Estimation of the regulated profit margin for electricity retailers in New South Wales

Methodology and assumptions

14 August 2009

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1. Introduction

Strategic Finance Group: SFG Consulting has been engaged to advise the Independent Pricing and Regulatory Tribunal ("IPART" or "the Tribunal") on the retail margin to be factored into regulated electricity tariffs. In this report we outline our methodology for performing this estimation procedure and preliminary assumptions which underpin our analysis. Further assumptions will be derived from information provided by electricity retailers, Frontier Economics and IPART as part of the review process. The Minister has asked IPART to determine regulated retail tariffs for the three standard retailers for the period 1 July 2010 to 30 June 2013. The terms of reference defines the objectives for the review, identifies the cost allowances to be included and specifies a range of matters that must be considered.

While the external environment has changed, in particular with respect to the carbon pollution reduction scheme (CPRS) and potential privatisation in New South Wales, in general the review will build on the principles and methodologies developed in the 2007 – 2010 electricity retail price review. We understand that given the short timeframe, importance of regulatory certainty and the level of industry understanding of IPART's approach and methodologies used in the 2007 determination, IPART will, as far as it reasonably can, use the same methodologies and approaches as it used in the 2007 determination.

With respect to the estimation of the retail margin, carbon cost becomes part of the assumed energy cost which is factored into our analysis, but the margin estimation technique is unchanged. To the extent that energy costs are estimated within a range, and that range becomes wider due to uncertainty over carbon cost, the range for the estimated margin will also increase. But the Tribunal's selection of an appropriate margin from within this range is contingent upon (a) the consequences for retailers and consumers of mis-estimating the carbon cost, and (b) any provisions in the regulatory framework for reviewing retail prices once we can observe the market price for energy inclusive of carbon cost. We also note the high volatility of energy prices, even before uncertainty over carbon cost is considered.

Our objective is to estimate the retail margin which provides an appropriate return for the level of systematic risk faced by an electricity retailer, also referred to as economic or market risk. Retail price setting occurs in an environment of uncertainty of material non-systematic risks, including uncertainty over energy costs associated with weather and carbon pricing. However, it is important to ensure that these risks are accounted for either in allowable costs, in the regulatory framework or in the allowable margin, and therefore not double-counted.

Our report proceeds as follows. In Section 2 we outline three methods used to estimate the retail margin: the expected returns approach, whereby the retail margin is set such that the distribution of returns in above- and below-average economic conditions is consistent with the estimated cost of capital; a benchmarking analysis to be conducted with reference to listed energy utilities and retail firms; and a bottom-up approach, whereby the retail margin is a function of an estimated asset base, including the retailer's intangible assets, and its estimated cost of capital. Our goal is to use these three different approaches to triangulate around an economically reasonable retail margin. To the extent that the results of the three approaches corroborate one another, decision-makers and industry can have more confidence in the outcomes. With respect to the benchmarking analysis, we acknowledge that historical margins do not necessarily reflect margins which are appropriate for those we expect to observe in the future. In Section 3 we discuss our data sources and preliminary assumptions which illustrate our estimation techniques. Readers should not draw conclusions regarding retail margin estimates from these illustrations. They merely serve to add clarity to our estimation techniques and the data being compiled in the estimation process. Final estimates will require further data to be provided by the electricity retailers, Frontier Economics and the Tribunal.

2. Methodology

The retail margin represents the return that an electricity retailer requires in order to attract the capital needed to provide a retailing service. The term margin is used as an estimate of profit divided by sales. In our report we generally refer to the ratio of earnings before interest and tax (EBIT) to sales as the retail margin. But our final report will present margin estimates using net profit after tax (NPAT), pre-tax profit (PTP), earnings before interest and tax, depreciation and amortisation (EBITDA), and gross profit (revenue minus energy and network costs). Three approaches are used to estimate the retail margin for an electricity retailer: the expected returns approach, the benchmarking approach and the bottom-up approach.

- The expected returns approach provides estimates of expected cash flows that an electricity retailer will earn, and determines a retail margin that ensures these expected cash flows compensate investors for the systematic risk of those cash flows. Under this approach, the value of the business and the required cash flows are estimated simultaneously in a way that ensures consistency with the estimate of systematic risk.

- A benchmarking analysis is performed with reference to the reported margins of listed energy utilities, using segment data where available, and the broader class of retail firms. We also ensure that the margins derived from the benchmarking approach are consistent with cost of capital assumptions and market valuations for electricity retailers, generators and network businesses. Finally, we will analyse this information in the context of prior regulatory decisions, bearing in mind that those decisions were made in different economic and regulatory circumstances.

- The bottom-up approach relies upon an assumed investment base and cost estimates, and provides estimates of earnings and revenue which allow the retailer to earn an expected return equal to its estimated cost of capital. This is analogous to the price-setting approach used in the regulation of network businesses, but with an assumption about the value of intangible assets for the retailer. Under this approach the value of the business is determined, and then required cash flows are set to provide a fair return (as estimated using the CAPM-WACC approach).

These three approaches to estimating the retail margin were relied upon in our work performed in relation to the 2007 determination. Our final report in relation to that determination is entitled *Mass market new entrant retail costs and retail margin* and the retail margin methodology is discussed in Section 5 and Appendix A of that report. With respect to the benchmarking and bottom-up approaches, our 2007 report analysed submissions made by electricity retailers rather than provide direct estimates of retail margins using these approaches. In the current project we will be making recommendations directly using these approaches.

In theory, these three approaches to estimating the retail margin will generate the same result. The objective is to estimate the profitability, relative to sales, of an electricity retailer operating in a competitive environment. Under the assumptions of the Capital Asset Pricing Model (CAPM), and if financial statements perfectly measured the performance of firms each year and the value of the capital base, the margins observed for listed electricity retailers would generate a return on assets equal to their cost of capital. However, given that equity returns are explained by variables apart from those in the CAPM, and that accounting information is imperfect, there will be a divergence of estimates from these three approaches. Nevertheless, adopting these three estimation techniques minimises the risk that the estimated margin is inconsistent with observed market pricing.

One obvious factor affecting energy markets which has changed since the prior determination is the proposed CPRS. It is generally agreed by market participants that energy costs will rise as part of government policy to limit carbon emissions, but we cannot observe a market price for energy inclusive of carbon cost. In theory, part of the risk associated with carbon price is systematic in nature. All else being equal, carbon price will be higher when there is higher demand for energy, which will occur in periods of above-normal economic growth. However, this systematic risk element is negligible compared to the non-systematic risk associated with the CPRS. The uncertainty about the allowable level of carbon emissions is a function of (a) the uncertainty over the global reduction in emissions needed to mitigate global warming; (b) the uncertainty over the policy response of other countries; and (c) the uncertainty over the Australian government's response to these outcomes. Hence, any systematic risk associated with carbon price is an order of magnitude less than these non-systematic risks so does not form part of our retail margin analysis. This does not imply that the risks associated with the CPRS will be ignored in the setting of regulated tariffs, only that they are accounted for in other aspects of the regulatory framework.

Another change affecting the business environment for electricity retailers is potential privatisation of segments of the New South Wales energy industry. This does not impact upon our analysis because we are already attempting to estimate the retail price which would prevail in a competitive market. This includes the estimated systematic risk of the standard retailer, which is independent of whether the business is owned by the government or the private sector.

2.1 Expected returns approach

Introduction

The basic principal of the expected returns approach is that the retail margin should be set at a level so that there is a match between (a) the systematic risk to the net cash flows to the electricity retailers, and (b) the systematic risk that is assumed when estimating the cost of capital for those same electricity retailers. Prior to the retail margin being determined, the value of an electricity retailer is unknown, as expected cash flows are determined by the margin that is set by the regulator. All else being equal, a higher allowed margin increases the value of the business and a lower allowed margin decreases value. That is, this approach is based on the notion that the value of an electricity retail business cannot be estimated until the allowed retail margin is known.

Of course, the allowed margin also impacts on the variability of returns. All else being equal, a higher allowed margin exposes the business to less risk, because when computing returns the same cash flow volatility is expressed relative to a higher business value. Because the margin is one component of the net cash flow a higher margin will increase cash flow volatility proportionately less than the increase in the value of the business, and consequently an increase in margin will (other things equal) tend to reduce systematic risk. This means that the retail margin has two effects on business value – through an increase to net cash flows, and through a decrease in systematic risk.

In our previous analysis for IPART, we developed a technique for estimating the retail margin which ensures consistency between the systematic risks faced by an electricity retailer, and the volatility of returns resulting from that margin associated with systematic risks. A distinction is made here between systematic risks, also referred to as economic or market risks, and company-specific risks. The estimated margin only provides compensation for systematic risks, consistent with regulated cost of capital estimates only reflecting compensation for systematic risks, according to the CAPM.

The standard regulatory approach to estimating a regulated price starts with an estimate of the regulated asset base, often estimated as Depreciated Optimised Replacement Cost (DORC). The regulator then estimates a discount rate (or required return) in order to derive a stream of cash flows that have a present value equal to that asset base. Value and discount rates are inputs into the process and the regulated price and expected cash flows (and by extension the regulated margin) are outputs of the process. In the simplest case where expected cash flows are a constant perpetuity, the regulator relies upon the equation below:

$$\begin{array}{ll} \text{Value} \times \text{Discount rate} & = \text{Expected cash flows} \\ \text{Inputs} & \rightarrow \text{Output} \end{array}$$

This equation runs in a different direction for firms and investors considering a potential acquisition. They make an estimate of value after forecasting the expected cash flows and discounting those at the estimated cost of capital (required return). Again for the simplest case where the expected cash flows are a level perpetuity, we have the same equation re-arranged so that expected cash flows and discount rate are an input into the process and value is an outcome:

$$\begin{array}{ll} \dfrac{\text{Expected cash flows}}{\text{Discount rate}} & = \text{Value} \\ \text{Inputs} & \rightarrow \text{Output} \end{array}$$

A substantial proportion of the assets of an electricity retailer are comprised of its customer base, and the value of this customer base is difficult to quantify. This is the reason the standard regulatory approach applied to electricity distribution assets, which are largely tangible and for which a DORC value can be estimated, is less appropriate for electricity retailers. The expected returns approach treats the estimate of systematic risk as an input into the process and simultaneously estimates margin and value for a representative firm. Similar to the equations presented above, our approach can be conceptualised as follows for a simple formulation where expected cash flows are a level perpetuity:

$$\begin{array}{ll} \text{Discount rate} & = \dfrac{\text{Expected cash flows}}{\text{Value}} \\ \text{Input} & \rightarrow \text{Outputs} \end{array}$$

Underpinning the discount rate assumption is an estimate of systematic risk – how returns on investment are expected to vary in response to changes in economic conditions. Positive systematic risk is consistent with returns on investment moving, on average, in the same direction as the market portfolio of all risky assets. That is, returns are higher when general economic conditions are better. Consequently, we model how the cash flows of an electricity retailer would be expected to change in cases where the economy performed better or worse than expected, conditional upon an assumed retail margin for the expected cash flows. The concept is that the systematic risk of returns on investment measured using cash flows and value, the right-hand side of the equation, must be the same as the systematic risk of returns upon which the discount rate is derived, the left-hand side of the equation.

Importantly, this equation is useful in understanding why we don't necessarily observe a direct positive relationship between discount rate and expected cash flows within the expected returns approach:

- If value is held constant, as in the standard regulatory setting, an increase in the discount rate necessarily implies an increase in expected cash flows. This relationship holds in all of our modelling.

- In contrast, if expected cash flows are held constant, as in the acquisition case, an increase in the discount rate necessarily implies a decrease in value.

- In the case where neither expected cash flows nor value are held constant, as in the expected returns approach, it does not necessarily hold that expected cash flows or value will increase or decrease in response to an increase in the discount rate. That is, if systematic risk is higher, then asset values are lower, other things being equal. But other things are not equal here because cash flows, and therefore margin, must be higher to compensate for the increased risk. Thus the net effect is ambiguous. Our approach is to estimate the combination of asset value and margin that is consistent with the estimated systematic risk (internal consistency) and then to compare this asset value and margin against external benchmarks (external consistency).

Risk decomposition

An electricity retailer will face a number of risks and one of the roles of the retail margin is to provide appropriate compensation to the firm (and ultimately its investors) for bearing this risk. However, not all of the risks facing an electricity retailer will be relevant to the retail margin – some will be accommodated elsewhere. The remainder of this section catalogues two risks facing an electricity retailer, volume risk and energy purchase risk, and develops the links between risk and retail margin.

Volume risk, the uncertainty surrounding expected volumes, has two components. First, volumes might be higher or lower than expected. This variability has a non-systematic component (in the short term, variability is driven by weather and unplanned outages) and a systematic component (in the longer term there is a relationship between volumes and general economic conditions). It is only the latter, systematic component that requires compensation via a return in the form of a retail margin. As part of our advice we will examine the relationship between volume growth and economic conditions via regression analysis. This issue was previously addressed in the May 2007 report *The association between unexpected changes in electricity volume and GDP growth for residential customers*.

Second, there is a form of volume risk in sizing the hedge that reflects a retailer's contracting strategy. Most hedge contracts are for fixed volumes, but the retailer does not know exactly what future energy volume will be, and therefore, what volume will need to be hedged. This in turn impacts the variability of prices around the expected prices. In other words, one reason the overall energy purchase price is not known with certainty is that the size of the hedging activity cannot perfectly match realised volumes. The impact of this risk is captured in the price variability discussed below, which will be estimated by Frontier Economics.

Energy purchase risk, the uncertainty surrounding the cost of purchasing energy, also has two components. First, there is uncertainty about the level of future energy prices. This will be reflected in the report by Frontier Economics on energy costs, which will use a range of energy price scenarios for the purpose of estimating the market price of energy. These different scenarios provide different estimates of energy costs. This is an estimation risk which has no systematic component and consequently has no relevance to estimating an appropriate range for the retail margin. That is, this risk is not about whether future prices will be above or below expectations, but about the ability to process the presently available data. If there is likely to be some severe impact of mis-estimating energy costs in one particular direction, the Tribunal has discretion to minimise this potential impact, but it does not affect the estimated range itself.

Second, for any energy price scenario, there still remains some price variability as measured by the standard deviation around the expected price. This variability has a non-systematic component (as with volumes, in the short-term price variability is determined by weather and unplanned outages) and a systematic component (in the longer term there is a weak relationship between prices and general economic conditions). It is only the latter, systematic component that requires compensation via a return in the form of a retail margin. However, the high degree of hedging that retailers are likely to engage in, and the relatively weak relationship between prices and aggregate economic conditions, means that this risk has a small impact on retail margins, relative to the uncertainty about volumes.

In any event, our margin estimates only account for the volume component of systematic risk, because the energy costs being assumed, in conjunction with the regulatory framework, will consider retailers' exposure to price risks, regardless of whether these risks are systematic or non-systematic in nature. This does not imply that other economic risks, such as interest rate fluctuations or customer defaults in economic downturns, are ignored in our analysis. Our framework is developed under the assumption that in any given year the economy is performing above- or below- expectations, and that in those good and bad economic states, all economic indicators are moving in a consistent direction. In our framework, in good economic conditions the sharemarket rises, GDP growth is above-average and unemployment falls, with the reverse occurring in bad economic conditions. The assumed market movement in those good and bad states therefore summarises economic conditions, and the association between the electricity retailer's returns and market returns is the systematic risk faced by the retailer. In other words there is no need to provide additional compensation for economic risks over and above the risks associated with the market movement.

Retail margin as compensation for bearing systematic risk

The basic premise underlying the estimate of an appropriate retail margin is that the expected returns to equity holders should reflect the systematic risk of those returns. This premise is the basis for the setting of almost every regulated price in Australia. Systematic risk is the result of exposure to overall economic or market conditions. Non-systematic risk is the variability in returns to equity holders resulting from factors uncorrelated with overall economic conditions. Non-systematic risk is also referred to as diversifiable or firm-specific risk. The relationship between systematic risk and expected returns to equity holders is formalised in the CAPM presented below:

$$r_e = r_f + \beta_e \times (r_m - r_f)$$

where:

r_e = the required return expected by equity holders in order for them to commit capital;
r_f = the risk-free rate of interest;
r_m = the expected return on the market portfolio of all risky assets; and
β_e = the equity beta, a measure of the systematic risk of returns to equity holders.

The equity beta is a measure of the association between returns to equity holders and returns on the market portfolio. Expressed as an equation, the equity beta is:

$$\beta_e = \frac{COV(r_e, r_m)}{\sigma_m^2}$$

where:

$COV(r_e, r_m)$ = the covariance of returns to equity holders and returns on the market portfolio; and
σ_m^2 = the variance of returns on the market portfolio.

The theory behind the CAPM is that asset prices, and therefore expected returns, will only reflect systematic risks because investors are able to eliminate their exposure to firm-specific risks through diversification. This is a different issue to the firms' exposure to non-systematic risks. The CAPM does not assume that firms diversify away their non-systematic risks, only that investors will bid up the price of those firms to the point where they are compensated only for bearing exposure to overall economic conditions. Whether it is prudent for firms to minimise non-systematic risks is a separate issue. Where the firm is exposed to asymmetric consequences of good and bad events, there is an optimal amount of risk mitigation. For example, firms mitigate against the risk of financial distress in order to ensure this does not disrupt their operations, or at the extreme cause bankruptcy. When the CAPM is assumed to hold, the firm's management of non-systematic risks will affect investors' expectation of cash flows, but not their required return.[1]

The systematic risk of returns to equity holders increases with financial and operational leverage. Financial leverage is the proportion of capital contributed by debt holders, who receive fixed cash flows rather than the variable cash flows received by equity holders in the form of dividends and capital gains. The more cash flows directed to debt holders in the form of fixed interest payments, the more volatile are the residual cash flows available to pay dividends to equity holders, or to reinvest in new projects which generate capital gains. The same reasoning applies in relation to the impact of operating leverage on the risk faced by debt and equity holders. The higher the proportion of fixed costs in the entity's cost structure, the more volatile will be the residual cash flows in the form of operating profits available to make distributions to both debt and equity holders.

Financial and operational leverage impact directly on the estimated retail margin for an electricity retailer. The retail margin must be sufficient to provide reasonable compensation for the potential variation in response to various economic conditions. It is positively related to:

- the variability of revenue in association with economic circumstances;
- operating leverage – the proportion of fixed costs in the entity's cost structure; and
- financial leverage – the proportion of the capital base financed by debt holders.

Our approach is best explained with the aid of examples. In the two sub-sections below, we outline our expected returns approach in a one period model and with respect to a multi-period model.

One period model

Consider the following example, which is formulated under the one-period assumption commonly used in finance practice. In reality, an electricity retailer is expected to earn profits over an extended period of time. But for expositional purposes, we illustrate the basic concept in this one-period framework.

The representative firm expects to sell 1,000 units of a product and to incur costs of $90,000. These costs comprise $20,000 of fixed costs and $70,000 of volume-related costs ($70 per unit). The after-tax cost of capital is estimated at 10%, implying that the firm must set a price for its product such that its expected earnings will be sufficient to generate a return on investment of 10%. At this stage, the investment base is unknown, but is theoretically the present value of the expected future earnings. The firm is all-equity financed and we ignore dividend imputation for the time being. Of course, leverage and dividend imputation are ultimately accounted for in our estimated margin of an electricity retailer. The corporate tax rate is 30%.

Suppose that management decides to sell its 1,000 units for $100 each, which would generate expected sales of $100,000 and EBIT of $10,000, as shown in Table 1.
This corresponds to an EBIT margin (EBIT/Sales) ratio of 10%.

[1] Country Energy (2009, p.22) made the point that, "if energy trading risk really were diversifiable, then prudent retailers would not engage in energy trading at all." As discussed above, the theory underpinning the CAPM is that investors can minimise their exposure to this risk by holding a diversified portfolio of assets. They will therefore pay asset prices which reflect only their systematic risk exposure. However, those investors will form expectations of future cash flows for each firm which incorporate expectations regarding the volatility of energy prices and the firm's hedge position. They will therefore pay lower prices for firms who are both highly exposed to company-specific risks and where the cash flow impacts of adverse events outweigh those associated with good news.

Table 1. Example income statement

Income statement item	Computation	$
Revenue	1,000 × $100	100,000
Variable costs	1,000 × $70	70,000
Fixed costs		20,000
Earnings before interest and tax (EBIT)		10,000
After-tax cash flow	EBIT × (1 – 0.30)	7,000

Given this one-period example, we are able to compute the value of the investment as the present value of expected cash flows. Applying the discount rate of 10% to the expected after-tax cash flow of $7,000, the value of the firm is $6,364, computed as follows:

$$V = \sum_{i=1}^{n} \frac{E(CF_i)}{(1+r)^i} = \frac{7{,}000}{1.10} = 6{,}364$$

where:

V = value of the firm at time 0;
$E(CF_i)$ = expected cash flow to the firm in year i;
n = number of years of expected cash flows; and
r = the risk-adjusted cost of capital.

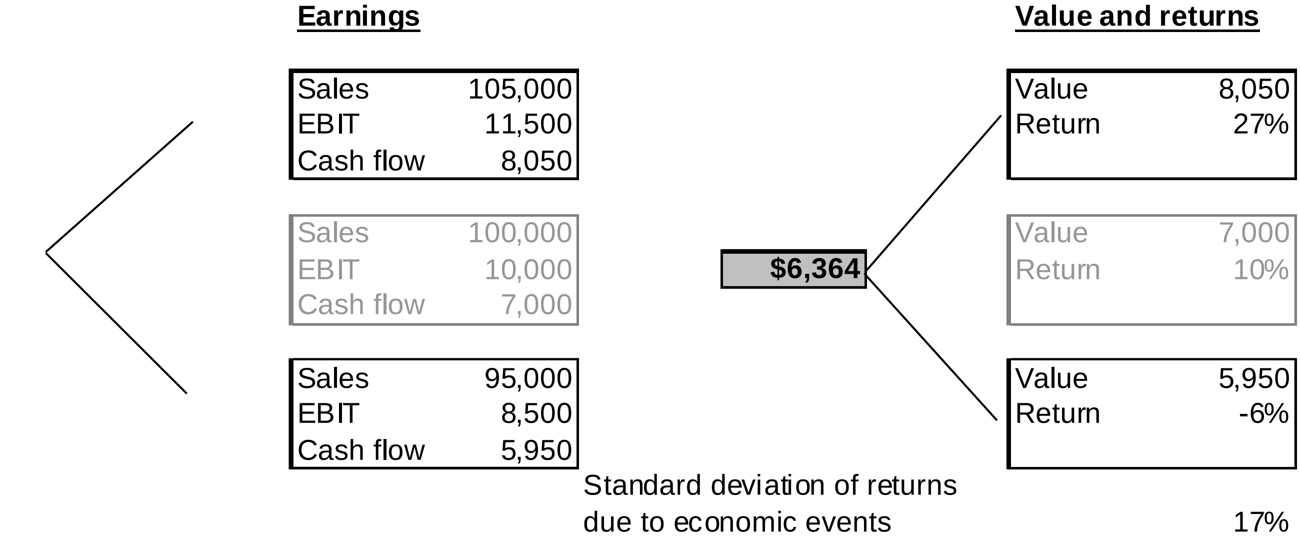
Is this price sufficient to compensate the firm for the potential variation in its cash flows as a result of systematic risk? The simplest formulation to account for this variation is to consider the case in which cash flows could be higher or lower than expected. The expected cash flows used for valuation are a probability-weighted average of these two possible cash flows.

Suppose that in a high-growth economic state, volume is likely to be 5% higher than expected, and that in a low-growth economic state, volume is likely to be 5% lower than expected. There is an equal probability of each of these high- and low-growth economic states. In these circumstances, the high-growth economic state would result in revenue of $105,000 and EBIT of $11,500, compared to revenue of $95,000 and EBIT of $8,500 in the low-growth state.[2] The impact of fixed costs translates a 5% change into revenue to a 15% change in operating earnings. We refer to this ratio of 3 times (15% relative to 5%) as the degree of operating leverage (DOL).

Figure 1 illustrates the revenue, EBIT and return on investment associated with each of these economic states. In the high-growth economic state, realised returns are 27%, compared to –6% in the low-growth economic state. That is, under the assumed discount rate of 10% the present value of the expected cash flow is $6,364 as computed above. If the high-growth economic state occurs, a year-end cash flow of $8,050 will be realised. This amounts to a return of 27% on the initial $6,364 value (6,364 × 1.27 = 8,050). Conversely, if the low-growth economic state occurs, a year end cash flow of $5,950 will be realised, which amounts to a –6% return on the initial value of $6,364.

[2] EBIT = 1000 × 1.05 × ($1,000 – $700) – $20,000 = 105 × $300 – $20,000 = $31,500 – $20,000 = $11,500; or
EBIT = 950 × 1.05 × ($1,000 – $700) – $20,000 = 955 × $300 – $20,000 = $28,500 – $20,000 = $8,500.

Figure 1. Example earnings and returns in high- and low-growth economic states



Expected values are represented between the upper and lower nodes.

If there is a 50% chance of revenue being above or below initial expectations, the standard deviation of potential returns is 17%, computed as follows:

$$\sigma = \sqrt{\sum_{j=1}^{m} p_j \left[r_j - E(r)\right]^2} = \sqrt{0.5 \times \left[0.27 - 0.10\right]^2 + 0.5 \times \left[-0.06 - 0.10\right]^2} = 0.17$$

where:

σ = standard deviation of returns;
p_j = probability of event j for $j = 1$ *to* m events;
r_j = realised returns given event j; and
$E(r)$ = expected return on investment.

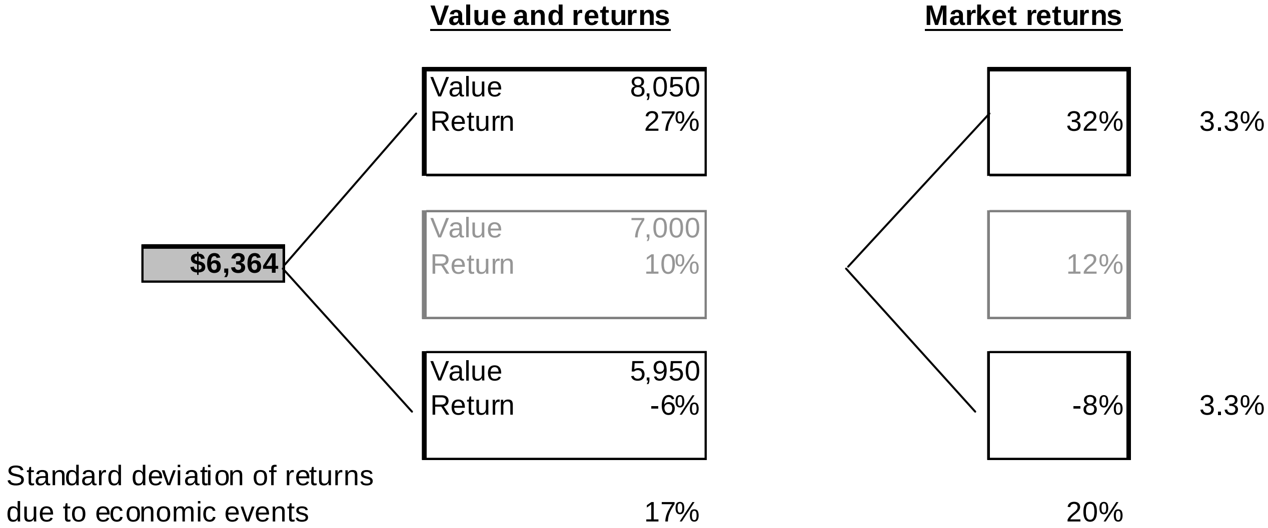
This discussion implies that an EBIT margin of 10% is consistent with an expected return of 10% and a standard deviation of expected returns (due to variation in economic events) of 17%. The question is whether this reward-for-risk trade-off is consistent with evidence we observe in the broader market. More specifically, we need to measure whether the expected return of 10% is consistent with the systematic risk of those returns. Our approach is to examine a range of metrics including EBIT margin, expected returns and risk, and to ensure that they are all consistent with one another and consistent with market data from comparable firms. The present example is designed to illustrate how one might assess whether an assumed set of inputs is *internally* consistent.

To measure the systematic risk of the expected returns we need to consider the likely movements of the equity market in high- and low-growth economic states. Suppose that the expected return on the equity market is 12% with a standard deviation of 20%. The expected return of 12% is the sum of a risk-free rate of 6% and a market risk premium of 6%. These same assumptions also imply that the expected return of 10% for the representative firm in our example is consistent with a beta estimate of 0.67 according to the following computation:

$$\beta_e = \frac{r_e - r_f}{mrp} = \frac{0.10 - 0.06}{0.06} = 0.67.$$

Given the same 50/50 chance of the economy growing at above- or below-expectations, to arrive at an expected return on the equity market of 12% with a standard deviation of 20% requires potential returns of 32% in the high-growth state, and returns of –8% in the low-growth state. Returns with this level of dispersion are typical of what we have observed in the equity market over the last 100 years. Of course, it is rare that the equity market rises or falls by these amounts in a given year, but these numbers are simply the result of using a simple one-period, binomial model for the present example. In reality, we observe several observations closer to the expected value of 12%, but we also observe occasional values well outside of these two extremes. The association between returns to the representative firm in our example and returns on the market is illustrated in Figure 2.

Figure 2. Association between asset returns and market returns



Expected values are represented between the upper and lower nodes.

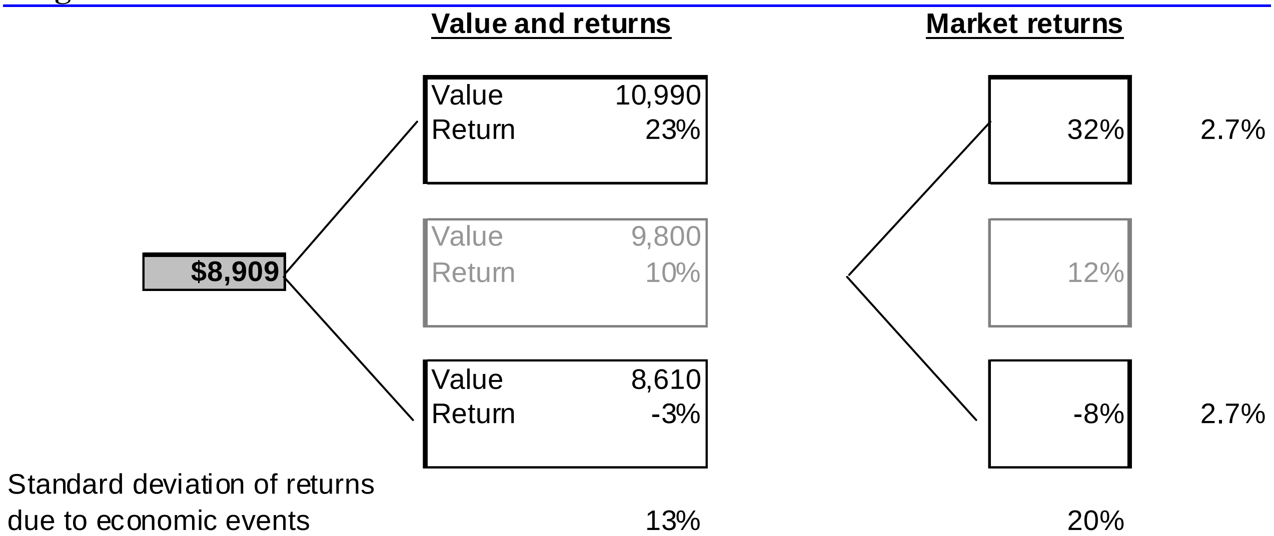
From these returns we can measure the systematic risk of returns to the representative firm. The asset beta turns out to be 0.83 (calculated below), which exceeds the asset beta of 0.67 that was consistent with the expected return of 10%. In other words, the assumed return (based on an EBIT margin of 10%) is insufficient to compensate investors for the actual systematic risk they face. Beta is computed as follows:

$$
\begin{aligned}
\beta_e &= \frac{COV(r_e, r_m)}{\sigma_m^2} \\
&= \frac{\sum_{j=1}^{m} p_j \left[r_{e,j} - E(r_e)\right]\left[r_{m,j} - E(r_m)\right]}{\sigma_m^2} \\
&= \frac{0.5 \times [0.27 - 0.10] \times [0.32 - 0.12] + 0.5 \times [-0.06 - 0.10] \times [-0.08 - 0.12]}{0.20^2} \\
&= \frac{0.017 + 0.016}{0.040} \\
&= \frac{0.033}{0.040} \\
&= 0.83.
\end{aligned}
$$

To this point, we can say that the expected earnings from the investment are insufficient to compensate investors for the systematic risk they face – the expected returns have a beta estimate of 0.83 but the level of expected returns is only 10%, which is sufficient compensation only for a beta estimate of 0.67. Thus, the EBIT margin of 10% produces a return that is insufficient compensation for risk. This means that the EBIT margin must be increased to produce an appropriate balance of risk and return. The relevant question then becomes, "What price will increase expected cash flows to the level where the expected cash flows provide appropriate compensation for systematic risk?"

In this case, that price is $104 per unit, equivalent to an EBIT margin of 13.5%. This is documented in Figure 3. At a price of $104 per unit, expected cash flows are $9,800, which have a present value of $8,909. In the high-growth economic state, expected cash flows are $10,990, which provides a return of 23%. In the low-growth economic state, expected cash flows are $8,610, which provides a return of –3%.

Figure 3. Association between asset returns and market returns where the expected EBIT margin is 13.5%



Expected values are represented between the upper and lower nodes.

Importantly, the systematic risk of these potential returns as measured by beta is 0.67, so we have consistency between the systematic risk of returns and the level of expected returns. That is, increasing the level of cash flows across all economic states has: (1) increased the present value of those cash flows; and (2) reduced the systematic risk of returns. The resulting returns are less risky such that an expected return of 10% is appropriate compensation for them. Thus, we have found a set of cash flows (that is, an EBIT margin) that is internally consistent with the risk and return to equity holders. Our approach is to benchmark the risk (beta), return, EBIT margin, and other metrics against comparable firms to ensure that we also have external consistency with market data.

Multi-period model

This one-period illustration of the framework can be extended to account for returns earned over a time period greater than one year. In our example, as the time period over which returns are earned increases, the required EBIT margin decreases. This occurs because the returns in each period are a combination of two factors – the cash flows generated in each period plus the present value of expected future cash flows. As the time period is extended, a greater proportion of asset value is contributed by the cash flows that are expected to be earned over subsequent future periods. This means that returns in each period are less sensitive to the variability of near-term cash flows.

In this section, we extend the illustration to the case where the asset has a life of ten years. We maintain the assumptions that variable costs are $70 per unit, fixed costs are $20,000 and expected units in the first year are 1000. In each year, there is a 50/50 chance that volume growth could be 5% higher or lower than the expected value of zero. This means that in year 1, the firm could sell 1,050 units or 950 units. In year 2, conditional upon year 1 sales of 1,050 units, volume could rise to 1,102 units or fall to

998 units. If first-year volume was 950 units, second-year volume could rise to 998 units or fall to 903 units, and so on.

Figure 4. Potential volume under the assumption that volume growth could be 5% above or below expected growth of zero

Year	1	2	3	4	5	6	7	8	9	10
Volume										
	1,050	1,103	1,158	1,216	1,276	1,340	1,407	1,477	1,551	1,629
	950	998	1,047	1,100	1,155	1,212	1,273	1,337	1,404	1,474
		903	948	995	1,045	1,097	1,152	1,209	1,270	1,333
			857	900	945	993	1,042	1,094	1,149	1,206
				815	855	898	943	990	1,040	1,092
					774	812	853	896	941	988
						735	772	810	851	894
							698	733	770	808
								663	697	731
									630	662
										599
Probabilities										
	50%	25%	13%	6%	3%	2%	1%	0.4%	0.2%	0.1%
	50%	50%	38%	25%	16%	9%	5%	3%	2%	1.0%
		25%	38%	38%	31%	23%	16%	11%	7%	4.4%
			13%	25%	31%	31%	27%	22%	16%	11.7%
				6%	16%	23%	27%	27%	25%	20.5%
					3%	9%	16%	22%	25%	24.6%
						2%	5%	11%	16%	20.5%
							1%	3%	7%	11.7%
								0.4%	2%	4.4%
									0.2%	1.0%
										0.1%

Figure 4 illustrates the potential volume outcomes in each year and the probability associated with each potential volume. This variation in potential volume necessarily leads to variation in asset returns. As with the one-period illustration, the issue is, "What is the appropriate price or EBIT margin which generates sufficient expected cash flows to compensate investors for the systematic risk of those cash flows?"

Our technique for answering this question is as follows:

1. For a given price, model the potential cash flows in each year associated with each potential volume outcome presented in Figure 4.

2. Model the potential asset values in each period as the present value of expected (probability-weighted) cash flows.

3. Model the distribution of terminal year asset values under the assumption that intermediate-year cash flows are reinvested in assets that continue to generate comparable returns to the firm in question.

4. Compile the distribution of total returns associated with each of these terminal-year asset values, and the distribution of total returns on the market portfolio, under the assumption that the market has an expected return of 12% and a standard deviation of 20%.

5. Compute the systematic risk of the total returns on the asset, as the covariance of asset returns with market returns relative to the variance of market returns. Compare this beta computation with the beta estimate assumed in the original cost of capital (0.67 in this illustrative example).

Then we check for consistency between the systematic risk assumed in determining the discount rate and the systematic risk of the returns generated from the particular EBIT margin assumption.

6. Adjust the initial price (which necessarily means adjust the initial EBIT margin) such that the systematic risk of returns computed in step 5 is the same as the systematic risk assumed in the discount rate (that is, ensure internal consistency). This is the EBIT margin that is sufficient for investors to earn a return that provides compensation for systematic risk.

To complete the illustration, we present in Table 2 computations of asset and market returns over the ten-year period, under the assumption that the initial price is set to $101.61 per unit, which is consistent with an EBIT margin of 11.4%. At this initial price/margin, the asset has a beta estimate of 0.67, which was the same level of systematic risk assumed in the initial discount rate estimate of 10%. We have highlighted economic states 4 – 8 which have a cumulative probability of occurrence of 89%.[3] Within this range, the annualised returns on the asset range from 4 – 17%, compared to a range of 3 – 18% for the market.

Table 2. Cumulative returns, probabilities and beta computation under the assumption that the initial EBIT margin is 11.4%.

Economic state	Cumulative returns (%)		Annualised returns (%)		Probability
	Asset	Market	Asset	Market	(%)
1	718	1506	23	32	0.1
2	591	1019	21	27	1.0
3	475	680	19	23	4.4
4	371	444	17	18	11.7
5	277	279	14	14	20.5
6	191	164	11	10	24.6
7	114	84	8	6	20.5
8	44	28	4	3	11.7
9	-19	-11	-2	-1	4.4
10	-76	-38	-13	-5	1.0
11	-128	-57	na	-8	0.1
Expected	202	211	10	12	
Variance	171	356			
Covariance	237				
Beta	0.67	(i.e. 237/356)			

The cells labelled "na" represent the cases in which the cumulative asset return is less than -100%, which represents the situation where cumulative losses are greater than the initial investment value.

According to this estimation technique, the appropriate EBIT margin for an electricity retailer is a function of the following five assumptions:

- the systematic risk of returns as measured by asset and equity beta;
- operating leverage as measured by the proportion of costs which increase at a constant rate with changes in volume, or "volume-related costs";
- percentage change in volume in response to economic conditions;
- variance in market returns; and

[3] States 1 and 11 are highly unlikely to occur. These states would require uniformly good or uniformly bad economic performance every year over the analysis period. States in the middle of the range represent outcomes in which general economic performance was good in some years and poor in others.

- time period over which returns are modelled.

With respect to the final assumption, the time period over which returns are modelled, we will model volumes and cash flows over a ten year period, and then estimate terminal values under the assumption that expected cash flows grow at a constant rate in perpetuity. Hence, the final year cash flow includes the term:

$$\text{Terminal value} = \frac{\text{Cash flow in forecast year 10} \times (1+g)}{WACC - g}$$

Our assumption is that growth equates to the assumed long-term inflation rate. But as discussed below, this assumption is only valid if the cash flow assumption allows sufficient reinvestment to ensure that assets are maintained in their existing productive capacity and that customers are retained.[4]

The objective of this approach is to estimate an EBIT margin that is *internally* consistent. That is we derive an EBIT margin that produces future cash flows and a consequential enterprise value such that there is a consistency between the systematic risk of the final cash flows and the systematic risk that was assumed in setting the firm's cost of capital. As part of this approach, we will ensure that financial leverage, operating leverage, and cash flow variability are benchmarked against comparable firms. We also note that this is one of three approaches that are designed to triangulate around our final estimate of an economically reasonable estimate of the retail margin.

2.2 Benchmarking

A complementary approach is to conduct a benchmarking exercise in which the underlying assumption is that margins for an electricity retail business should be broadly consistent with margins for other comparable retail businesses. Our method for this analysis will be to compile a set of "comparable" listed firms, whose margins are readily observable because of stock exchange disclosure requirements. The term "comparable" can take on an expansive or constrained definition, where the set chosen involves a trade-off between (a) obtaining a sufficiently large sample size to ensure the statistical reliability of estimates, and (b) ensuring that the set of firms face substantially the same risk and growth prospects as a New South Wales electricity retailer. Our analysis will comprise three sets of comparable firms, listed energy utilities from Australia, the United States and the United Kingdom; listed retailers from these three markets; and listed and non-listed Australian energy retailers. The listed retailing set will comprise the largest sample, followed by the medium-sized sample of listed energy utilities and the small-sized sample of Australian energy retailers. The relevance of these samples is in the reverse order. We will also have regard to other regulatory decisions but acknowledge that these decisions do not necessarily reflect the same assumptions as our analysis – especially with regard to the allocation of risk premiums and costs in arriving at the regulated price – and they were made with lower uncertainty over future energy costs.

In the 2007 price review, submissions from the regulated businesses used the benchmarking and bottom-up approaches, and we were asked to comment upon these submissions, and evaluate how our margin estimates compare to margins derived from the alternative methods. In the current price review, we are required to directly use these two alternative estimation techniques, rather than merely respond to submissions.

[4] This is consistent with submissions made by energy retailers including Energy Australia (2009, p.35): "It is appropriate to base the acquisition costs on those associated with acquiring a new customer to the business rather than costs associated with covering a regulated customer to a contract (which some also consider an acquisition;" Origin (2009, p.24): "Original supports IPART's inclusion of customer acquisition cost and also considers that the aggregate allowance from the previous determination was consistent with Origin's experience in various jurisdictions;" and AGL (2009, p.4): "The allowance for retail operating costs should be established at a level that includes all costs in attaining, retaining and servicing customers."

The strength of the expected returns technique is that it is entirely consistent with the Capital Asset Pricing Model, the model for expected returns adopted uniformly by Australian energy regulators in relation to network assets. It also allows for an estimate of the retail margin entirely independent of an external estimate of intangible asset value. Its limitation is that, like any analysis based on an economic model, the reality of markets may violate the model's underlying assumptions, resulting in observed margins which differ from the predications of the model. This is why the benchmarking analysis is important, to ensure that margins generated by the expected returns approach approximate those observed for comparable listed firms, and that there are robust explanations for any differences. It should also be the case that margins derived from the expected returns approach approximate those derived from the bottom-up approach, if the assumed asset base approximates market value.

2.3 Bottom-up analysis

Finally, we will conduct a bottom up analysis, which is consistent with the setting of regulated network prices. In this analysis, the retail margin is set such that the expected return of the business matches a regulated rate of return. To estimate the retail margin in this manner requires an assumption about the regulated asset base. For a network business, this is typically estimated at replacement cost on the depreciated tangible assets. For a retail business, a material proportion of the asset base will be the value associated with existing customers, which regulated businesses have previously estimated as customer acquisition costs. Hence, the bottom up approach requires an estimate of the regulated asset base (both tangible and intangible assets), regulated rate of return, and all costs associated with the business.

The difference between the bottom up approach and the expected returns approach is directional. With the bottom up approach, the value of the business is imposed on the analysis, along with the cost of capital, and the retail margin is an output of the analysis. With the expected returns approach, both business value and retail margins are jointly estimated as outputs of the analysis – the basis being that it is impossible to know the value of the retail business without first knowing what the allowed margin will be.[5]

The asset base can be estimated as a multiple of customers, a multiple of volume or a multiple of book value. In the 2007 price review Integral Energy made a submission which estimated market value at $524 per customer. This estimate was an average figure derived from observed transactions, an average which increased to $584 per customer once we incorporated the sales of Sun Retail and Energy Direct in Queensland. Our approach to estimating the asset base will be to augment this set of transactions with recent sales, and rely on multiples of customers, volume and book value to estimate the asset base.[6]

[5] The difference between these two approaches can be illustrated with reference to the submission made by AGL (2009, p.30): "The margin earned by a business is, in effect, a return on the risk to its revenue/capital outlay the business is required to undertake in its operations. In order for other energy retailing businesses to enter the market and compete, the margin available must be one which…debt and equity providers consider commercially acceptable to warrant the risk." Implicit within this statement is the assumption that the asset value can be reliably estimated, and is to be maintained, through setting expected earnings at a sufficient level for returns to equal the cost of capital. In our bottom-up analysis, market transactions will determine an estimate of asset value, from which we will derive a retail margin. In the expected returns approach, there is no assumption that value is known, but value and profit margin are derived jointly.

[6] Our use of transactions data to derive the estimated asset base is partly consistent with the view of Country Energy (2009, pp.21 – 22) who expressed concern that the asset base would reflect only the book value of assets for a standard retailer. The use of transactions data to estimate a market value asset base means that the disaggregation of value into tangible versus intangible assets is not required.

We will then estimated the profit margin which satisfies the following valuation equation, where the present value of expected cash inflows equals the estimated asset base:

$$\text{Asset base} = \frac{\text{Cash flows}_1}{(1+WACC)^1} + \frac{\text{Cash flows}_2}{(1+\text{WACC})^2} + ... + \frac{\text{Cash flows}_\infty}{(1+\text{WACC})^\infty}$$
$$= \sum_{t=1}^{\infty} \frac{\text{Cash flows available for distribution to debt and equityholders}}{(1+\text{Weighted average cost of capital})^t}$$

where:

Cash flows available for distribution to debt and equity holders =

Earnings before interest and tax (EBIT) × (1 – Corporate tax rate)
\+ Non-cash expenses (for example, depreciation)
– Capital expenditure and any retention cash outflows which don't appear in the income statement
– Change in working capital (working capital = Current assets – current liabilities); and

$$WACC = r_e \times \left[\frac{1-\tau}{1-\tau \times (-\gamma)}\right]\frac{E}{V} + r_d \times (1-\tau) \times \frac{D}{V}$$

In the equation for the weighted average cost of capital, r_e and r_d represent the returns required by equity and debt holders in order for them to commit capital to the firm; τ or "tao" is the corporate tax rate; γ or "gamma" is an estimate of the market value of one dollar of corporate tax paid which gives rise to an imputation credit; and E/V and D/V represent the market value proportion of equity and debt capital used to finance the firm's operations.

If the cash flows available for distribution to debt and equity holders increases at a constant rate, *g*, then the equation simplifies to the expression below:

$$\text{Asset base} = \frac{\text{Cash flow available for distribution to debt and equityholders}_0 \times (1+g)}{\text{WACC - g}}$$

This in turn leads to a series of three equations for the estimated EBIT, the estimated revenue, and the estimated EBIT margin in year one:

Equation 1 says that the earnings before interest and tax (EBIT) in year one is determined by:

(a) multiplying the asset base times the weighted average cost of capital minus long-term growth;
(b) subtracting non-cash expenses and adding capital expenditure and other cash outflows not appearing in the income statement; and
(c) dividing by 1 minus the corporate tax rate.

$$A_0 = \frac{CF_1}{WACC - g}$$
$$A_0 \times (WACC - g) = CF_1$$
$$A_0 \times (WACC - g) = EBIT_1 \times (1-\tau) + NoncashExp_1 - Capex_1 - ChgWC_1 \qquad (1)$$
$$A_0 \times (WACC - g) - NoncashExp_1 + Capex_1 + ChgWC_1 = EBIT_1 \times (1-\tau)$$
$$\frac{A_0 \times (WACC - g) - NoncashExp_1 + Capex_1 + ChgWC_1}{1-\tau} = EBIT_1$$

Equation 2 says that revenue is the sum of earnings before interest and tax (from equation 1) and operational costs (that is, not financing costs) appearing in the income statement; and Equation 3 expresses EBIT as a percentage of revenue, which is referred to as the EBIT margin:

$$\text{Revenue} = \text{EBIT} + \text{P \& L costs} \quad (2)$$

$$\frac{\text{EBIT}}{\text{Revenue}} = \frac{\text{EBIT}}{\text{EBIT} + \text{P \& L costs}} \quad (3)$$

3. Data

In this section we outline the data that will underpin each of our estimation techniques. The expected returns and bottom-up approaches rely upon historical economic and sharemarket data, current expectations for returns to equity and debt holders, and assumptions derived from data to be supplied by Frontier Economics, IPART and retail electricity businesses. The benchmarking approach relies upon sharemarket and financial statement information for listed energy utilities and retailers.

It is important to recognise that we have not yet obtained all of the necessary data and that key components of the data will be supplied by Frontier Economics, IPART and the retail electricity businesses. The data set out below consists only of that which is available from public sources, and in some case is expressed at an aggregated level. This section is designed to illustrate the types of data that is required for each of the three approaches, and how it will be used. No conclusions about any estimates of the retail margin can be drawn at this stage from the incomplete data that is set out for illustrative purposes below.

An important assumption which impacts upon all three approaches will be the definition of a standard retailer, for which we will rely upon advice from the Tribunal. All three of our approaches are designed to estimate the margin which allows a standard retailer to earn its cost of capital on the market value of its assets. Analysis of the historical and projected financial statements of the retail businesses are likely to inform the definition of the standard retailer. We will also analyse this financial statement information to ensure that our analysis is economically reasonable when applied to any particular retailer. For example, the estimated retail margin, if applied to a particular retailer, should allow that retailer to sustain financial ratios consistent with an investment-grade credit rating, as assumed in the cost of capital.

3.1 Expected returns approach

In the expected returns approach, the estimated EBIT margin for an electricity retailer is a function of the following assumptions:

- cost of capital assumptions –the risk-free rate of interest, debt margin, market risk premium, systematic risk of returns as measured by the asset beta and equity beta, financial leverage, corporate tax rate, and the value of imputation credits;
- economic assumptions – the standard deviation of percentage change in volume in response to economic conditions and the standard deviation of market returns (which should be consistent with the assumed market risk premium); and
- operating leverage as measured by the proportion of costs which increase at a constant rate with changes in volume.

In this section we discuss how each of these parameter estimates will be determined, and, where data is already available, the specific parameter estimates.

Cost of capital assumptions

The Tribunal has estimated a range for the weighted average cost of capital and individual parameter estimates which underpin this range. These estimates are presented in the table below and imply a range for the weighted average cost of capital of 7.3 – 9.2%.[7] Below the table we present computations of the after-tax cost of equity capital including imputation adjustment, after-tax cost of debt, after-tax weighted average cost of capital and debt beta for mid-point estimates so there is no ambiguity about the definitions of these terms.

Table 3. Cost of capital assumptions

	Low	Mid-point	High
Risk-free rate (%)	5.50	5.50	5.50
Market risk premium (%)	5.50	6.00	6.50
Debt margin (%)	2.00	2.71	3.38
Debt funding (%)	40.00	40.00	40.00
Value of imputation credits (gamma)	0.50	0.40	0.30
Tax rate (%)	30.00	30.00	30.00
Equity beta	0.90	1.00	1.10
Asset beta	0.52	0.66	0.81
Debt beta (SFG assumption as used in 2007)	0.13	0.13	0.13
After-tax cost of equity excluding imputation adjustment (%)	10.45	11.50	12.65
After-tax cost of equity including imputation adjustment (%)	8.61	9.82	11.21
Pre-tax cost of debt (%)	7.50	8.21	8.88
After-tax cost of debt (%)	5.25	5.75	6.22
After-tax WACC (%)	7.26	8.19	9.21

$$\begin{aligned}\text{After-tax cost of equity including imputation adjustment} &= \left[r_f + \beta \times (r_m - r_f)\right] \times \left[\frac{1-\tau}{1-\tau \times (1-\gamma)}\right] \\ &= [0.055 + 1.0 \times 0.06] \times \left[\frac{1-0.30}{1-0.30 \times (1-0.40)}\right] \\ &= 0.1150 \times 0.8537 \\ &= 9.82\%\end{aligned}$$

$$\begin{aligned}\text{After-tax cost of debt} &= (r_f + \text{Debt margin}) \times (1-\tau) \\ &= (0.0550 + 0.0271) \times (1-0.30) \\ &= 0.0821 \times 0.70 \\ &= 5.75\%\end{aligned}$$

$$\begin{aligned}\text{After-tax WACC} &= \text{After-tax cost of equity including imputation adjustment} \times \frac{E}{V} + \text{After-tax cost of debt} \times \frac{D}{V} \\ &= 0.0982 \times 0.60 + 0.0575 \times 0.40 \\ &= 8.19\%\end{aligned}$$

$$\beta_a = \frac{\beta_e + \beta_d \times \left[1 - \frac{r_d}{1+r_d} \times (1-\gamma) \times \tau\right] \times \frac{D}{E}}{1 + \left[1 - \frac{r_d}{1+r_d} \times (1-\gamma) \times \tau\right] \times \frac{D}{E}} = \frac{1.00 + 0.13 \times \left[1 - \frac{0.0821}{1.0821} \times (1-0.40)\right] \times \frac{40}{60}}{1 + \left[1 - \frac{0.0821}{1.0821} \times (1-0.40)\right] \times \frac{40}{60}} = \frac{1.08}{1.64} = 0.66$$

Economic assumptions

Under the expected returns approach we estimate how cash flows and returns will change in periods of above- and below-normal market conditions. We take a binary approach such that, in any given year, market returns are one standard deviation above or below expected returns of 11.5%. Our estimate for the annual standard deviation of market returns is 19% per year. This is the standard deviation of annual returns on the Australian sharemarket for 109 years from 1900 – 2008, a period in which the average return was 11.9% per year and 6.0% above the yield to maturity on ten-year government bonds.

[7] We use an after-tax nominal cost of capital in our analysis as defined by the series of equations below the table. We have assumed an estimated debt beta of 0.13 as was our assumption in 2007 and derived an estimated asset beta using the Monkhouse approach which is generally adopted by the Tribunal.

Given that the market risk premium assumed by the Tribunal is equal to this historical average, it is appropriate to assume that the volatility of market returns is the same as we have observed historically.[8]

We also need to make an assumption about the percentage change in volume we would expect to observe in these periods of above and below-normal conditions. Our working expectation is that the volumes will be 2.5% above or below expectations, contingent upon whether market returns are high or low. This is based upon the historical average standard deviation of GDP growth being 2.5% and an assumption of a one-to-one relationship between volume growth and changes in GDP, supported by a literature review and empirical analysis in our report *The association between unexpected changes in electricity volume and GDP growth for residential customers.* As part of the current project we will re-examine the relationship between unexpected changes in electricity volume and GDP growth using an updated dataset. It is important to emphasise that our estimated margin is based upon an association between changes in volume and economic conditions, and that examining the volatility of GDP growth (and its time-series association with volume changes) is merely a proxy for this assumption. For the 49-year period ending in March 2009, the standard deviation of percentage changes in GDP growth is 2.5%, based upon data reported by the Australian Bureau of Statistics.

Operating leverage

As the proportion of fixed costs in a retailer's cost structure increases, so does the volatility of its returns. For the purposes of estimating the retail margin we require an estimate of operating leverage, computed as the proportion of expenses which are fixed versus variable. In estimating this operating leverage, we consider how expenses would increase or decrease in response to electricity demand which is above or below expectations. Therefore, we use the term *volume-related costs*.

In our previous analysis we estimated volume-related costs within the range of 70 – 80% of total costs, implying that costs unrelated to volume lie within the range of 20 – 30%. This estimation relies upon estimates for energy purchase costs, network fees, operating costs, customer acquisition costs and depreciation, which will be provided by Frontier Economics, IPART and derived by us once information is received from the retail businesses. To illustrate the derivation of volume-related costs, we present the table below which is to be populated with data from our previous report for a representative retailer with expected annual volume of 5 million MWh and 900,000 customers.

Table 4. Derivation of the proportion of volume-related costs

	Non volume-related ($m)	Volume-related ($m)	Total ($m)	Volume-related (%)	Proportion of total costs (%)
Energy purchase	0	315	315	100	36
Network fees	84	371	455	81	52
Operating[3]	47	16	63	25	7
Customer acquisition	34	0	34	0	4
Depreciation	8	0	8	0	1
Total	174	702	875	80	100

Extracted from Table 8 of our 2007 report *Mass market new entrant retail costs and retail margin.*

3.2 Benchmarking

Our benchmarking analysis relies upon two sets of listed companies, 81 energy utilities and 335 retailers listed in Australia, the United States or the United Kingdom. The energy utilities were selected according to North American Industry Classification System (NAICS) code 2211 which corresponds to

[8] For a description of the data used to estimate these historical returns, see Dunn, Francis and Hall (2009) and Brailsford, Handley and Maheswaran (2008).

energy generation, transmission and distribution utilities. The retailers were selected according to the Thomson Financial classifications of General Retailers and Food & Drug Retailers.

We will perform benchmarking analysis on these two sets of firms in different ways. For the energy utilities we will examine their profit margins at the firm level as well as at the segment level, selecting the reported segment which corresponds most closely to retail electricity. Listed utilities are almost exclusively vertically-integrated businesses which makes analysis of their segment data important. However, even this analysis does not provide conclusive evidence of competitive margins for an electricity retailer as segment data often aggregates the network and retail components of the business. In addition, corporate overheads are often segregated from the segment data, so we will have to rely upon an assumed allocation of corporate overheads.

Analysis of listed energy firms also helps to ensure that the regulated retail margin is consistent with regulators' allowable returns on network businesses and the reported results of generators. From analysis of listed energy utilities we can estimate the aggregate profitability, risk, value and gearing across these three business units. If we can then make estimates of the profitability, risk, value and gearing of network and generation businesses, what remains can be attributed to their retailing arms. With respect to listed retailers from other industries, we will analyse their reported profit margins and discuss whether we would expect these margins to differ from electricity retailers.

3.3 Bottom-up analysis

The table below illustrates the transactional data which will be compiled as part of the bottom-up approach, in order to estimate an appropriate asset base. In contrast to the large sample analysis underpinning the benchmarking approach, we will be drawing from a considerably smaller set of observations in performing the bottom-up analysis. Hence, each observation needs to be scrutinised in more detail to minimise the risk of spurious results. They also need to be examined carefully to ensure that the transaction price recorded represents the value of assets, rather than just the equity in the business. Finally, transaction prices will be converted to current dollar values in our margin analysis.

Table 5. Proposed and completed acquisitions of retail electricity firms

Acquirer	Target	Date	Price ($m)	Customers ('000)	Volume (TWh)	Valuation multiples per	
						Customer	MWh
Acquirer 1	Target 1	Date 1	800	900	20	889	40
Acquirer 2	Target 2	Date 2	900	800	10	1,125	80
Acquirer 3	Target 3	Date 3	600	400	5	1,500	80
Average			767	700	12	875	67
Median			800	800	10	1,125	80

As a generic example, suppose that the estimated asset base was $1,000 million, the weighted average cost of capital was 9%, long-term growth is 3% and total estimated costs for a standard retailer were $900 million. These assumptions would lead to an estimated EBIT margin of 8.70% as shown in the table below.

Table 6. Illustration of the bottom-up approach to margin estimation

WACC	9.00%
Constant growth	3.00%
WACC – growth	6.00%
Asset base	$1,000 million
Asset base × (WACC – growth)	$60 million
– Depreciation	0
+ Capital expenditure	0
+ Change in working capital	0
EBIT × (1 – τ)	$60 million
EBIT	$86 million
Costs	$900 million
Revenue	$986 million
EBIT margin	8.70%

In this illustration we assume that capital expenditure and depreciation are offsetting and that there is no change in working capital. These assumptions may change in our analysis.

We also emphasise that the margins presented above are only appropriate under the assumption that cash flows growth at a constant rate in perpetuity. Incorporating variable growth rates means the EBIT margin will need to be estimated according to the present value equation presented in Section 2.3, page 16. We also highlight that any growth assumption must be estimated jointly with the cash flow estimates such that sufficient operating costs or capital expenditures are incurred to facilitate this growth. Even if growth is only equal to the inflation estimate there must be sufficient costs and/or capital investment to maintain assets in their existing productive capacity and to maintain the customer base.

4. Submissions

We have read submissions made by AGL, Council of Social Service of NSW, Country Energy, Delta Electricity, EnergyAustralia, the Energy and Water Ombudsman, Jack Green Energy, Origin, the Public Interest Advocacy Centre Ltd and TRUenergy and have made reference to some of these submissions. These submissions will be addressed in more detail in subsequent reports. These submissions highlight the need for consistency between the retail margin estimate, estimated costs and the regulatory framework.

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