NER discount rate	Implied cost of equity with assumed nominal dividends growth rate post 2012 of:				
		GDP (5.5%)	Inflation (2.5%)	Zero (0.0%)	Negative 1%	Negative 2%
Aust Pipeline Trust	1.0	1.76	1.44	1.19	1.09	0.99
DUET	1.0	1.50	1.17	0.90	0.79	0.69
Envestra Limited	1.0	2.04	1.74	1.51	1.41	1.32
SP AusNet	1.0	1.62	1.30	1.04	0.94	0.84
Spark Infrast. Grp	1.0	1.82	1.51	1.26	1.16	1.06
Hastings Div Utils	1.0	2.08	1.79	1.55	1.46	1.37
Average	**1.0**	**1.81**	**1.49**	**1.24**	**1.14**	**1.05**

Source: CEG Analysis

48. Consistent with the previous tables, Table 8 shows that unless dividends post 2012 are forecast to fall at more than 2% pa, the average DGM implied equity beta is more than the NER assumed equity beta.

49. Yet another way of conveying the same information is to ask what the market risk premium (MRP) would have to be assuming all other NER transmission CAPM parameters held true (ie, the ten year bond rate is the risk free rate and the equity beta is 1.0). This is done in the table below.

Table 9: NER MRP versus DGM MRP

Firms	NER MRP	Implied MRP with assumed nominal dividends growth rate post 2012 of:				
		GDP (5.5%)	Inflation (2.5%)	Zero (0.0%)	Negative 1%	Negative 2%
Aust Pipeline Trust	6.0%	10.6%	8.7%	7.1%	6.5%	6.0%
DUET	6.0%	9.0%	7.0%	5.4%	4.8%	4.1%
Envestra Limited	6.0%	12.3%	10.5%	9.0%	8.5%	7.9%
SP AusNet	6.0%	9.7%	7.8%	6.2%	5.6%	5.0%
Spark Infrast. Grp	6.0%	10.9%	9.0%	7.5%	7.0%	6.4%
Hastings Div Utils	6.0%	12.5%	10.7%	9.3%	8.7%	8.2%
Average	**6.0%**	**10.8%**	**8.9%**	**7.4%**	**6.8%**	**6.3%**

Source: CEG Analysis

50. We also note that the implied value of tax advantages attached to dividends would have to be negative in order to make the DGM discount rate equate to the NER discount rate for all rates of dividend growth above 1.5% pa nominal (around -1.5% real). A negative value of tax advantages is not possible and so we do not separately report this.

51. Consistent with the pervious tables, Table 9 shows that the average implied DGM MRP is above the NER MRP for all dividend growth forecasts greater than 2%.

52. It would be very unusual for the market to be anticipating a 4.1% pa increase in dividends out to 2012 followed by a more than 2% pa fall in dividends in every year thereafter. On this basis, it can be concluded that the DGM analysis provides:

- strong support for the view that the NER derived cost of equity on 30 June 2008 was lower than investors' cost of equity on the same date;
- very strong support for the view that a reasonable range for the market cost of equity for regulated energy businesses extends materially above the NER derived cost of equity.

4. Sensitivity analysis

53. In section 4 the conclusion was reached that the discount rate applied by the market to the dividends of regulated utilities was higher than the NER estimated cost of equity on 30 June 2008. In this section we examine the extent to which this might be explained by:

- the possibility that dividends for these businesses are, in part, derived from activities that are higher risk than regulated utilities;
- the actual debt level of these businesses is higher than the level of debt assumed by regulators (therefore raising their risk); and
- the level of imputation credits distributed by these businesses is lower than the assumed level of imputation credits distributed.

4.1. Risk associated with non-regulated assets

54. It may be that some businesses in the sample engage in activities with greater risk than is associated with the ownership of regulated utilities. If this is true then the market discount rate for these businesses would be higher than the NER estimate of the cost of equity – even if the NER estimate was correct for the underlying regulated activities.

55. However, the businesses in the sample are either solely engaged in regulated activities or have only small unregulated activities. We include the sale of gas under long term contracts as 'regulated' on the basis that the contract itself forms a source of regulation and that these are often negotiated with the alternative of a regulated tariff already in existence or potentially in existence. Moreover, it does not appear to be the case that those businesses with sole regulated activities have lower DGM discount rates than others. For example, Envestra and Hastings Diversified Utilities have the highest DGM discount rates but are both 'pure play' regulated assets.

56. On this basis it does not appear to be the case that the findings in section 2 are a result of the sample being biased by the inclusion of non-regulated assets.

57. For completeness, it should be noted that it is very difficult to perform any sort of *a priori* assessment of the relative risk of non-regulated assets that might be owned by these businesses. Measuring relative risk is not simple and it would be a

mistake to simply assume that any non-regulated assets are automatically 'more risky'.

4.2. Gearing

58. It may be that some businesses in the sample have higher gearing, and therefore higher risk, than is assumed in the development of the NER cost of equity. If this is true then the market discount rate for these businesses would be higher than the NER estimate of the cost of equity – even if the NER estimate was correct for its assumed level of gearing.

59. The below table presents gearing levels for each of the businesses in the sample.

Table 10: Estimated gearing

	Gearing (debt to total value of debt and equity)
Aust Pipeline Trust	50%
DUET	76%
Evestra Limited	70%
SP AusNet	56%
Spark Infrastructure Group	61%
Hastings Div Utils	48%
Average	**60%**

Source: ACG Empirical evidence on proxy beta values for regulated gas distribution activities June 2007.

60. As can be seen, the average actual gearing is around 60% which is the same as the assumed level of gearing in the NER.

61. In any event, even if actual gearing was substantially different to the NER assumed gearing it is not clear that this would substantially affect the discount rate applied by the market. While gearing is likely to affect the measured equity beta the weight of empirical evidence is that this will not have a proportionate effect on the risk premium (measured relative to the Government bond rate) demanded by investors. That is, the weight of empirical evidence is that the required return on zero beta equity will be well above the Government bond rate.[9]

[9] The original studies with this finding (which has been repeated on many occasions) are: Fama, Eugene F. and James D. MacBeth, 1973, "Risk, return, and equilibrium: Empirical tests," *Journal of Political Economy*. 81, pp. 607-636. And Black F., Jensen, M.C. and Scholes, M., 1972, "The capital asset pricing model: Some empirical tests" in Jensen, M.C., ed., *Studies in the Theory of Capital Markets*, Praeger.

4.3. The taxable nature of distributions

62. The fact that a lower market value of equity is observed than is estimated using the NER cost of equity of 12.45% may be due to the fact that actual distributions receive less favourable tax treatment than is assumed by the NER. That is, it might be that the headline required return in the NER (12.5% in the relevant period) is correct but the NER assumption that some part of this is delivered to shareholders in the form of imputation credits is wrong. Specifically, it may be that the value of franking credits is less than the 50% assumed in the NER or that businesses have a lower ability to pay out franking credits.

63. Of course, the important issue is whether the NER assumptions in their totality give rise to a return that is consistent with the required market return. If the NER correctly sets the headline cost of equity and then incorrectly reduces this by more than appropriate to reflect the value of imputation credits then the net result is still that investors receive less than the headline cost of equity.

64. On this issue, note that the equity in many of the businesses in the sample is "stapled" to debt instruments that are subordinated to other debt. However, it is appropriate to treat this 'debt' as equity in a DGM analysis such as this.

65. This reflects the fact that stapled debt instruments have a lower claim for repayment than does other debt issued by the entity and they cannot be traded separately to the relevant equity. These qualities make stapled debt, as a matter of finance theory, equivalent to equity. That is, stapled debt is a residual claimant after other debt providers have been paid and cannot be purchased separately to equity. For this reason 'dividends' in Table 5 represent total distributions some of which are interest on stapled debt, return of principle on stapled debt, return of equity and some of which are 'dividends' proper.

66. In terms of the tax consequences, the use of stapled debt reduces the amount of corporations tax paid (as interest payments are deductible at the corporate level) but simultaneously increases the amount of tax payable by the investor (as interest payments have no imputation credits attached). Similarly, repayment of capital is not immediately taxable to the investor but may have an impact on the investor's future capital gains tax obligations.

67. As described earlier the DGM analysis employs the assumption that that the tax consequences associated with these distributions are identical to the assumed tax consequences in the NER (ie, each 70 cents of dividend has 15 cents worth of imputation credits attached). This is the appropriate assumption given that we are

attempting to compare market discount rates with NER assumed discount rates and, if the NER assumptions were accurate, a rational business would not structure itself to deliver less favourably taxed distributions.

5. US application of the DGM model

68. In the US, application of the DGM model is commonly used to establish the cost of equity for a number of regulated gas and electricity businesses. Consistent with the above findings, the results of these analyses tend to suggest that the cost of equity for regulated utilities is more than would be implied by application of the NER prescriptions.

69. NERA Economic Consulting[10] has recently provided a summary of these decisions and estimated the implied equity beta in these decisions using the NER CAPM formula, the NER assumed MRP of 6% and the NER presumption that the ten year government bond rate is the relevant risk free rate. The formula used is thus:

$$\beta = \frac{\text{Regulatory equity return} - \text{prevailing 10 year bond rate}}{6\%}$$

70. NERA found that the implied equity beta from these decisions was above 1.0. That is, NERA found that US regulators use of the DGM analysis led them to ascribe higher implied CAPM risk than is currently associated with the equity beta used in the NER for transmission and the previously adopted values for distribution referred to the NER (assuming the same MRP in Australia and the US).

71. The results of NERA's analysis are repeated in Tables 11 and 12. It is important to note that the implied equity betas in Tables 11 and 12 are, on average, around double the market equity betas for regulated utilities estimated for US gas transmission/distribution businesses by Allen Consulting Group during 2002 to 2007[11]. That is, the higher US regulatory equity premiums are not explained by higher observed equity betas in the US regulated businesses. This tends to suggest that a simplistic 'plugging in' of observed equity betas into the Sharpe CAPM formula will not accurately estimate the cost of equity (assuming that US regulators have accurately applied the DGM).

[10] NERA, Equity Beta for Gas Distribution, 29 October 2007. A report for APIA, ENA and ETNOF.

[11] ACG, *Empirical evidence on proxy beta values for regulated gas distribution activities* June 2007. *See table 5.12 on page 69.*

Table 11: Implied US Equity Beta for Electricity Utilities from Regulatory Decisions

Period		Authorised equity returns (average)	Number of decisions	Average 10 year Treasury Security yield	Equity as percentage of capital structure	Implied equity beta (60% debt ratio)
1996	Full year	11.39	22	6.44	44.34	0.91
1997	Full year	11.40	11	6.35	48.79	1.03
1998	Full year	11.66	10	5.26	46.14	1.23
1999	Full year	10.77	20	5.72	45.08	0.95
2000	Full year	11.43	12	5.98	48.85	1.11
2001	Full year	11.09	18	5.02	47.20	1.19
2002	Full year	11.16	22	4.61	46.27	1.26
2003	Full year	10.97	22	4.01	49.41	1.43
2004	Full year	10.75	19	4.27	46.84	1.26
2005	1st quarter	10.51	7	4.30	44.55	1.15
	2nd quarter	10.05	7	4.16	48.3	1.19
	3rd quarter	10.84	4	4.22	43.58	1.20
	4th quarter	10.75	11	4.49	48.55	1.27
	Full year	10.54	29	4.29	46.73	1.22
2006	1st quarter	10.38	3	4.58	50.25	1.21
	2nd quarter	10.69	5	5.07	45.40	1.06
	3rd quarter	10.06	7	4.89	46.86	1.01
	4th quarter	10.39	10	4.63	50.29	1.21
	Full year	10.36	25	4.80	48.67	1.13
2007	1st quarter	10.27	8	4.68	47.80	1.11
	2nd quarter	10.27	10	4.85	46.03	1.04
	Average	**10.9**	**228**			**1.15**

Source: NERA

Table 12: Implied US Equity Beta for Gas Utilities from Regulatory Decisions

Period		Authorised equity returns (average)	Number of decisions	Average 10 year Treasury Security yield	Equity as percentage of capital structure	Implied equity beta (60% debt ratio)
1996	Full year	11.19	20	6.44	47.69	0.94
1997	Full year	11.29	13	6.35	47.78	0.98
1998	Full year	11.51	10	5.26	49.50	1.29
1999	Full year	10.66	9	5.72	49.06	1.01
2000	Full year	11.39	12	5.98	48.59	1.10
2001	Full year	10.95	7	5.02	43.93	1.09
2002	Full year	11.03	21	4.61	48.29	1.29
2003	Full year	10.99	25	4.01	49.93	1.45
2004	Full year	10.59	20	4.27	45.90	1.21
2005	1st quarter	10.65	2	4.30	43.00	1.14
	2nd quarter	10.54	5	4.16	47.69	1.27
	3rd quarter	10.47	5	4.22	49.54	1.29
	4th quarter	10.40	14	4.49	49.03	1.21
	Full year	10.46	26	4.29	48.66	1.25
2006	1st quarter	10.63	6	4.58	51.18	1.29
	2nd quarter	10.50	2	5.07	44.38	1.00
	3rd quarter	10.45	3	4.89	47.19	1.09
	4th quarter	10.14	5	4.63	44.28	1.02
	Full year	10.43	16	4.8	47.43	1.11
2007	1st quarter	10.44	10	4.68	48.33	1.16
	2nd quarter	10.15	5	4.85	51.01	1.13
	Average	**10.86**	**194**			**1.17**

Source: NERA

72. As described earlier. The average implied equity beta (assuming 60% gearing, MRP of 6% and ten year bond rate as the risk free rate) in US regulatory decisions is 1.15 for electricity utilities and 1.17 for gas utilities.

6. Conclusion

73. The implied market cost of equity for a sample of six regulated utilities (or owners of regulated utilities) is calculated using the DGM model. For the period 2008 to 2012 market estimates of dividends derived from Bloomberg are used. Beyond 2012 a variety of forecasts of dividend growth are employed.

74. A comparison of the implied market cost of equity and the cost of equity derived from the current NER for transmission provides strong support for the view that the NER derived cost of equity in June and July 2008 was lower than investors' cost of equity over the same period.

75. US regulators commonly use the DGM model to establish the regulated cost of equity. If regulators in the US had set the cost of equity based on market equity betas estimated by ACG over 2002 to 2007, then the risk premium would have been about 50% lower than the actual risk premium set by regulators in the US.