

Estimation of a competitive profit margin for gas retailers in New South Wales

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1. Introduction

1.1 Context

Strategic Finance Group: SFG Consulting has been engaged to advise the Independent Pricing and Regulatory Tribunal (“IPART” or “the Tribunal”) on a reasonable profit margin for gas tariffs. In March 2010 we issued a similar report in relation to regulated electricity tariffs for the three standard electricity retailers for the period 1 July 2010 to 30 June 2013.

There is a material difference in the Tribunal’s role in the regulation of retail gas supplies compared to electricity. With respect to electricity, the Tribunal determines a default tariff on the basis of estimates of energy costs, network charges, operating costs and a reasonable profit margin. Regulated customers have the option to remain on this default tariff or accept a market offer. In the case of gas, the Tribunal makes a decision as to whether the gas retailers’ proposed tariffs are reasonable and consistent with the costs that an efficient and prudent retailer would incur. The Tribunal’s approach to this issue has been to separately analyse the reasonableness of retailers’ estimates of energy costs (including transmission), operating costs and margin (as the difference between proposed tariffs and aggregate costs). Applying this approach with respect to a reasonable margin, the question for the Tribunal is whether the implicit margin proposed by the gas retailers, as a function of the proposed tariffs and cost estimates, is reasonable and consistent with the costs that an efficient and prudent retailer incur, when compared to an estimate of the margin which would prevail in a competitive market.

The techniques we use to estimate the retail margin do not alter as a result of the different regulatory approach affecting gas versus electricity. Our role remains to estimate a range for the profit margin which we would expect to observe in a competitive market. Hence, the analysis presented below is formed on the basis of the same estimation techniques and presented in the same format as our electricity analysis.

However, we need to confront an important conceptual issue which has a material impact on the results, and how this conceptual issue is treated is impacted by the different regulatory approach. One of our estimation techniques is the bottom-up approach, whereby we estimate the profit margin which sets the present value of expected cash flows for a representative firm equal to an assumed investment base. This approach is analogous to the regulatory approach to the setting of network charges. In contrast to the network setting in which the regulated asset base is estimated with respect to depreciated replacement cost, our estimate of the asset base is a market-based estimate, formed with respect to historical transactions. We estimate the inflation-adjusted value per customer and value per energy unit (MWh or GJ) and apply these valuation multiples to a representative firm to generate a market value for the investment base. Given our limited number of transactions, we pool six acquisitions of electricity retailers, three acquisitions of gas retailers and one dual fuel retailer into one dataset.

The result of this estimation technique is that the estimated margins on a dollars per customer or dollars per energy unit basis are approximately the same for electricity and gas retailers. While our computations solve for a percentage margin – that is, earnings before interest and tax (or “EBITDA”)/Sales – which is held constant, this only ensures that the percentage margin is not eroded over time due to cost inflation. The costs per customer or energy unit for delivery of gas are considerably lower than the costs associated with delivery of electricity. Hence, with approximately the same margins in terms of dollars per customer or per energy unit for both electricity and gas, applied to a lower cost base, the percentage margin increases to levels which intuition suggests are overstated.

To be specific, the bottom-up approach, as currently implemented, implies an EBITDA per customer within the range of \$97 – 129 in forecast year one, \$103 – 136 in forecast year two and \$108 – 144 in

forecast year three. In our electricity margin analysis using the same approach, the estimated EBITDA margin per customer ranges were \$85 – 119 in forecast year one, \$98 – 137 in forecast year two and \$116 – 163 in forecast year three. The overlapping range in each of the three forecast years is \$97 – 119 in forecast year one, \$103 – 136 in forecast year two and \$116 – 144 in forecast year three. In simple terms, because the asset value per customer or per unit of energy is the same in both instances, and the assumed discount rate is the same, the estimated cash flows will be approximately the same, and only differ due differences in long-term growth estimates, or the individual fluctuations in volumes and costs over our three year explicit forecast period. Yet because the per customer costs of the representative gas business are only approximately one-third the costs of the representative electricity business, the estimated margin in percentage terms for gas is much higher using the bottom-up approach. In percentage terms, the estimated margins for gas retailers using the bottom-up approach are 12.9 – 16.5% in EBITDA terms (compared to 4.5 – 6.1% for electricity) and 11.4 – 15.0% in EBIT terms (compared to 3.7 – 5.4% for electricity).

These margins are higher than the average margins observed for any of the six retail sub-industries evaluated in our benchmarking analysis. Ultimately, they are the result of estimating an asset base using relatively limited publicly-available information on transactions.¹ Analysis of equity research reports prepared at the time of these acquisitions suggests that the acquisition prices reflect premiums for three factors: (1) scale benefits, including scale benefits of being a dual fuel retailer; reduction of hedging costs, due to the natural hedge associated with vertical integration; and (3) the option value associated with being an incumbent in the Queensland market during the transition towards full retail contestability.² It is also worth noting that the All Ordinaries Index reached its all time high on 1 November 2007, a year which coincides with the two highest transaction multiples in our comparable transactions set, and at 7 April 2010 was still 27% below this level.

To investigate this issue further we reviewed the AGL Energy segment data over five half-year periods from December 2007 to December 2009. In aggregate over this period, for mass market customers AGL energy earned a gross margin (that is, excluding operating costs) for electricity of 16.8% as a percentage of revenue, \$21.80 per MWh (equivalent to \$6.06 per GJ) and \$179 per annual customer; compared to the following margins for gas 18.5% as a percentage of revenue, \$2.87 per GJ and \$129 per customer. Hence, while the gross margin in percentage terms is higher for gas relative to electricity, the gross margin per energy unit is 47% of the gross margin for electricity and the gross margin per customer is 72% of the gross margin for electricity. The implication of this data is that the lower gross margin per energy unit and per customer observed for the gas business should, all else being equal, translate to lower transaction prices for gas retailers compared to electricity retailers. However, we do not observe this in our set of transactions prices, which suggests that a material portion of those prices can be attributed to the other factors identified above. Our analysis of this issue would be aided by information from retailers about the assumptions which underpinned the prices paid in recent transactions.

If we were to strip out the portion of acquisition prices associated with these factors our estimated valuation multiples would decrease, along with our estimated margins. While it is our view that some portion of the price paid in these acquisitions represents a premium to account for the factors above, we do not have an objective technique to measure just how much of the price can be attributed to these factors. In other words, the margins derived from the bottom-up analysis are likely to have an upward bias, and placing equal weight on each of our three estimation techniques would incorporate one-third of this upward bias. In the absence of a technique to measure the extent of this bias, we present two

¹ The analysis is not assisted by disaggregating our sample into six electricity retailers, three gas retailers and one dual fuel retailer, as the average value per customer multiple paid in the gas transactions was in fact higher than the average multiple paid in the other transactions, and the average value per unit of energy was approximately the same across the transactions.

² It is also worth noting that the All Ordinaries Index reached its all time high on 1 November 2007 and at 7 April 2010 was still 27% below this level.

margin computations in our analysis. The first places equal weight on our three estimation techniques, and the second places equal weight on the expected returns and benchmarking analysis.

The analysis presented below suggests that, if equal weight were placed upon the expected returns approach, the benchmarking analysis and the bottom-up approach, the resulting EBITDA margins would be within the range of 9.2 – 11.1%, which we understand exceeds the proposed margins embedded within the retailers' pricing proposals. Placing equal weight on the expected returns approach and the benchmarking analysis, the resulting EBITDA margins would be within the range of 7.3 – 8.3%, which we understand approximates the retailers' pricing proposals.

1.2 Conclusions

Our report proceeds as follows. In Section 2 we briefly outline three methods used to estimate the retail margin: (1) 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; (2) a benchmarking analysis to be conducted with reference to listed energy utilities and retail firms; and (3) 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 present our results and make concluding comments in Section 4. Our conclusions are reported below and summarised in Table 1. Note that our estimation procedures generate estimates for the EBIT margin (that is, earnings before interest and tax relative to sales), to which estimated depreciation and amortisation charges are added in order to provide the Tribunal with EBITDA margin estimates.

- The expected returns approach implied an EBIT margin of 6.6% within a reasonable range of 5.9 – 7.5%. This translates to the following ranges for forecast years one, two and three respectively: **EBITDA margin of 7.5 – 9.0%, 7.5 – 9.0% and 7.5 – 9.1%**; EBIT margins of \$1.17 – 1.51 per GJ, \$1.23 – 1.59 per GJ and \$1.29 – 1.66 per GJ; and EBITDA margins of \$1.49 – 1.83 per GJ, \$1.56 – 1.92 per GJ and \$1.64 – 2.02 per GJ.³ From the first to the third forecast year, the dollar margin increases by around one tenth because we are applying a constant margin to a rising cost base.
- The benchmarking analysis implied an EBIT margin of 5.8% within a reasonable range of 5.6 – 6.0%. This translates to a range for the **EBITDA margin of 7.2 – 7.6%** over each of the three forecast years; and the following ranges for years one, two and three, respectively: EBIT margins of \$1.11 – 1.20 per GJ, \$1.17 – 1.25 per GJ and \$1.22 – 1.32 per GJ; and EBITDA margins of \$1.43 – 1.51 per GJ, \$1.50 – 1.58 per GJ and \$1.57 – 1.67 per GJ.
- The bottom-up analysis implied an EBIT margin of 13.2% within a reasonable range of 11.4 – 15.0%. This translates to a range for the **EBITDA margin of 12.9 – 16.5%** over each of the three forecast years; and the following ranges for years one, two and three, respectively: EBIT margins of \$2.42 – 3.32 per GJ, \$2.53 – 3.48 per GJ and \$2.66 – 3.65 per GJ; and EBITDA margins of \$2.74 – 3.64 per GJ, \$2.86 – 3.81 per GJ and \$3.01 – 4.00 per GJ.
- Applying equal weight to margins estimated from all three approaches, the estimated EBIT margin is 8.6% within a reasonable range of 7.6 – 9.5%, computed as the average of the three upper and

³ Throughout our report all dollar values are expressed in nominal terms. Our margin estimates are compiled for a representative standard retailer expected to sell 7.4 PJ per year over three years to 207,000 customers.

lower bounds of the EBIT margin estimated from each of the three approaches. This translates to the following ranges for forecast years one, two and three respectively: **EBITDA margin of 9.2 – 11.0%, 9.2 – 11.0% and 9.2 – 11.1%**; EBIT margins of \$1.55 – 1.97 per GJ, \$1.62 – 2.06 per GJ and \$1.70 – 2.16 per GJ; and EBITDA margins of \$1.87 – 2.29 per GJ, \$1.95 – 2.39 per GJ and \$2.06 – 2.52 per GJ.

- Applying equal weight to the expected returns and benchmarking analysis, the estimated EBIT margin is 6.2% within a reasonable range of 5.7 – 6.7%, computed as the average of the upper and lower bonds of the EBIT margin estimated from these two approaches. This translates to the following ranges for forecast years one, two and three respectively: **EBITDA margin of 7.3 – 8.3%, 7.3 – 8.3% and 7.4 – 8.3%**; EBIT margins of \$1.14 – 1.35 per GJ, \$1.20 – 1.42 per GJ and \$1.26 – 1.49 per GJ; and EBITDA margins of \$1.46 – 1.67 per GJ, \$1.53 – 1.75 per GJ and \$1.61 – 1.84 per GJ.

Table 1. Results summary

	EBITDA margin		EBIT margin	
	% sales	\$/GJ	% sales	\$/GJ
<u>Expected returns analysis</u>				
Year 1	7.5 – 9.0	1.49 – 1.83	5.9 – 7.5	1.17 – 1.51
Year 2	7.5 – 9.0	1.56 – 1.92	5.9 – 7.5	1.23 – 1.59
Year 3	7.5 – 9.1	1.64 – 2.02	5.9 – 7.5	1.29 – 1.66
<u>Benchmarking analysis</u>				
Year 1	7.2 – 7.6	1.43 – 1.51	5.6 – 6.0	1.11 – 1.20
Year 2	7.2 – 7.6	1.50 – 1.58	5.6 – 6.0	1.17 – 1.25
Year 3	7.2 – 7.6	1.57 – 1.67	5.6 – 6.0	1.22 – 1.32
<u>Bottom-up analysis</u>				
Year 1	12.9 – 16.5	2.74 – 3.64	11.4 – 15.0	2.42 – 3.32
Year 2	12.9 – 16.5	2.86 – 3.81	11.4 – 15.0	2.53 – 3.48
Year 3	12.9 – 16.5	3.01 – 4.00	11.4 – 15.0	2.66 – 3.65
<u>Equal-weighted average</u>				
Year 1	9.2 – 11.0	1.87 – 2.29	7.6 – 9.5	1.55 – 1.97
Year 2	9.2 – 11.0	1.95 – 2.39	7.6 – 9.5	1.62 – 2.06
Year 3	9.2 – 11.1	2.06 – 2.52	7.6 – 9.5	1.70 – 2.16
<u>Average of expected returns and benchmarking</u>				
Year 1	7.3 – 8.3	1.46 – 1.67	5.7 – 6.7	1.14 – 1.35
Year 2	7.3 – 8.3	1.53 – 1.75	5.7 – 6.7	1.20 – 1.42
Year 3	7.4 – 8.3	1.61 – 1.84	5.7 – 6.7	1.26 – 1.49

\$/GJ figures are estimates for a retailer with expected annual volume of 7.4 PJ.

The three estimation techniques generate different results because they rely upon theoretical and market-based evidence to different degrees. The expected returns approach places high reliance on the economic theory of the Capital Asset Pricing Model (CAPM) and an estimated relationship between profitability of gas retailers and economic conditions; the benchmarking analysis allows us to perform large-sample analysis and relies entirely on observed profit margins, but is limited by lack of comparability (in the case of general retailers) and by small sample size; and the bottom-up analysis relies upon market-based evidence to estimate an asset base, and theoretical analysis to estimate an appropriate return on that asset base. By performing analysis using all three techniques our intent is to rely upon both theoretical and market-based evidence to infer margins which are likely to prevail in a competitive market. In comparison to the percentage margins estimated with respect to electricity retailers, the margins presented above are higher because of lower assumptions regarding cash operating costs, higher depreciation charges, and an assumption that 30% of costs are unrelated to volume (compared to 20% for electricity retailers).

2. Methodology

The retail margin represents the return that a gas 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 EBIT to sales as the retail margin, but report margins on a number of different bases. Three approaches are used to estimate the retail margin for a gas retailer: the expected returns approach, the benchmarking approach and the bottom-up approach.

- The expected returns approach provides estimates of expected cash flows that a gas 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 the broader class of listed retailers and retail segment data of energy utilities where this is available.
- 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.⁴

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 a gas retailer operating in a competitive environment. Consistent with this objective our detailed modelling relies upon assumptions for the entire business of the standard retailers, not just the regulated customer segment. This also avoids the arbitrary allocation of costs amongst regulated and contestable customer segments and the circularity problem of customers switching from contestable to regulated tariffs and vice versa in response to the regulated margin. Under the assumptions of the 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 gas 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. The paper *Estimation of the regulated profit margin for electricity retailers in New South Wales: Methodology and assumptions* provides more detail on these estimation techniques, in particular the expected returns approach.

⁴ The difference between the expected returns and bottom-up approaches can be illustrated with reference to the submission made by AGL (2009a, p.30) with respect to electricity margins: “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 are used to derive an estimate of asset value, from which we derive a retail margin. In the expected returns approach, there is no assumption that value is known, rather, value and profit margin are derived jointly.

3. Results

3.1 Overview

In this section we present the results from each of our three estimation techniques. Our computations are performed in order to estimate the EBIT margin as a percentage of sales, which we then convert to an EBITDA margin assuming depreciation estimates derived from projections of the standard retailers. We also report margins relative to GJ of expected volume and customers. Our analysis is based upon a representative standard retailer, which is estimated to sell an annual average of 7.4 PJ of gas to 207,000 customers over the three financial years from 2010/11 – 2012/13. These average estimates for volume and customers are average projections provided by the standard retailers – AGL, ActewAGL, Origin Energy and Country Energy. In aggregate the standard retailers are projecting a 3.0% increase in volume over three years to 2012/13, from an average 7.2 to 7.4 PJ, and customer numbers are expected to remain steady at an average of 207,000.

The expected returns approach implied an estimated EBIT margin of 6.6% within a reasonable range of 5.9 – 7.5%. This translates to the following ranges for forecast years one, two and three respectively: EBITDA margin of 7.5 – 9.0%, 7.5 – 9.0% and 7.5 – 9.1%; EBIT margins of \$1.17 – 1.51 per GJ, \$1.23 – 1.59 per GJ and \$1.29 – 1.66 per GJ; and EBITDA margins of \$1.49 – 1.83 per GJ, \$1.56 – 1.92 per GJ and \$1.64 – 2.02 per GJ. From the first to the third forecast year, the dollar margin increases by one tenth because we are applying a constant margin to a rising cost base. The estimated EBIT margin is that which, if held constant, would generate an expected return to equity holders of 11.50% per year and systematic risk of those returns equivalent to an equity beta of one. The range of 5.9 – 7.5% is the middle third of 81 scenarios derived from low, mid-point and high values for four value drivers: the cost of equity capital (10.45 – 12.65% plus imputation credit value of 0.3 – 0.50), the standard deviation of percentage changes in volume (1.5 – 2.5%), the proportion of fixed costs (25 – 35%) and the volatility of market returns (14 – 24%).

The benchmarking analysis implied an estimated EBIT margin of 5.8% within a reasonable range of 5.6 – 6.0%. This translates to the following ranges for forecast years one, two and three respectively: EBITDA margin of 7.2 – 7.6% for all years; EBIT margins of \$1.11 – 2.10 per GJ, \$1.17 – 1.25 per GJ and \$1.22 – 1.32 per GJ; and EBITDA margins of \$1.43 – 1.51 per GJ, \$1.50 – 1.58 per GJ and \$1.57 – 1.67 per GJ. The EBIT margin estimate is the average EBIT margin for a sample of 269 firms and 3,474 annual observations of listed retailers in Australia, the United States and the United Kingdom over a 29-year period ending in 2008. The range of 5.6 – 6.0% is a 90 per cent confidence interval surrounding the mean estimate.

The bottom-up approach implied an estimated EBIT margin of 13.2% within a reasonable range of 11.4 – 15.0%. This translates to the following ranges for forecast years one, two and three respectively: EBITDA margin of 12.9 – 16.5% for all years; EBIT margins of \$2.42 – 3.32 per GJ, \$2.53 – 3.48 per GJ and \$2.66 – 3.65 per GJ; and EBITDA margins of \$2.74 – 3.64 per GJ, \$2.86 – 3.81 per GJ and \$3.01 – 4.00 per GJ. The estimated EBIT margin is that which, if held constant, would generate a value for the representative retailer equivalent to an estimated value derived from historical acquisition prices. In estimating an asset base of \$199 million (\$961 per customer and \$27 per GJ) we applied a two-thirds weight to valuation multiples derived from five transactions which occurred during 2006 – 2007 and a one-thirds weight to valuation multiples derived from five transactions which occurred during 1999 – 2002. The 11.4% lower bound of the reasonable range is derived from an assumed asset base of \$163 million (\$785 per customer and \$22 per GJ) which is based upon the average transaction multiple of \$22 per GJ observed for all ten transactions. The 15.0% upper bound of the reasonable range is derived from an assumed asset base of \$237 million (\$1147 per customer and \$32 per GJ) which is based upon the average transaction multiple of \$1147 per customer observed for the five most recent transactions.

Applying equal weight to margins estimated from all three approaches, the estimated EBIT margin is 8.6% within a reasonable range of 7.6 – 9.5%. The reasonable range is the average of the three upper and lower bounds from each estimation technique. This translates to the following ranges for forecast years one, two and three respectively: EBITDA margin of 9.2 – 11.0%, 9.2 – 11.0% and 9.2 – 11.1%; EBIT margins of \$1.55 – 1.97 per GJ, \$1.62 – 2.06 per GJ and \$1.70 – 2.16 per GJ; and EBITDA margins of \$1.87 – 2.29 per GJ, \$1.95 – 2.39 per GJ and \$2.06 – 2.52 per GJ.

Applying equal weight to the expected returns and benchmarking analysis, the estimated EBIT margin is 6.2% within a reasonable range of 5.7 – 6.7%. The reasonable range is the average of the three upper and lower bounds from the two estimation techniques. This translates to the following ranges for forecast years one, two and three respectively: EBITDA margin of 7.3 – 8.3%, 7.3 – 8.3% and 7.4 – 8.3%; EBIT margins of \$1.14 – 1.35 per GJ, \$1.20 – 1.42 per GJ and \$1.26 – 1.49 per GJ; and EBITDA margins of \$1.46 – 1.67 per GJ, \$1.53 – 1.75 per GJ and \$1.61 – 1.84 per GJ.

3.2 Comparison to other jurisdictions

3.2.1 Queensland

In November 2008, the Queensland Competition Authority (QCA, 2008 and MMA, 2008) received advice from McLennan Magasanik Associates (MMA) that an EBITDA margin of 6.5% was appropriate for a customer consuming up to 100 GJ per year. This conclusion was based upon discussions retailers with respect to their targeted margins and with reference to regulatory precedent, rather than being an independent quantification of an economically sustainable margin.

3.2.2 Western Australia

The Office of Energy in Western Australia (2009) has adopted an EBITDA margin of 5% for regulated gas tariffs due to its consistency with electricity margins and determinations in other jurisdictions.

3.2.3 South Australia

In 2008 the Essential Services Commission of South Australia (ESCOSA, 2008) determined that a retail margin of 13% of controllable costs was appropriate for the standard contract price, controllable costs being wholesale gas costs, transmission costs and retail operating costs. This represents an increased margin allowance compared to the 10% of controllable costs allowed for in the 2005 determination. Non-controllable costs are primarily distribution costs. ESCOSA estimated that the margin allowance of 13% of controllable costs is approximately 5.6% of sales. In contrast, Origin Energy submitted that an appropriate retail margin would be 9.2% of sales revenue based upon a bottom-up analysis. Its actual submission proposed a retail margin of 13% of controllable costs but Origin was asked to provide information for a bottom-up analysis.

As part of the determination in South Australia, transaction multiples were compiled but were ignored in estimating an asset base in conducting a bottom-up analysis. Instead, ESCOSA relied upon an assumption as to the cost of organically acquire customers, stating that the sale price of a retail business is likely to reflect a range of expectation about future return.⁵ There is insufficient detail provided in the ESCOSA decision to replicate the margin computation, but the fundamental difference between its bottom-up analysis and ours is the technique used to estimate the asset base. ESCOSA estimates the

⁵ Note that ESCOSA stated that its bottom-up analysis was used as a reasonableness check, rather than a determinant of the margin itself. However, the other technique used to estimate the margin was to adjust its previous determination (10% of controllable costs) for alternative assumptions regarding distribution. So it does appear that the bottom-up analysis is the only quantitative estimate of the margin which equates customer value and present value of expected cash flows in some way. It also does not place any significant reliance on other regulatory decisions.

asset base as the sum of the cost of physical assets and the costs to organically acquire customers, assuming that the organic acquisition cost is amortised over an average customer life. In contrast, we observe prices paid to acquire an entire business.

Under our approach, there may be an upward bias to the asset base because acquisition prices are likely to reflect scale benefits and option value associated with the development of new markets. In particular, acquirers are likely to have paid a premium to be the incumbent retailer in the Queensland market, especially as they can amortise their operating costs via dual fuel offerings and achieve geographic diversification. However, the building block approach of ESCOSA to estimating the asset base is likely to result in a downwardly-biased estimate of that asset base. The computation involves estimating the customer acquisition cost to a business which already has significant scale. The acquisition cost incurred in achieving that scale is likely to be substantially larger. Yet that is the cost which is appropriate for a bottom-up analysis – prices in a competitive market will reflect investment incurred in entering that market.

3.3 Expected returns analysis

3.3.1 Assumptions

In the expected returns approach, the estimated EBIT margin for a gas 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.

Cost of capital

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 7.6 – 9.8% according to Equation 7 of Officer (1994, p.6) 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.⁶

Our expected returns modelling explicitly models the cash flows available to equity holders, including imputation benefits, over a ten-year forecast horizon followed by a perpetual growth assumption. We measure the distribution of returns to equity holders at the end of the ten-year forecast period and its covariance with market returns over this period, assuming any distributions are reinvested in the businesses (that is, analogous to a dividend reinvestment plan whereby the shares are repurchased on-market). The objective is that the covariance of equity returns with market returns, scaled by the variance of market returns, should equal one, consistent with the assumed equity beta. Hence, the reasonable range for the total returns to equity holders is 10.45 – 12.65% (which incorporates a range for the equity beta of 0.9 – 1.1), and that the estimated value of imputation credits (that is, γ or gamma) lies within the range of 0.3 – 0.5.

⁶ The cost of equity capital is estimated according to the CAPM which states that a risk premium above a risk-free return required by investors is determined by the systematic risk of the returns, also termed market risk, economic risk or non-diversifiable risk. In relation to the electricity determination, Country Energy (2009a, 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. In its later submission, Country Energy (2009b) argues that the weighted average cost of capital should not be set at the mid-point of the range because there are asymmetric consequences to estimating a regulated rate of return which is too high, relative to the consequences of setting the rate too low. Energy Australia (2009b, p.24), Origin (2009b, p.36) and AGL (2009b, pp.10 – 12) also made recommendations for a higher cost of capital assumption. The cost of capital inputs into our analysis are a matter for the Tribunal.

Table 2. 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	2.85	3.70
Debt funding (%)	30.00	30.00	30.00
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
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
Cost of debt excluding tax benefit (%)	7.50	8.35	9.20
Cost of debt including tax benefit (%)	5.25	5.85	6.44
Vanilla WACC	9.57	10.56	11.62
After-tax WACC including imputation adjustment (%)	7.60	8.63	9.78

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

$$\begin{aligned}
 \text{After - tax cost of debt} &= (r_f + \text{Debt margin}) \times (1 - \tau) \\
 &= (0.0550 + 0.0285) \times (1 - 0.30) \\
 &= 0.0835 \times 0.70 \\
 &= 5.85\%
 \end{aligned}$$

$$\begin{aligned}
 \text{Vanilla WACC} &= \text{Cost of equity} \times \frac{E}{V} + \text{Cost of debt} \times \frac{D}{V} \\
 &= 0.1150 \times 0.70 + 0.0835 \times 0.30 \\
 &= 10.56\%
 \end{aligned}$$

$$\begin{aligned}
 \text{After - tax WACC} &= \text{After - tax cost of equity including imputation adjustment} \times \frac{E}{V} + \text{Cost of debt including tax benefit} \times \frac{D}{V} \\
 &= 0.0982 \times 0.70 + 0.0585 \times 0.30 \\
 &= 8.63\%
 \end{aligned}$$

$$\beta_a = \frac{\beta_e + \beta_d \times \left[1 - \frac{r_d}{1 + r_d} \times (1 - \gamma) \times \tau \right] \times \frac{D}{E}}{1 + \left[1 - \frac{r_d}{1 + r_d} \times (1 - \gamma) \times \tau \right] \times \frac{D}{E}} = \frac{1.00 + 0.13 \times \left[1 - \frac{0.0835}{1.0835} \times (1 - 0.30) \right] \times \frac{30}{70}}{1 + \left[1 - \frac{0.0835}{1.0835} \times (1 - 0.30) \right] \times \frac{30}{70}} = \frac{1.05}{1.41} = 0.74$$

Volatility of market returns

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 11.50%. 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. 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.⁷

⁷ For a description of the data used to estimate these historical returns, see Dunn, Francis and Hall (2009) and Brailsford, Handley and Maheswaran (2008).

Association between expected volume changes and economic conditions

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. We assume that volumes will be 2.0% 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 2.0% 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 changes in electricity demand and GDP growth* and the follow-up report *The association between changes in gas demand and GDP growth* [...forthcoming...].⁸ 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 June 2009, the standard deviation of percentage changes in GDP growth is 1.9%, based upon data reported by the Australian Bureau of Statistics. In conducting sensitivity analysis we incorporate upper and lower bounds of 1.5 – 2.5% as a range for the estimated standard deviation of percentage changes in volume in response to market conditions.

Operating leverage, operating costs and long-term growth

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 gas demand which is above or below expectations. Therefore, we use the term *volume-related costs*.

We incorporate an assumption that volume-related costs comprise 70% of total costs and incorporate a range of 65 – 75% in sensitivity analysis. This estimation is derived from estimates for wholesale gas costs, distribution costs, operating costs, customer acquisition costs, depreciation and amortisation provided by the standard retailers. The table below presents the derivation of volume-related costs. In each category of costs, the proportion estimated to be volume related is as follows: retail operating costs – 37%; gas commodity and transmission costs – 83%; distribution costs – 70%; and depreciation and amortisation – 0%.

For our representative standard retailer, estimated costs in real terms are \$18.19 per GJ in 2010/11, \$18.51 per GJ in 2011/12 and \$18.86 per GJ in 2012/13 as presented in the upper left hand section of the table. We estimate the dollar costs in real terms as a function of estimated customer numbers for retail operating costs, and as a function of volume for gas commodity and transmission costs, distribution costs, depreciation and amortisation. The estimated total costs in nominal terms for the representative firm range from \$139 million in 2010/11 to \$153 million in 2012/13, of which \$42 – 46 million or 30% are estimated to be unrelated to volume. The table also presents aggregate cost estimates in nominal terms of \$18.73 per GJ in 2010/11, \$19.64 per GJ in 2011/12 and \$20.61 per GJ in 2012/13, assuming annual inflation of 3.00%. Over the three-year explicit forecast period, there is no material change to the relative proportion of each cost to the overall cost estimate.

⁸ These reports are provided as an attachment to the pdf version of this document.

Table 3. Derivation of the proportion of volume-related costs

	\$/GJ			\$/customer			\$m			%		
	2010/11	2011/12	2012/13	2010/11	2011/12	2012/13	2010/11	2011/12	2012/13	2010/11	2011/12	2012/13
Real terms cost allowance												
Operating costs incl. cust. acqu.	2.43	2.45	2.54	86.63	87.85	91.21	18	18	19	13	13	13
Gas commodity + transmission costs	7.34	7.41	7.45	261.55	265.40	267.58	54	55	55	40	40	39
Distribution costs	8.10	8.34	8.55	288.59	298.92	307.13	60	62	63	45	45	45
Depreciation and amortisation	0.31	0.31	0.32	11.00	11.16	11.56	2	2	2	2	2	2
Total costs	18.19	18.51	18.86	647.78	663.33	677.47	135	137	140	100	100	100
Nominal terms cost allowance												
Operating costs incl. cust. acqu.	2.51	2.60	2.77	89.23	93.20	99.67	19	19	21	13	13	13
Gas commodity + transmission costs	7.56	7.86	8.14	269.40	281.56	292.39	56	58	60	40	40	39
Distribution costs	8.35	8.85	9.34	297.25	317.12	335.61	62	66	69	45	45	45
Depreciation and amortisation	0.32	0.33	0.35	11.33	11.84	12.63	2	2	3	2	2	2
Total costs	18.73	19.64	20.61	667.21	703.72	740.29	139	146	153	100	100	100
Capital expenditure (estimate)	0.68	0.69	0.69	30	30	30						
Capital expenditure (assumption)	0.76	0.76	0.76	27	27	27	6	6	6			
Costs unrelated to volume												
Recommended retail cost allowance	1.58	1.63	1.74	56.22	58.57	62.34	12	12	13	8	8	8
Gas commodity + transmission costs	1.31	1.33	1.35	46.72	47.66	48.66	10	10	10	7	7	7
Distribution costs	2.49	2.63	2.76	88.65	94.14	99.22	18	19	20	13	13	13
Depreciation and amortisation	0.32	0.33	0.35	11.33	11.84	12.63	2	2	3	2	2	2
Total costs	5.70	5.92	6.20	202.93	212.21	222.85	42	44	46	30	30	30
Customer and volume assumptions												
	2010/11	2011/12	2012/13	Average								
Total customers	207,693	206,834	206,538	207,022								
Total TJ	7,397	7,411	7,420	7,409								

Subsequent to the costs modelled over the first three years of our analysis, we assume an expected annual long-term growth rate for the representative firm of 2.48%. This figure is derived in our bottom-up analysis from a comparison of expected capital expenditure versus depreciation for the representative firm. To summarise here, according to the three-year projections of book value of assets versus depreciation supplied by Country Energy and change in working capital assumptions supplied by ActewAGL, we estimate that the book value of assets for the representative firm will increase by 2.48% in 2012/13. Our assumption is that the expected growth in the business remains constant from this point onwards, as reflected in cost and revenue increases, but with constant expected volume and customers. In other words, we assume that the representative firm retains the same customer base but inflationary increases in costs are also reflected in prices. While the long-term growth estimate assumed here is below the long-term inflation assumption of 3.00%, it is important from a modelling perspective that there is consistency between the estimated free cash flows available at the end of the three-year explicit forecast period and the long-term growth assumption.⁹ In any event, if we were to use a long-term growth assumption of 3.00% in our expected returns analysis, the estimated EBIT margin would only decrease by 0.1% in our base case.

Summary

In sum, we make the following assumptions in our expected returns modelling, where the mid-point of the range listed below forms our base case assumption:

- the required return to equity holders lies within a range of 10.5 – 12.7% (which includes a range for the equity beta of 0.9 – 1.1) and imputation credits have an estimated value of 0.3 – 0.5 as a proportion of company tax paid;
- the standard deviation of market returns lies within a range of 14 – 24% per year;
- the standard deviation of percentage changes in GDP growth in association with market returns being one standard deviation above- or below-expectations is 1.5 – 2.5%;

⁹ In relation to our electricity work, Origin (2009b, p.33) emphasised the need for internal consistency between input assumptions including that the growth rate assumption be consistent with the allowable costs. Our long-term growth estimate is derived from the standard retailers' projections of growth in their asset base, and IPART's allowable cost estimates have been drawn from that same information set. So we have every reason to believe that there is consistency in that regard. Furthermore, the long-term growth assumption is below expected inflation, so there is minimal risk that we have assumed a long-term growth rate which is overstated relative to the reinvestment required to sustain this growth.

- operating costs are estimated at \$18.73, \$19.64 and \$20.61 per GJ over the first three forecast years, the proportion of volume-related costs is estimated at 65 – 75% and the long-term growth rate is 2.48% per year.

3.3.2 Results

A base-case estimate for the required margin is computed using the mid-points of the assumptions discussed above. Similarly, a range for the required margin could be estimated with reference to the extreme (maximum and minimum) assumptions. However, this approach would result in a wide and relatively meaningless margin range. That is, the probability that all assumptions are at the extreme end of the reasonable range is small. For this reason, our margin analysis considered 81 potential scenarios. Each assumption outlined at the end of the previous section was assumed to take one of three values: high-point, mid-point and low-point.¹⁰ This resulted in a potential distribution for the required margin that incorporates uncertainty in the key assumptions. Our approach is to assume a reasonable range that incorporates the middle third of the 81 potential outcomes. In other words, the low and high results reported in Table 4 reflect the 33rd and 67th percentiles, of projections for each year. We subsequently present a detailed summary of the expected income statement and valuation metrics for the representative firm. The binomial trees which underpin this analysis are presented in Appendix 6.1.

We estimated a reasonable range for the EBIT margin of 5.9 – 7.5%, which translates to EBITDA margin ranges of 7.5 – 9.0%, 7.5 – 9.0% and 7.5 – 9.1% for forecast years 1, 2 and 3, respectively. These percentage margins correspond to the following margins with respect to forecast years 1, 2 and 3: EBITDA margins per GJ of \$1.49 – 1.83, \$1.56 – 1.92, and \$1.64 – 2.02; and EBITDA margins per customer of \$53 – 65, \$56 – 69 and \$59 – 72. These dollar margin ranges overlap with the dollar margin ranges we estimated in our electricity report, which are also presented in the table.

The primary reason for the higher estimated margins for gas versus electricity retailers is the assumption that non volume-related costs are 25 – 35% of total costs, compared to a range of 15 – 25% for electricity retailers. Had we relied upon an assumption that non volume-related costs are 15 – 25% of total costs, the estimated range under the expected returns approach would have been an EBIT margin of 4.8 – 5.9%. This would have resulted in the following estimated range under the expected returns approach for forecast years one, two and three respectively: EBITDA margins of 6.5 – 7.5%, 6.4 – 7.5% and 6.5 – 7.6%; EBIT margins of \$0.95 – 1.18 per GJ, \$1.00 – 1.24 per GJ and \$1.05 – 1.30 per GJ; and EBITDA margins of \$1.27 – 1.50 per GJ, \$1.33 – 1.57 per GJ and \$1.40 – 1.65 per GJ.

We also observe implied value per customer multiples of \$285 – 417 and value per GJ multiples of \$8 – 12. In Section 3.5 we present our bottom-up analysis which relies upon observed transaction multiples for Australian electricity and gas retailers. The average inflation-adjusted customer multiple is \$983 and the average inflation-adjusted volume multiple is \$22 per GJ. Hence, the value per customer and the value per GJ multiples implied by the expected returns analysis are below the average prices observed in acquisitions.¹¹

The difference between valuation multiples and margins implied by the expected returns approach and the bottom-up analysis could occur for a number of reasons. For example the difference could occur because:

¹⁰ With three difference states and four variables, the number of scenarios is $3^4 = 81$.

¹¹ The valuation multiples with respect to earnings (EBITDA, EBIT and NPAT) are lower for gas versus electricity because of the lower growth trajectory of earnings in the first three forecast years, resulting from substantial cost escalations for electricity during this period. The valuation multiples with respect to revenue are higher for gas versus electricity because of the higher profit margins estimated for gas.

Table 4. Margin summary and valuation metrics according to the expected returns analysis

	Year 1 ranges			Year 2 ranges			Year 3 ranges			2007 report		
	Low	Base	High	Low	Base	High	Low	Base	High	Low	Base	High
<i>Panel A: Gas</i>												
EBITDA margin												
% sales	7.5	8.2	9.0	7.5	8.2	9.0	7.5	8.2	9.1			
\$/GJ	1.49	1.65	1.83	1.56	1.73	1.92	1.64	1.82	2.02			
\$/Customer	53	59	65	56	62	69	59	65	72			
EBIT margin												
% sales	5.9	6.6	7.5	5.9	6.6	7.5	5.9	6.6	7.5			
\$/GJ	1.17	1.33	1.51	1.23	1.40	1.59	1.29	1.47	1.66			
\$/Customer	42	47	54	44	50	57	46	53	60			
Value (\$m)	59	72	87	62	75	89	64	77	92			
Book-to-mkt assets ¹²	1.34	1.61	1.96	1.34	1.60	1.94	1.34	1.59	1.92			
Value multiples:												
\$/GJ	8	10	12	8	10	12	8	10	12			
\$/Customer	285	349	417	286	350	419	287	351	419			
\$/Revenue	0.40	0.49	0.58	0.38	0.46	0.55	0.36	0.44	0.53			
\$/EBITDA	5.4	5.9	6.5	5.1	5.7	6.2	4.9	5.4	5.9			
\$/EBIT	6.8	7.3	7.8	6.5	7.0	7.4	6.2	6.7	7.1			
Equity multiple:												
\$/NPAT	8.3	9.0	9.8	7.8	8.5	9.3	7.4	8.1	8.8			
<i>Panel B: Electricity</i>												
EBITDA margin												
% sales	3.6	4.1	4.7	3.6	4.2	4.8	3.4	4.0	4.6	4.3	5.1	6.4
\$/GJ	1.92	2.25	2.58	2.19	2.56	2.97	2.56	3.00	3.47	2.19	2.61	3.28
\$/Customer	65	76	88	75	87	101	87	102	119	44	52	66
EBIT margin												
% sales	2.6	3.2	3.8	2.6	3.2	3.8	2.6	3.2	3.8	3.5	4.3	5.5
\$/GJ	1.42	1.75	2.08	1.61	1.97	2.36	1.97	2.42	2.89	1.75	2.17	2.83
\$/Customer	48	59	71	55	67	81	68	83	100	35	43	57
Value (\$m)	402	502	611	419	522	634	426	531	644	460	574	774
Book-to-mkt assets	0.65	0.79	0.98	0.64	0.77	0.96	0.63	0.76	0.95	0.51	0.59	0.86
Value multiples:												
\$/GJ	15	18	22	15	19	23	15	19	23	26	32	43
\$/Customer	497	620	754	510	636	774	523	652	794	511	638	860
\$/Revenue	0.27	0.30	0.41	0.24	0.30	0.37	0.20	0.25	0.30			
\$/EBITDA	7.6	8.2	8.6	6.7	7.3	7.7	5.9	6.4	6.6			
\$/EBIT	10.1	10.5	10.7	9.1	9.4	9.6	7.6	7.9	8.0			
Equity multiple:												
\$/NPAT	13.7	14.3	14.5	12.0	12.5	12.7	9.6	10.0	10.2			

- the cost of capital is lower than assumed in our expected returns analysis (that is, the market pays higher prices for assets because its expected returns are less than we have assumed) – all else being

¹² We received little information from the four standard retailers on book values of assets, so do not interpret this ratio.

equal a 1% change in the cost of capital accompanied by a 1% change in the long-term growth estimate changes the estimated margin by 0.2% in the opposite direction;¹³

- the volatility of market returns is lower than we have assumed (that is, we under-estimate the required margin and therefore understate value because market risks are overstated) – all else being equal a 5% change in the volatility assumption changes the estimated margin by approximately 1.7% in the opposite direction;
- the standard deviation of changes in expected volume in association with market movements is greater than we have assumed (that is, we under-estimate the required margin and therefore understate value because the systematic risk of volume changes is understated) – all else being equal a 0.5% change in the standard deviation of percentage volume fluctuations changes the estimated margin by 1.3% in the same direction; and
- the proportion of fixed costs in a retailers' cost structure is more than we assumed (that is, we under-estimate the required margin and therefore understate value because operating risks are understated) – all else being equal a 5% change in the proportion of fixed costs changes the estimated margin by 0.7% in the same direction.

The table below illustrates the expected income statement and valuation metrics over a ten-year forecast horizon incorporating a constant expected EBIT margin of 6.6%. Over the first three years this table can be directly compared with data presented in corresponding tables which underpin the bottom-up analysis of Section 3.5.

To illustrate the relationship between the estimated margin and systematic risk, we present Table 6 which shows the distribution of returns to equity holders and the market given 11 potential market outcomes at the end of the ten-year forecast horizon. The shaded section highlights the most likely outcomes, which have a cumulative probability of occurrence of 89%, in which equity holders would expect to earn total returns of –3 to 18% per year, and the market is expected to earn total returns of 3 to 18% per year.

¹³ The sensitivity analysis presented in this section is derived by computed the average EBIT margin resulting from 27 scenarios associated with the high, mid-point and low values of the particular variable of interest. We then take an average of the difference between the average EBIT margin associated with the high input versus the base case, and the difference between the average EBIT margin associated with the low input versus the base case. For example, the average estimated EBIT margin associated with the mid-point cost of capital and growth assumptions is 6.97% (the averaging across 27 other scenarios is the reason for the difference between this figure and 6.64% in the base case). Under the lower cost of capital and long-term growth assumptions the average estimated EBIT margin is 7.27% and under the higher cost of capital and long-term growth assumptions the average estimated EBIT margin is 6.78%. The differences between these estimates and the averages under the mid-point cost of capital and growth assumptions are 0.30% and 0.19%, respectively, which implies an average sensitivity of 0.24%.

Table 5. Expected financial statement items derived from the expected returns analysis

Year	0	1	2	3	4	5	6	7	8	9	10
PJ	7.206	7.397	7.411	7.420	7.420	7.420	7.420	7.420	7.420	7.420	7.420
Customers (million)	0.207	0.208	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207	0.207
Income statement, cash flows and valuation											
Revenue		148.4	155.9	163.8	167.8	172.0	176.3	180.7	185.1	189.7	194.4
Operating costs		136.2	143.1	150.3	154.0	157.8	161.8	165.8	169.9	174.1	178.4
EBITDA		12.2	12.8	13.5	13.8	14.2	14.5	14.9	15.2	15.6	16.0
Depreciation		2.4	2.4	2.6	2.7	2.7	2.8	2.9	2.9	3.0	3.1
EBIT		9.9	10.4	10.9	11.1	11.4	11.7	12.0	12.3	12.6	12.9
Interest		1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3
Pre-tax profit		8.0	8.5	8.9	9.2	9.4	9.6	9.9	10.1	10.4	10.6
Income tax expense		2.4	2.5	2.7	2.8	2.8	2.9	3.0	3.0	3.1	3.2
Net profit after tax		5.6	5.9	6.3	6.4	6.6	6.7	6.9	7.1	7.3	7.4
Capital expenditure		5.6	5.6	5.7	5.8	5.9	6.1	6.2	6.4	6.6	6.7
Borrowings/repayments to debtholders		0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
Net cash flows to equityholders including imputation benefits		4.1	4.5	4.9	5.0	5.1	5.2	5.4	5.5	5.6	5.8
Net cash flows to debtholders		1.1	1.2	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6
NPV of cash flows to equityholders (end)	51	52	54	55	57	58	60	61	63	64	66
NPV of cash flows to debtholders (end)	22	22	23	24	24	25	26	26	27	27	28
Firm value	72	75	77	79	81	83	85	87	89	92	94
Leverage	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Growth in debt over time		3.40%	2.98%	2.48%	2.48%	2.48%	2.48%	2.48%	2.48%	2.48%	2.48%
Exp capex from debt		0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
Equity reinvestment	2.4	2.5	2.5	2.5	2.5	2.6	2.7	2.7	2.8	2.9	2.9
Value decomposition											
Debt	21.7	22.5	23.1	23.7	24.3	24.9	25.5	26.1	26.8	27.5	28.1
Equity	50.7	52.4	54.0	55.3	56.7	58.1	59.5	61.0	62.5	64.1	65.7
Firm	72.4	74.9	77.1	79.0	81.0	83.0	85.0	87.1	89.3	91.5	93.8
Book value of assets	116.3	119.5	122.7	125.7	128.8	132.0	135.3	138.7	142.1	145.6	149.3
Book-to-market assets	1.61	1.60	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59
Book-to-market equity	1.87	1.85	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84	1.84
Value0/Revenue		0.49	0.46	0.44	0.43	0.42	0.41	0.40	0.39	0.38	0.37
Value0/EBITDA		5.9	5.7	5.4	5.2	5.1	5.0	4.9	4.7	4.6	4.5
Value0/EBIT		7.3	7.0	6.7	6.5	6.3	6.2	6.0	5.9	5.7	5.6
Price0/Earnings		9.0	8.5	8.1	7.9	7.7	7.5	7.3	7.2	7.0	6.8
Value0/GJ		9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8
Value0/Customer		349	350	351	351	351	351	351	351	351	351

Table 5. Expected financial statement items derived from the expected returns analysis (continued)

Year	0	1	2	3	4	5	6	7	8	9	10
Income statement (%)											
Revenue	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Operating costs excluding D&A	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8	91.8
EBITDA	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2	8.2
D&A	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
EBIT	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6
Interest expense	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
Pre-tax profit	5.4	5.4	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Income tax expense	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
Net profit after tax	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8	3.8
Income statement (\$ per GJ)											
Revenue	20.07	21.04	22.07	22.62	23.18	23.76	24.35	24.95	25.57	26.21	
Operating costs excluding D&A	18.42	19.31	20.25	20.76	21.27	21.80	22.34	22.90	23.47	24.05	
EBITDA	1.65	1.73	1.82	1.86	1.91	1.96	2.01	2.05	2.11	2.16	
D&A	0.32	0.33	0.35	0.36	0.37	0.38	0.39	0.40	0.41	0.42	
EBIT	1.33	1.40	1.47	1.50	1.54	1.58	1.62	1.66	1.70	1.74	
Interest expense	0.25	0.25	0.26	0.27	0.27	0.28	0.29	0.29	0.30	0.31	
Pre-tax profit	1.09	1.14	1.21	1.24	1.27	1.30	1.33	1.36	1.40	1.43	
Income tax expense	0.33	0.34	0.36	0.37	0.38	0.39	0.40	0.41	0.42	0.43	
Net profit after tax	0.76	0.80	0.84	0.87	0.89	0.91	0.93	0.95	0.98	1.00	
Income statement (\$ per customer)											
Revenue	714.69	753.80	792.97	812.66	832.83	853.50	874.69	896.41	918.66	941.47	
Operating costs excluding D&A	655.88	691.88	727.66	745.73	764.24	783.21	802.65	822.58	843.00	863.93	
EBITDA	58.81	61.91	65.31	66.93	68.59	70.29	72.04	73.83	75.66	77.54	
D&A	11.33	11.84	12.63	12.95	13.27	13.60	13.93	14.28	14.63	15.00	
EBIT	47.48	50.07	52.68	53.98	55.32	56.70	58.10	59.55	61.02	62.54	
Interest expense	8.73	9.07	9.35	9.58	9.82	10.06	10.31	10.57	10.83	11.10	
Pre-tax profit	38.74	41.01	43.32	44.40	45.50	46.63	47.79	48.98	50.19	51.44	
Income tax expense	11.62	12.30	13.00	13.32	13.65	13.99	14.34	14.69	15.06	15.43	
Net profit after tax	27.12	28.70	30.33	31.08	31.85	32.64	33.45	34.28	35.13	36.01	
Expected cash flows as a probability-weighted average											
Revenue	148.4	155.9	163.8	167.8	172.0	176.3	180.7	185.1	189.7	194.4	
EBIT	9.9	10.4	10.9	11.1	11.4	11.7	12.0	12.3	12.6	12.9	
Pre-tax profit	8.0	8.5	8.9	9.2	9.4	9.6	9.9	10.1	10.4	10.6	
Income tax expense	2.4	2.5	2.7	2.8	2.8	2.9	3.0	3.0	3.1	3.2	
Net profit after tax	5.6	5.9	6.3	6.4	6.6	6.7	6.9	7.1	7.3	7.4	
Cash flows to debt and equity holders including imputation t	5.2	5.7	6.2	6.4	6.5	6.7	6.9	7.0	7.2	7.4	
Disaggregation of returns to providers of capital											
Expected cash flows to equity (\$m)	4.1	4.5	4.9	5.0	5.1	5.2	5.4	5.5	5.6	5.8	
Capital gains (\$m)	1.7	1.6	1.3	1.4	1.4	1.4	1.5	1.5	1.6	1.6	
Total return (\$m)	5.8	6.0	6.2	6.4	6.5	6.7	6.8	7.0	7.2	7.4	
Total return (%)	11.50%	11.50%	11.50%	11.50%	11.50%	11.50%	11.50%	11.50%	11.50%	11.50%	
Expected cash flows to debtholders (\$m)	1.1	1.2	1.4	1.4	1.4	1.5	1.5	1.5	1.6	1.6	
Capital gains (\$m)	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	
Total return (\$m)	1.8	1.9	1.9	2.0	2.0	2.1	2.1	2.2	2.2	2.3	
Total return (%)	8.35%	8.35%	8.35%	8.35%	8.35%	8.35%	8.35%	8.35%	8.35%	8.35%	

Table 6. Disaggregation of returns at the end of ten years

Economic state	Probability (%)	Cumulative return (%)		Annualised return (%)	
		Equity holders	Market	Equity holders	Market
1	0.1	820	1333	25	31
2	1.0	684	915	23	26
3	4.4	554	620	21	22
4	11.7	428	410	18	18
5	20.5	308	262	15	14
6	24.6	192	156	11	10
7	20.5	80	82	6	6
8	11.7	-27	29	-3	3
9	4.4	-129	-9	na	-1
10	1.0	-228	-35	na	-4
11	0.1	-320	-54	na	-8
Expectation		197	197		
Variance		324	292		
Covariance			292		
Beta			1.00		

Referring to the cumulative returns over ten years we have the following computation which is consistent with an equity beta of one.

$$\begin{aligned}
 \beta &= \frac{COV(r_m, r_e)}{\sigma_m^2} \\
 &= \frac{\sum_{i=1}^{11} p_i \times [r_{e,i} - E(r_e)] \times [r_{m,i} - E(r_m)]}{\sum_{i=1}^{11} p_i \times [r_{m,i} - E(r_m)]^2} \\
 &= \frac{0.001 \times [8.20 - 1.97] \times [13.33 - 1.97] + \dots + 0.246 \times [1.92 - 1.97] \times [1.56 - 1.97] + \dots + 0.001 \times [-3.20 - 1.97] \times [-0.54 - 1.97]}{0.001 \times [13.33 - 1.97]^2 + \dots + 0.246 \times [1.56 - 1.97]^2 + \dots + 0.001 \times [-0.54 - 1.97]^2} \\
 &= \frac{2.92}{2.92} \\
 &= 1.00
 \end{aligned}$$

where:

$COV(r_e, r_m)$ is the covariance of equity and market returns;

σ_m^2 is the variance of market returns;

p_i is the probability of economic state i from 1 to 11;

$r_{e,i}$ and $r_{m,i}$ are the expected returns to equity holders and the market in economic state i ; and

$E(r_e)$ and $E(r_m)$ are the aggregate expected returns to equity holders and the market

3.4 Benchmarking

The rationale for conducting a benchmarking exercise is that margins for a gas retail business should be broadly consistent with margins for other comparable retail businesses. Our method for this analysis is 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, whereby the set chosen involves a trade-off between (1) obtaining a sufficiently large sample size to ensure the statistical reliability of estimates; and (2) ensuring that the set of firms face substantially the same risk and growth prospects as a New South Wales gas retailer. Our analysis comprises two sets of comparable firms, the broader class of listed retailers from Australia, the United States and the United Kingdom, and listed and non-listed energy utilities from those markets.

The strength of the expected returns technique is that it is entirely consistent with the CAPM, 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.

3.4.1 Analysis of listed retailers

With respect to listed retailers we analysed financial information on an annualised basis from 1980 – 2008. Our sample comprised 329 firms listed in Australia (37), the United Kingdom (59) and the United States (233) and which were classified as General Retailers and Food & Drug Retailers by Thomson Financial.¹⁴ Our sample consists of 4,006 observations, which represents an average of 12 years of data per firm. In arriving at this sample, we excluded observations 7% of observations in which the EBITDA/Sales, EBIT/Sales, Leverage, Book-to-market equity ratio, Book-to-market assets ratio or the Value/EBIT ratio was less than the 1st percentile or greater than the 99th percentile. This is to ensure that our conclusions are not based upon extreme outcomes which are likely to be due to asset writedowns. For example, the average EBIT margin based upon all data points is –12.2%, compared to the median of 5.9% for all observations. Descriptive statistics are presented in Table 7.

¹⁴ In relation to the electricity report, EnergyAustralia (2009, p.23) expressed the view that the broader class of listed retailers are not necessarily comparable businesses because they do not bear the risks associated with the obligation to supply and their operating environments may be very different, in terms of regulation, wages costs and accounting standards. A similar concern is expressed by Origin (2009b, p.34) noted that firms within the comparable firm set use different reporting frameworks so are not directly comparable and that historical margins may not be indicative of margins we would expect in the future. We don’t disagree that the broader classes of retailers run different businesses to electricity and gas retailers, and that their regulatory and operating conditions are different. However, if the objective is to estimate the profit margin which is likely to prevail in a competitive environment, we should have some regard to the margins actually observed in a competitive environment. Further, as discussed in Section 3.4.2, we simply are unable to observe a large sample of profit margins for pure retail electricity and gas businesses, and the margins we can observe are largely a function of the Australian regulatory environment, rather than an independent measurement of margins observed in a competitive market. EnergyAustralia also noted the importance of transparency in the comparable firm selection, as did other participants at the electricity forum subsequent to the release of our methodology paper. All comparable firms used in the benchmarking analysis are listed either in Appendix 6.2, in respect of the listed retail businesses, or in Section 3.4.2 in respect of the listed utilities.

Table 7. Summary statistics for 329 Australian, US and UK listed retailers from 1980 – 2008

	N	EBITDA/Sales (%)				EBIT/Sales (%)				Leverage (%)				Book-to-market assets (%)				Value/EBIT			
		Mn	Md	Lo	Hi	Mn	Md	Lo	Hi	Mn	Md	Lo	Hi	Mn	Md	Lo	Hi	Mn	Md	Lo	Hi
All firms	4006	9.3	8.5	9.1	9.5	6.5	6.1	6.3	6.7	19	12	18	19	62	53	61	64	12.9	11.1	12.5	13.4
<u>Country</u>																					
Australia	248	9.2	7.6	8.0	10.3	6.8	5.4	5.6	7.9	19	12	17	21	63	49	58	67	12.1	11.4	10.9	13.4
UK	792	8.7	8.5	8.2	9.1	6.2	6.2	5.7	6.7	17	11	16	18	63	52	60	65	11.6	10.2	10.6	12.6
USA	2966	9.8	8.6	9.3	9.8	6.6	6.1	6.4	6.8	20	12	19	20	62	53	61	64	13.4	11.3	12.9	13.9
<u>Sub-industry</u>																					
Apparel retailers	1027	10.0	10.1	9.6	10.3	7.1	7.5	6.8	7.5	14	7	13	15	60	51	58	62	12.0	10.2	11.3	12.8
Broadline retailers	333	8.0	7.6	7.4	8.6	5.7	5.6	5.1	6.3	20	15	18	21	67	57	63	70	12.2	12.1	10.9	13.6
Drug retailers	201	5.8	6.2	5.1	6.4	4.5	4.9	3.8	5.1	14	9	12	15	52	47	48	55	14.8	13.0	13.2	16.5
Food ret. & w'salers	512	6.1	5.5	5.8	6.5	4.1	3.7	3.8	4.4	24	17	22	25	65	57	62	67	11.6	10.7	10.8	12.3
Home improvement	253	9.4	9.2	8.9	9.9	7.3	7.5	6.8	7.8	19	13	17	21	60	49	56	65	13.6	10.7	12.1	15.2
Specialty retailers	1148	7.5	7.1	7.1	7.8	5.3	4.9	4.9	5.7	22	13	21	23	68	57	65	70	13.1	11.1	12.2	14.0
Ex Spec. cons.svs	3474	8.1	7.9	7.9	8.3	5.8	5.7	5.6	6.0	19	12	18	19	63	54	62	64	12.6	10.9	12.2	13.0
Specialised cons. svcs	532	17.3	17.8	16.3	18.3	11.3	11.7	10.3	12.2	20	14	19	22	57	48	55	60	15.2	12.1	13.6	16.8
<u>Year</u>																					
1980	24	9.1	8.8	7.1	11.1	7.2	6.6	5.5	9.0	30	19	20	40	85	77	71	99	7.0	6.7	6.0	8.0
1981	38	9.4	8.5	8.0	10.8	7.6	7.0	6.4	8.9	26	17	20	33	79	74	69	90	6.9	6.5	6.2	7.7
1982	41	9.2	8.7	7.8	10.6	7.4	7.2	6.1	8.7	20	12	15	26	60	54	51	69	9.7	8.9	8.4	11.0
1983	45	9.6	9.7	8.4	10.9	7.9	8.1	6.8	9.1	18	10	14	22	55	50	47	64	10.6	9.7	9.4	11.8
1984	49	9.8	8.7	8.5	11.1	8.2	7.7	7.0	9.4	16	10	13	20	57	48	49	64	9.5	8.4	8.4	10.5
1985	51	9.8	9.6	8.6	11.0	8.0	7.4	6.9	9.1	15	12	11	18	50	42	43	57	11.1	10.3	10.1	12.2
1986	57	10.0	9.4	8.8	11.2	8.0	7.8	6.9	9.1	15	11	11	18	47	41	41	53	13.5	10.9	11.4	15.7
1987	65	11.4	10.5	10.1	12.6	9.4	8.8	8.2	10.5	17	11	14	21	57	49	50	64	10.0	9.0	8.8	11.3
1988	77	11.3	10.2	10.0	12.6	9.0	8.1	7.9	10.0	18	16	15	21	58	54	52	64	9.5	9.3	8.5	10.5
1989	79	9.8	9.5	8.9	10.8	7.7	7.1	6.8	8.6	22	21	19	26	66	60	59	72	11.1	9.9	9.7	12.5
1990	87	9.7	9.3	8.5	10.8	7.5	7.2	6.4	8.5	23	22	20	27	73	66	66	80	10.3	7.9	7.1	13.5
1991	93	9.7	8.4	8.5	10.9	7.3	6.6	6.2	8.3	22	18	19	26	66	57	59	73	14.4	11.1	11.1	17.7
1992	103	9.2	8.8	8.0	10.4	6.3	6.4	5.4	7.3	19	14	16	22	60	53	54	66	15.5	13.5	12.8	18.3
1993	130	8.7	8.2	7.7	9.7	6.1	6.1	5.1	7.0	17	12	14	19	54	49	49	59	17.0	12.4	13.8	20.1
1994	139	9.2	8.1	8.1	10.2	6.6	6.0	5.7	7.4	19	13	16	22	62	57	57	67	15.6	11.4	13.1	18.1
1995	151	9.7	8.6	8.7	10.8	7.0	6.3	6.2	7.9	19	12	16	21	64	56	58	70	13.6	10.9	11.1	16.1
1997	166	9.0	8.0	7.9	10.1	6.2	5.7	5.3	7.2	19	14	16	21	59	53	54	64	12.8	11.5	10.6	15.1
1998	178	9.5	8.4	8.5	10.5	6.9	5.8	6.0	7.7	18	10	15	20	56	45	51	61	16.8	14.2	14.8	18.7
1999	182	9.9	8.7	9.0	10.7	7.1	6.2	6.3	7.9	18	11	16	20	59	49	54	64	15.6	13.1	13.6	17.6
2000	191	9.8	9.7	8.6	11.1	6.8	6.9	5.7	8.0	22	13	19	24	65	56	60	71	12.4	10.6	11.0	13.9
2001	206	9.1	9.3	7.9	10.3	5.8	6.4	4.6	7.0	24	14	21	27	75	66	69	82	11.7	9.4	9.8	13.5
2002	218	7.7	7.7	6.3	9.0	4.1	5.0	2.7	5.6	20	11	18	23	63	53	58	67	12.7	11.7	10.6	14.8
2003	234	8.5	8.1	7.4	9.6	5.1	5.1	3.8	6.3	19	12	17	22	67	60	63	72	11.3	9.9	8.9	13.7
2004	242	8.9	8.1	7.9	9.9	5.7	5.4	4.7	6.8	17	8	15	19	56	48	52	59	13.2	12.4	11.0	15.4
2005	263	9.6	8.3	8.7	10.5	6.5	5.7	5.7	7.4	17	10	15	19	54	46	51	57	15.5	12.8	13.6	17.4
2006	270	9.6	8.3	8.7	10.4	6.7	5.7	5.9	7.5	16	9	14	17	54	46	50	57	15.1	12.8	13.3	17.0
2007	285	9.5	8.1	8.6	10.4	6.7	5.7	5.8	7.6	14	9	13	16	52	44	49	55	14.1	12.9	12.2	16.0
2008	263	9.0	8.3	8.2	9.8	6.1	5.8	5.3	6.9	18	11	16	19	66	55	62	70	12.9	10.6	11.1	14.7

Observations in which the EBITDA margin, EBIT margin, Book-to-market equity ratio, book-to-market assets ratio and Value/EBIT ratio are below the 1st percentile or above the 99th percentile are excluded. Mean estimates for individual firms and the number of observations contributed by each firm, are contained in Appendix 6.2.

The appropriate profit margin for comparison with gas retailers is the EBIT margin of listed retailers, rather than the EBITDA margin. Listed retailers are more capital-intensive than gas retailers, incurring depreciation charges which, on average, are 2.8% of sales. However, for completeness, we report descriptive statistics on both EBITDA and EBIT margins, along with leverage [Debt/(Debt + Market capitalisation)], Book-to-market assets ratio [(Book value of equity + Debt)/(Market value of equity + Debt)] and Value/EBIT [(Market value of equity + Debt)/EBIT]. The table presents mean and median

figures, along with lower and upper bounds from a 90% confidence interval around the mean estimate.¹⁵

We observe an average EBIT/Sales ratio of 6.5% for the full sample (within a 90% confidence interval of 6.3 – 6.7%).¹⁶ There is no material difference in the profitability of retailers across the three countries analysed, with average EBIT margins of 6.2% for the United Kingdom, 6.6% for the United States and 6.8% for Australia. Average margins are higher in the early years of the sample, with an annual average of 7.9% observed in the 12 years from 1980 – 1991 and 6.2% for the 17 years from 1992 – 2008. This reduction in profitability in later years of the sample is present for all six sub-industries examined.

There are also differences in profitability across sub-industries with average EBIT margins ranging from 4.1% for Food Retailers & Wholesalers to 11.3% for Specialized Consumer Services. Specialized Consumer Services, comprising 60 firms and 532 annual observations, is the sub-industry which is most markedly different from the other sub-industries. The remaining firms in the sample have an average EBIT margin of 5.8%. They also have considerably lower Value/EBIT ratios, which on average are 12.6 compared to 15.2, and are less capital-intensive. Comparing the EBITDA margin and the EBIT margin, the other firms report average depreciation & amortisation/sales of 2.2%, compared to 6.1% for Specialized Consumer Services.¹⁷

We consider the most appropriate sample for our benchmarking exercise to be the sample of 269 firms and 3,474 annual observations of listed retailers which excludes Specialized Consumer Services. These firms have average EBIT/Sales ratio of 5.8%, leverage of 19%, book-to-market assets ratio of 63% and Value/EBIT ratio of 12.6 times.¹⁸

3.4.2 Analysis of energy utilities

We analysed the segment information for 84 energy utilities which were either (1) listed in Australia, the United States or the United Kingdom and classified by the North American Industry Classification System (NAICS) as code 2211, which corresponds to energy generation, transmission and distribution utilities; or (2) Australian businesses – listed and unlisted – for which retail profitability data is known to be available. Unfortunately the listed energy utilities in the United Kingdom and the United States

¹⁵ The 90 per cent confidence interval is computed by adding and subtracting a multiple of the standard error, where the standard error is the standard deviation divided by the square root of the number of observations. For example, for the full sample of 4,006 observations, the *t*-statistic corresponding to a 90 per cent confidence interval is 1.65. The standard deviation of the EBIT margin is 8.17% so the standard error is 0.13% (that is, $0.0817 \div \sqrt{4006} = 0.0817 \div 63 = 0.0013$). This means that the lower bound of the 90 per cent confidence interval is $0.065 - 1.65 \times 0.0013 = 0.063$ and the upper bound is $0.065 + 1.65 \times 0.0013 = 0.067$.

¹⁶ This means that, based upon the dispersion of EBIT/Sales ratios observed amongst our sample of 329 listed retailers, there is a 90 per cent chance that the average EBIT/Sales ratio for the population of listed retailers lies between 6.3 and 6.7%. The confidence interval does not provide information about whether this sample is appropriate for addressing a particular research issue, it only provides a range for the mean estimate in a population. In other words, it does not provide information about whether that population is an appropriate benchmark for addressing the issue at hand.

¹⁷ Representative firms in this segment include Career Education Corporation, which provides degree, certificate and diploma programs in vocational disciplines (Average EBITDA margin = 17.3%; EBIT margin = 12.1%), Monro Muffler Brake and Service (Average EBITDA margin = 16.5%; EBIT margin = 11.1%) and Sotheby's, an auction firm (Average EBITDA margin = 16.2%; EBIT margin = 12.2%).

¹⁸ Our conclusions on the benchmarking analysis relied primarily on the measurement of EBIT margins of 3,474 observations from listed retailers over a 29-year period from 1980 – 2008. Origin (2010, p.14) expressed its concern over the use of retail businesses' total earnings in the analysis as they will incorporate large volume, small margin components rather than supplying small retail customers." The implication is that business which supply a large number of small customers are higher than businesses which supply a small number of large customers. In Table 9 of our report we present margin estimates for different retail segments, which include food retailers and wholesalers (average EBIT margin of 4.1%) and drug retailers (average EBIT margin of 4.5%). On a relative basis, these sub-industries would be expected to have the largest customer numbers and yet have the lowest average margins. Further, it is unclear what the alternative would be to using the listed retailers total earnings in analysis. We analysed the segment data for 84 listed energy utilities and in Table 10 report the profit margins for business which separately reported earnings for their retail energy segments. This left us with just five firms with available data over the three year period from 2006 – 2008. It is unlikely that segment analysis of the broader class of listed retailers will provide any additional useful information on the retail margins earned by businesses supplying small customers.

provide insufficient detail in their segment reporting to reach meaningful conclusions regarding the profitability of retail segments. Only one of these firms – RRI Energy Inc. – reported data which we considered to be sufficiently close to an energy retail segment to form a reliable observation. At present, we do not have historical financial statement information available to compute the corresponding figures for the four standard gas retailers in New South Wales.

Table 8. Profit margins of retail energy businesses

Year to June	EBITDA (%)			EBIT (%)		
	2009	2008	2007	2009	2008	2007
RRI Energy (retail energy) ¹	-7.4	11.5	3.0	-10.0	11.2	2.9
Australian Power and Gas	-22.5	-51.1	-759.1	-13.0	-35.6	-808.8
AGL Energy (retail energy)	4.7	6.1	3.8	3.9	5.6	3.4
Babcock and Brown Power (energy markets)	14.3	19.0		8.2	13.3	
Origin Energy (retail)	8.9	10.6	9.6	7.9	9.7	8.4
Country Energy (NSW regulated electricity)		Commercial in confidence			Commercial in confidence	
Energy Australia (NSW regulated electricity)		Commercial in confidence			Commercial in confidence	
Integral Energy (NSW regulated electricity)		Commercial in confidence			Commercial in confidence	
		<u>Medians over three years</u>				
All observations (n=20)		5.4			4.8	
Profitable Australian firms (n=14)		7.1			6.7	
NSW regulated segments (n=6)		6.2			5.8	

¹Year to December of the prior year. Depreciation and amortisation is estimated as equal to capital expenditure on long-lived assets in computing the EBIT margin.

There are seven Australian firms in our dataset, including the three standard electricity retailers. For the three standard electricity retailers – EnergyAustralia, Integral Energy and Country Energy – we compiled their EBIT and EBITDA margins from the NSW regulated electricity business for two years ending 30 June 2008, according to the regulatory accounts submitted to IPART.¹⁹ For the other four Australian businesses we compiled retail segment information from their annual reports. The segments were the retail energy segment of AGL Energy for the five years ending 30 June 2009, the entire firm for Australian Power and Gas for the three years ending 30 June 2009, the energy markets segment of Babcock and Brown Power for the two years ending 30 June 2009 and the retail segment of Origin Energy for the three years ending 30 June 2009.

The data limitations and the obvious circularity involved (we are observing the retail margins for regulated businesses in order to determine their future retail margin) alter our approach to the energy utilities data. We approach this information to determine whether there is something noticeably different about the margins currently being earned by retail energy businesses, compared to the margins earned by the broader class of retailers, and the margins implied by our expected returns and bottom-up analysis. In other words, is there information in the segment data which implies that the margins implied by our analysis are substantially different than the businesses' current level of profitability? And if there is a substantial difference in profitability, is there an appropriate economic explanation?

The table above presents estimated profit margins for the eight energy retail business segments, comprising 20 data points in each case. The median EBITDA margin is 5.9% and the median EBIT margin is 5.5%.²⁰ These medians increase to 7.1% and 6.7% respectively if we consider only the profitable Australian businesses and fall back to 6.2 and 5.8% if we consider just the NSW regulated

¹⁹ The NSW regulated segments of the standard retailers is used in this analysis, but it is worth reiterating that all we can derive from these reported margins is an estimate of the margins actually observed in the same regulatory environment, rather than being an independent assessment of the margins we would expect to observe in a competitive market.

²⁰ The substantial negative margins for Australian Power and Gas make the mean estimate an unreliable estimate of the firms' profitability.

electricity businesses.²¹ The most reasonable conclusion from this data is the observed profit margins of retail energy businesses are not materially different from the observed profit margins of the broader class of retailers, which had a mean EBIT margin of 5.8% within a 90 per cent confidence interval of 5.6 – 6.0%.²²

3.5 Bottom-up analysis

3.5.1 Estimating the asset base

We estimated the asset base of a representative retailer with reference to ten transactions of Australian electricity and gas retailers over the nine year period from 1999 – 2007, as summarised in the table below. We estimated the consideration paid for the proportionate interest acquired, which we then converted to an implied value for a 100% interest. We then computed an inflation-adjusted value as at 30 September 2009 using percentage changes in the consumer price index since the acquisition. This allowed us to estimate inflation-adjusted multiples of value per customer and value per GJ of equivalent energy.²³

The average inflation adjusted multiples are \$983 per customer and \$22 per GJ. There is considerable dispersion in the multiples across the ten transaction which likely reflects variations in expected profitability and growth. For the five transactions which occurred in 2006 – 2007 the average inflation-adjusted multiples are \$1,147 per customer and \$31 per GJ equivalent. In contrast, for the five transactions which occurred in 1999 – 2002 the average inflation-adjusted multiples are \$819 per customer and \$13 per GJ equivalent.

²¹ The most recent regulatory accounts are expected to show lower profitability, given submissions made by regulated businesses that their margins have been under pressure.

²² As part of our benchmarking analysis, we compiled mean and median estimates of the profit margins reported by the three standard electricity retailers in the financial years 2007 and 2008. In relation to the electricity report, Origin (2010, p.15) expressed concern that this was inappropriate, as estimating the margins for the standard retailers is the intention of benchmarking in the first place. We discuss the circularity of this in our report and base our conclusions on the estimated profit margins of the broader class of listed retailers. As discussed, we use this information as a test for reasonableness, to determine whether there is something noticeably different about the margins actually earned by the standard retailers in recent years and those earning historically by other retail businesses.

²³ This is consistent with submissions made by energy retailers with respect to the electricity report, including Energy Australia (2009a, 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 (2009a, p.24): “Origin 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 (2009a, p.4): “The allowance for retail operating costs should be established at a level that includes all costs in attaining, retaining and servicing customers.” Our use of transactions data to derive the estimated asset base is also partly consistent with the view of Country Energy (2009a, 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. In its subsequent submission Country Energy (2009b, p.33) proposed that an asset base be measured by separately identifying fixed assets, intangible assets, energy trading and risk capital and working capital. The limitation of this identification is that intangible assets are most reliably measured as the difference between the market value of a business and the value of tangible assets. The use of transactions data provides us with a total estimated value for the business, and we rely upon estimates of book value of assets from the standard retailers to compute a book-to-market assets ratio as a reasonableness test. There is no additional need to separately identify the components of the asset base, if there is sufficient information in transactions data.

Table 9. Acquisitions of Australian retail electricity and gas businesses

Acquirer	Target	Sector	Date	Interest (%)	Consideration (\$m)	Implied value (\$m)	Inflation-adjusted value (\$m)	Customers ('000)	Volume (PJ)	Valuation multiples		Inflation-adjusted multiples	
										Customer	GJ	Customer	GJ
AGL Energy ¹	Powerdirect Australia	Electricity	19 Feb 2007	100	570	570	696	432	16.9	1,320	34	1,417	36
Alinta/BBP ²	AGL Energy	Gas	2 Nov 2007	33	220	667	299	556	13.0	1,200	51	1,252	54
Origin ³	Sun Retail	Electricity	27 Nov 2006	100	916	916	612	833	32.4	1,100	28	1,181	30
AGL Energy ⁴	Sun Gas Retail	Gas	27 Nov 2006	100	75	75	81	70.8	33.8	1,059	2	1,138	2
Boral Energy ⁵	Energy21	Gas	13 Mar 1999	100	474	474	984	540	61.9	878	8	1,204	10
Origin ⁶	Powercor Retail	Electricity	17 Apr 2001	100	470	470	165	737	29.5	808	16	1,008	20
AGL ⁷	Pulse Energy	Electricity	2 Jul 2002	100	842	842	1,016	1,079	69.8	781	12	941	15
International Power ⁸	Energy Australia	Dual fuel	2 Nov 2007	50	142	284	587	400	na	710	na	748	na
Origin ⁹	CitiPower Retail	Electricity	19 Jul 2002	100	137	137	233	264	21.6	519	6	626	8
AGL Energy	ETSA Power	Electricity	14 Jan 2000	100	175	175	650	737	na	237	na	317	na
Average			13 Mar 2004	88	402	461	532	549	34.9	861	20	983	22
Median			22 Sep 2004	100	345	472	599	548	31.0	843	14	1,073	17

¹ On 19 February 2007 AGL Energy announced the acquisition of Powerdirect Australia from the Queensland Government for \$1,200 million, stating that the acquisition delivers an additional 473,000 customer accounts and an additional load of 19.1TWh. It states that it valued the retail business of 431,800 customers at \$1,300 per customer. Per slide 9/54 of AGL Powerdirect and financial results presentation, AGL stated that the proportion of the total consideration that was attributable to the retail electricity segment was A\$570m. It also states that the industrial/commercial business accounts for approximately 14.4TWh per annum, which leaves 4.7 TWh per annum as the estimated load for the retail business. On 1 March 2007 AGL Energy announced it had completed the acquisition.

² In November 2007, after the Babcock & Brown consortium successfully bought Alinta, Alinta agreed to buy out AGL's 33% interest in AlintaAGL's business for A\$522m (see AGL to record pre-tax profit of A\$125m from sale on interest in AlintaAGL article). The implied valuation of the gas mass market segment of the business is calculated as A\$1,200 per gas customer × number of mass market gas customers. By way of background to the transaction, in October 2006 Alinta (67%) and AGL (33%) formed AlintaAGL to hold Alinta's former WA retail business (predominantly gas customers) and cogeneration interests. In May 2007, when the Macquarie and Babcock & Brown consortium were bidding for Alinta, AGL Energy agreed to purchase the remaining 67% of the AlintaAGL retail business from Macquarie for a net consideration of A\$345m in the event that Macquarie was the successful bidder (see AGL reaches agreement to buy AlintaAGL retail business article).

³ On 27 November 2006 Origin Energy announced the acquisition of Sun Retail for \$1,202 million. It provided a valuation breakdown which included \$916 million for the Mass Market Retail business of 833,000 customers. It announced the completion of the acquisition on 1 February 2007. (Per page 1/4 of Origin Energy acquires Sun Retail press release, the valuation placed on the electricity retail mass market business was A\$916m).

⁴ In 2006, AGL agreed to purchase Sun Gas Retail from Energex for approximately A\$75m. This price was in relation to the entire business which services residential, industrial and commercial customers in Queensland, Northern NSW and Victoria (see AGL acquires Sun Gas Retail business article).

⁵ In March 1999, Envestra and Boral jointly bid for Stratus Networks and Energy21, Victorian gas distribution and gas retail companies respectively. It was agreed that Envestra would pay A\$1.196bn for Stratus Networks and that Boral would pay A\$474m for Energy21 (see slide 3/3 Origin Energy acquisition of Energy21 (Background)).

⁶ In April 2001, Origin Energy agreed to acquire Powercor's electricity retail business for a total of A\$315m cash (A\$235m for the retail business and A\$80m for access to benefits from the wholesale portion of the business). The parties also entered into a revenue sharing arrangement whereby Origin would make an extra payment to Powercor in 12 months time if certain performance benchmarks were met. Subsequent searches of annual reports and ASX announcements did not disclose any further payment being made. Furthermore, Origin assumed A\$315m of Powercor's debt as part of the transaction (based on a percentage split of the purchase price between retail and wholesale, A\$235m of debt attributed to retail unit).

⁷ On 2 July 2002 AGL announced the acquisition of Pulse Energy, EdgeCap and UltiMode for \$880 million including \$79 million of working capital. The announcement stated that Pulse Energy had 560,000 electricity customers and 520,000 gas customers. UltiMode is a customer services business of United Energy, one of the shareholders of Pulse Energy. Pulse Energy was owned by United Energy (25%), Energy Partnership (25%), Shell Australia (40%) and Woodside Energy (10%) and EdgeCap was owned by United Energy (50), Shell Australia (40%) and Woodside Energy (10%). Woodside stated that the sale price for Pulse Energy and EdgeCap was \$842.4 million and the price for UltiMode was \$37.6 million. The annual report for AGL in the year to June 2003 states that Pulse Energy contributed 49.1 PJ of natural gas (equivalent to 13,600 GWh) and 4,146 GWh of electricity, which is equivalent to total volume of 17,800 GWh. This contribution was for approximately 11 months so full year volume is approximately 19TWh.

⁸ In July 2005, International Power Pty Ltd (subsidiary of International Power plc) and Energy Australia Pty Ltd (subsidiary of Energy Australia) entered into a partnership to target residential, commercial and industrial customers in Victoria under the Energy Australia brand. IPower was required to pay A\$60m for its initial 50% stake in the venture. In August 2007, IPower bought out Energy Australia's remaining 50% for A\$142m and eventually formed the wholly-owned subsidiary Simply Energy to continue to sell electricity and gas to retail customers in Victoria and South Australia.

⁹ In July 2006, Cheung Electric agreed to purchase the entire CitiPower business (comprising electricity distribution and electricity retail) from American Electric Power for a total consideration of A\$1.555bn. Cheung Electric made a further agreement with Origin that Origin would purchase only the electricity retail business for A\$137m (both residential and industrial/commercial customers). There was no indication as to whether Origin assumed any of CitiPower's previous debt. For further details, see slide 3/10 of Origin Briefing - Acquisition of CitiPower Retail (22 Jul 2002).

¹⁰ In December 1999, Cheung Kong Infrastructure Holdings (CKI) and Hong Kong Electric International Limited (HEI) purchased ETSA Utilities (including ETSA Power which held the electricity retail assets) from the South Australian government for a total consideration of A\$3.25 billion. CKI and HEI subsequently on-sold the electricity retail portion of the business (ETSA Power) to AGL for A\$175m (see page 1/9 of AGL comment on 2000 results including ETSA Power acquisition, 24 Aug 2000).

In the analysis which follows we estimate the asset base for our representative retailer by applying a two-thirds weight to the average multiples from the five 2006 – 2007 transactions and a one-thirds weight to the average multiples from the five 1999 – 2002 transactions. We are cautious against placing undue weight on a small number of observations, so are reluctant to ignore half of the limited number of observations. In addition, the exclusive use of higher multiples from the more recent transactions reinforces the circularity involved in the bottom-up estimate. If the prices paid in these acquisitions were “too high” in the sense they were made with optimistic expectations of future margins (something which we cannot directly observe), to set a regulated margin on the basis of those prices would imply that retail businesses should be acquired at any cost. Nevertheless, it is relatively more likely that the recent transaction prices provide a more reliable indicator of appropriate asset values, which is the basis for our weighting scheme. We also report results under alternative valuation multiples.²⁴

This results in estimated multiples of \$1038 per customer and \$25 per GJ and implied asset values of \$215 million and \$183 million for our representative business. The average valuation of \$199 million forms the basis for our base case margin estimate using the bottom-up approach. This valuation is consistent with multiples of \$961 per customer and \$27 per GJ.²⁵ Given this asset base, we then estimate the EBIT margin which sets the present value of expected cash flows equal to that asset base. Given that we have cost estimates over a three year period ending 30 June 2013 we model a three year explicit forecast period and then assume that the business grows at a constant rate into perpetuity. The long-term growth rate is estimated at 2.48%, which is estimated as the percentage change in the book value of assets in year three of the explicit forecast period.²⁶ Specifically, the estimated capital expenditure in year three is \$5.7 million, which exceeds estimated depreciation of \$2.6 million by \$3.0 million. The estimated book value of assets at the start of year three is \$122.7 million, so book value is expected to grow by $\$3.0 \text{ million} \div \122.7 million or 2.48%. Holding the book-to-market ratio constant implies that market value and expected cash flows will grow at the same rate.

Consistent with the cost of capital assumptions, the business is assumed to be financed with 30% debt and 70% equity, implying a debt value of \$60 million and equity value of \$139 million. The valuation also implies a book-to-market assets ratio of 0.58, according to an estimated book value of assets of \$116 million. The estimated book value of assets is derived from book value estimates of Country Energy and ActewAGL.

We acknowledge that there is imprecision in this technique used to estimate the asset base, in the absence of the detailed assumptions which underpin the prices paid in the transactions we have observed. This is borne out by the substantial differences in valuation multiples exhibited in the research of equity analysts, both across analysts covering the same company and across different assets valued by the same analyst. For example, consider the following analysis from two equity research houses in relation to current valuation of energy retail businesses and valuations at the time of some transactions reported in the table above.

²⁴ In relation to the electricity report, Origin (2009b, p.34) expressed two concerns about the asset base estimate which underpins the bottom-up approach. First, there are a limited number of relevant transactions. Second, there is an inherent circularity involved in that acquisition prices will reflect purchasers’ expectations for margins, and we use those purchase prices to estimate margins. Both these concerns are valid. With response to the transaction set, our response is analogous to that in relation to that in respect of the benchmarking exercise. If we are to ensure that theoretical models provide sensible explanations for observed market prices we need to have regard to the external reference points which are available to us. Those reference points can be weighted inversely to their reliability, as we have attempted to in our analysis by applying more weight to recent transactions.

²⁵ Specifically, $2/3 \times \$1147 \text{ per customer} + 1/3 \times \$819 \text{ per customer} = \$1038 \text{ per customer}$ which implies an asset base of \$1038 per customer $\times 207,000 \text{ customers} = \215 million ; $2/3 \times \$31 \text{ per GJ} + 1/3 \times \$13 \text{ per GJ} = \$25 \text{ per GJ}$, which implies an asset base of \$25 per GJ $\times 7.4 \text{ PJ} = \183 million ; $(\$215 \text{ million} + \$183 \text{ million}) \div 2 = \199 million .

²⁶ Further discussion of this long-term growth rate assumption is provided on in Section 3.3.1.

With respect to current valuation:

- In February 2010 the energy retailing business of Origin (electricity and gas) was valued by Goldman Sachs JB Were at \$1,538 per customer and approximately 8 times EBITDA (GSJBW, 25 February 2010) while the retail electricity assets in NSW had an estimated value of \$460 per customer (GSJBW, 26 February 2010). GSJBW performs an aggregate valuation of AGL Energy, so does not separately disclose a valuation for its retail segment. But if we apply an 8 times EBITDA multiple to a recent fiscal year 2010 EBITDA projection for the retail segment, the implied multiple would be \$889 per customer (GSJBW, 26 February 2010).²⁷
- In March 2010, the energy retailing business of AGL Energy was valued by Credit Suisse at \$1,170 per customer and approximately 9.9 times EBITDA (Credit Suisse, 24 March 2010). The analyst also commented that gross margins (that is, excluding operating costs) for commercial and industrial customers had recently increased from 7% to 8.5% but that these margins were unlikely to be sustainable.

With respect to acquisition prices (and noting that the analysts in relation to the discussion below are different to the current analysts):

- In relation to Origin's acquisition of Sun Retail, GSJBW noted that the acquisition was accretive to earnings per share, despite the valuation multiple being substantially higher than prices observed in previous transactions (GSJBW, 27 November 2006). This was attributed to scale benefits and lower hedging costs, due to increased geographic diversity and the move towards a more vertically integrated business. Furthermore, the acquisition provided Origin with the opportunity to commercialise its coal seam methane assets. The estimated equity valuation was increased by 4.8%.
- In relation to AGL Energy's acquisition of Sun Gas, GSJBW also commented that the acquisition was expected to be earnings per share accretive and its estimated equity valuation was increased by 1.2% (GSJBW, 27 November 2006).
- In relation to AGL Energy's acquisition of Powerdirect, Credit Suisse commented that AGL had paid a "full price" when comparing the acquisition multiple of \$1,300 per customer to the price of \$1,100 per customer paid by Origin to acquire SunRetail (Credit Suisse, 20 February 2007) but concluded that the deal made strategic sense in that it provided a scalable retail platform entry into the Qld market.²⁸ GSJBW was less supportive, concluding that the acquisition was dilutive to earnings per share by approximately 9% in the fiscal year 2008 and 5% in the following year, and negatively impacted on equity value per share by 4% (GSJBW, 2007).
- In relation to the Alinta transaction, Credit Suisse commented that the price paid for the residential retail segment (\$1,200 per customer) implied an EBITDA multiple of 22.7 based upon an EBITDA margin of \$52.85 per customer (Credit Suisse, 25 September 2007). It also commented that the overall price (that is, the price for retail assets, wholesale assets and generation) reflects economies of scale, and option value inherent in being an incumbent participant as the market moves towards full retail contestability and generation development opportunities.

However, while there is clearly imprecision in applying broad valuation metrics to estimating the asset base, any bias associated with our valuation estimate is likely to be towards overstating, rather than

²⁷ The EBITDA projection for fiscal year 2010 is \$356 million. Relative to projected customer numbers of 3.204 million, this represents EBITDA of \$111 per customer. At a multiple of 8 times this represents value per customer of \$889. The corresponding revenue projection is \$5,249 million implying an EBITDA margin of 6.8%.

²⁸ In December 2006, the energy retailing business of AGL Energy was valued by Credit Suisse at \$1,123 per customer and approximately 11.0 times EBITDA (Credit Suisse, 11 December 2006).

understating value. While valuation estimates differ amongst market participants, a consistent view is that acquisition prices reflect **scale benefits** (including scale benefits of being a dual fuel retailer), **reduction of hedging costs** (due to the natural hedge associated with vertical integration) and the **option value** associated with being an incumbent in the Queensland market during the transition towards full retail contestability.

In estimating the margin we model the entire retail business, rather than the segment of the business which has customers on the regulated tariff, for three reasons. First, this avoids the issue of allocating revenue, costs and capital expenditure amongst these segments, which for some items may require an allocation which is not currently being performed by the businesses, and which may require an arbitrary allocation on the basis of volume or customers, rather than value. Second, given that customers switch between the default tariff and market offers in response to market conditions, the allocation of customers amongst the regulated and contestable segments will be conditional upon the estimated retail margin, creating another circularity. Third, in estimating the margin which allows a normal return to be earned on the asset base, we are estimating the profit margin which would prevail in a competitive market, which necessarily implies that the same margin prevails for both the regulated and contestable segments.

3.5.2 Margin estimates

The table below summarises the bottom-up analysis under our base case assumptions, where the estimated EBIT margin is contained in the 10th row of the first panel. Referring to the average basis valuation, the estimated EBIT margin is 13.2%. This is the margin which equates the present value of expected cash flows to the estimated asset value of \$199 million. It also presents the expected distributions to equity and debt holders, which have a present value of \$139 million and \$60 million, respectively. Specifically, according to an EBIT margin of 13.2%, the following equations hold:

$$\begin{aligned}
 V &= \frac{CF_1}{(1+WACC)^1} + \frac{CF_2}{(1+WACC)^2} + \frac{CF_3}{(1+WACC)^3} + \frac{CF_3 \times (1+g)}{(WACC-g) \times (1+WACC)^3} \\
 &= \frac{(EBIT - Int) \times [1 - \tau \times (1 - \gamma)] + Int + Depn - Capex}{(1+WACC)^1} + \frac{CF_2}{(1+WACC)^2} + \frac{CF_3}{(1+WACC)^3} + \frac{CF_3 \times (1+g)}{(WACC-g) \times (1+WACC)^3} \\
 &= \frac{13.23 + 4.98 + 2.37 - 5.59}{1.1056} + \frac{13.98 + 5.14 + 2.45 - 5.61}{1.1056^2} + \frac{14.78 + 5.28 + 2.61 - 5.65}{1.1056^3} + \frac{(14.78 + 5.28 + 2.61 - 5.65) \times 1.0248}{(0.1056 - 0.0118) \times 1.1056^3} \\
 &= \frac{14.98}{1.1056} + \frac{15.95}{1.1056^2} + \frac{17.01}{1.1056^3} + \frac{17.01 \times 1.0248}{(0.1056 - 0.0248) \times 1.1056^3} \\
 &= 13.55 + 13.05 + 12.59 + 159.81 \\
 &= \$199 \text{ million}
 \end{aligned}$$

$$\begin{aligned}
 E &= \frac{CFE_1}{(1+r_e)^1} + \frac{CFE_2}{(1+r_e)^2} + \frac{CFE_3}{(1+r_e)^3} + \frac{CFE_3 \times (1+g)}{(r_e-g) \times (1+r_e)^3} \\
 &= \frac{11.80}{1.1150} + \frac{12.52}{1.1150^2} + \frac{13.30}{1.1150^3} + \frac{13.30 \times 1.0248}{(0.1150 - 0.0248) \times 1.1150^3} \\
 &= 10.58 + 10.07 + 9.60 + 109.05 \\
 &= \$139 \text{ million}
 \end{aligned}
 \qquad
 \begin{aligned}
 D &= \frac{CFD_1}{(1+r_d)^1} + \frac{CFD_2}{(1+r_d)^2} + \frac{CFD_3}{(1+r_d)^3} + \frac{CFD_3 \times (1+g)}{(r_d-g) \times (1+r_d)^3} \\
 &= \frac{3.18}{1.0835} + \frac{3.43}{1.0835^2} + \frac{3.71}{1.0835^3} + \frac{3.71 \times 1.0248}{(0.0835 - 0.0248) \times 1.0835^3} \\
 &= 2.93 + 2.92 + 2.92 + 50.93 \\
 &= \$60 \text{ million}
 \end{aligned}$$

where:

CF , CFE and CFD are cash flows available to the firm, equity and debt holders;

CFE is equal to dividends + return of capital + tax expense $\times \gamma$;

CFD is equal to interest + principal repayments/(additional debt drawdown);

$EBIT$, Int , $Depn$ and $Capex$ are earnings before interest and tax, interest expense, depreciation and capital expenditure;

$WACC$ is the weighted average cost of capital, computed as

$$WACC = r_e \frac{E}{V} + r_d \frac{D}{V} = 0.1150 \times 0.70 + 0.0835 \times 0.30 = 10.56\% ;$$

r_e (11.50%) and r_d (8.35%) represent the required returns to equity and debt holders;
 γ or gamma is the market value of a dollar of corporate tax paid (0.40);
 τ is the corporate tax rate (30%); and
 g is the long-term growth rate (1.18%).

Table 10. Estimation of retail margin according to the bottom-up approach

Year	Customer basis valuation				Volume basis valuation				Average basis valuation			
	0	1	2	3	0	1	2	3	0	1	2	3
Book value of assets (end of year)	116.28	119.51	122.67	125.72	116.28	119.51	122.67	125.72	116.28	119.51	122.67	125.72
Value over time (end of year)	214.82	221.29	227.41	233.06	183.18	188.76	194.01	198.83	199.00	205.02	210.71	215.94
PJ		7.397	7.411	7.420		7.397	7.411	7.420		7.397	7.411	7.420
Customers (million)		0.208	0.207	0.207		0.208	0.207	0.207		0.208	0.207	0.207
Debt at the end of the year	64.45	66.39	68.22	69.92	55.0	56.63	58.20	59.65	59.7	61.51	63.21	64.78
<u>Estimation of margin</u>												
Growth in debt over forecast horizon		3.01%	2.77%	2.48%		3.05%	2.79%	2.48%		3.03%	2.78%	2.48%
EBIT margin (%)	13.98%	13.98%	13.98%	13.98%	12.45%	12.45%	12.45%	12.45%	13.22%	13.22%	13.22%	13.22%
<u>Income statement, cash flows and valuation (\$m)</u>												
Revenue		161.10	169.21	177.75		158.29	166.26	174.65		159.69	167.73	176.20
Operating costs excluding D&A		136.22	143.11	150.29		136.22	143.11	150.29		136.22	143.11	150.29
EBITDA		24.88	26.11	27.46		22.06	23.15	24.36		23.47	24.63	25.91
Depreciation and amortisation		2.35	2.45	2.61		2.35	2.45	2.61		2.35	2.45	2.61
EBIT		22.52	23.66	24.85		19.71	20.70	21.75		21.12	22.18	23.30
Interest		5.38	5.54	5.70		4.59	4.73	4.86		4.98	5.14	5.28
Pre-tax profit		17.14	18.11	19.15		15.12	15.97	16.89		16.13	17.04	18.02
Income tax expense		5.14	5.43	5.75		4.54	4.79	5.07		4.84	5.11	5.41
Net profit after tax		12.00	12.68	13.41		10.58	11.18	11.82		11.29	11.93	12.61
Capital expenditure and change in working capital		5.59	5.61	5.65		5.59	5.61	5.65		5.59	5.61	5.65
Borrowings/repayments to debtholders		1.94	1.84	1.69		1.67	1.58	1.44		1.81	1.71	1.57
Net cash flows to equityholders including imputation benefits		12.76	13.53	14.35		10.84	11.51	12.25		11.80	12.52	13.30
Net cash flows to debtholders		3.44	3.71	4.00		2.91	3.15	3.42		3.18	3.43	3.71
NPV of cash flows to equityholders (end of year)	150.37	154.90	159.19	163.14	128.22	132.13	135.81	139.18	139.30	143.52	147.50	151.16
NPV of cash flows to debtholders (end of year)	64.45	66.39	68.22	69.92	54.95	56.63	58.20	59.65	59.70	61.51	63.21	64.78
Firm value	214.82	221.29	227.41	233.06	183.18	188.76	194.01	198.83	199.00	205.02	210.71	215.94
Leverage	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000	0.3000
<u>Value decomposition</u>												
Value	214.82	221.29	227.41	233.06	183.18	188.76	194.01	198.83	199.00	205.02	210.71	215.94
Debt	64.45	66.39	68.22	69.92	54.95	56.63	58.20	59.65	59.70	61.51	63.21	64.78
Equity	150.37	154.90	159.19	163.14	128.22	132.13	135.81	139.18	139.30	143.52	147.50	151.16
Book-to-market assets	0.54	0.54	0.54	0.54	0.63	0.63	0.63	0.63	0.58	0.58	0.58	0.58
Book-to-market equity	0.34	0.34	0.34	0.34	0.48	0.48	0.47	0.47	0.41	0.40	0.40	0.40
Value0/Revenue		1.33	1.27	1.21		1.16	1.10	1.05		1.25	1.19	1.13
Value0/EBITDA		8.6	8.2	7.8		8.3	7.9	7.5		8.5	8.1	7.7
Value0/EBIT		9.5	9.1	8.6		9.3	8.8	8.4		9.4	9.0	8.5
Price0/Earnings		12.5	11.9	11.2		12.1	11.5	10.8		12.3	11.7	11.0
Value0/GJ		29	29	29		25	25	25		27	27	27
Value0/Customer		1034	1039	1040		882	886	887		958	962	963

Table 10. Estimation of retail margin according to the bottom-up approach (continued)

Year	Customer basis valuation				Volume basis valuation				Average basis valuation			
	0	1	2	3	0	1	2	3	0	1	2	3
<u>Income statement (%)</u>												
Revenue	100.00	100.00	100.00		100.00	100.00	100.00		100.00	100.00	100.00	
Operating costs excluding D&A	84.56	84.57	84.55		86.06	86.08	86.05		85.30	85.32	85.30	
EBITDA	15.44	15.43	15.45		13.94	13.92	13.95		14.70	14.68	14.70	
D&A	1.46	1.45	1.47		1.49	1.47	1.49		1.47	1.46	1.48	
EBIT	13.98	13.98	13.98		12.45	12.45	12.45		13.22	13.22	13.22	
Interest expense	3.34	3.28	3.20		2.90	2.84	2.78		3.12	3.06	3.00	
Pre-tax profit	10.64	10.70	10.78		9.55	9.61	9.67		10.10	10.16	10.23	
Income tax expense	3.19	3.21	3.23		2.87	2.88	2.90		3.03	3.05	3.07	
Net profit after tax	7.45	7.49	7.54		6.69	6.73	6.77		7.07	7.11	7.16	
<u>Income statement (\$ per GJ)</u>												
Revenue	21.78	22.83	23.96		21.40	22.43	23.54		21.59	22.63	23.75	
Operating costs excluding D&A	18.42	19.31	20.25		18.42	19.31	20.25		18.42	19.31	20.25	
EBITDA	3.36	3.52	3.70		2.98	3.12	3.28		3.17	3.32	3.49	
D&A	0.32	0.33	0.35		0.32	0.33	0.35		0.32	0.33	0.35	
EBIT	3.04	3.19	3.35		2.66	2.79	2.93		2.85	2.99	3.14	
Interest expense	0.73	0.75	0.77		0.62	0.64	0.66		0.67	0.69	0.71	
Pre-tax profit	2.32	2.44	2.58		2.04	2.16	2.28		2.18	2.30	2.43	
Income tax expense	0.70	0.73	0.77		0.61	0.65	0.68		0.65	0.69	0.73	
Net profit after tax	1.62	1.71	1.81		1.43	1.51	1.59		1.53	1.61	1.70	
<u>Income statement (\$ per customer)</u>												
Revenue	775.66	818.10	860.62		762.11	803.81	845.59		768.89	810.96	853.10	
Operating costs excluding D&A	655.88	691.88	727.66		655.88	691.88	727.66		655.88	691.88	727.66	
EBITDA	119.78	126.22	132.95		106.23	111.93	117.92		113.00	119.07	125.44	
D&A	11.33	11.84	12.63		11.33	11.84	12.63		11.33	11.84	12.63	
EBIT	108.44	114.38	120.32		94.90	100.09	105.29		101.67	107.23	112.81	
Interest expense	25.91	26.80	27.58		22.09	22.86	23.53		24.00	24.83	25.56	
Pre-tax profit	82.53	87.58	92.74		72.80	77.23	81.76		77.67	82.40	87.25	
Income tax expense	24.76	26.27	27.82		21.84	23.17	24.53		23.30	24.72	26.18	
Net profit after tax	57.77	61.30	64.92		50.96	54.06	57.23		54.37	57.68	61.08	

The summary of results, presented in Table 11, also includes upper and lower bounds derived from alternative asset base assumptions. Recall that the asset base can be derived either as a multiple of the number of customers or volume. We also observe different average multiples from the five earliest transactions from 1999 – 2002 compared to the five more recent transactions from 2006 – 2007. With regards to both time periods, multiples of customers imply higher valuations than multiples of volume when applied to our representative firm. As an upper bound we estimated an asset base of \$237 million as the product of the average customer multiple from the five most recent transactions, computed as \$1147 per customer \times 207,000 customers = \$237 million. In other words, if we applied 100% weight to recent transactions, and selected the multiple which provided the higher valuation estimate, the estimated asset base would be \$237 million, which is 19% above our base case assumption. As a lower bound we estimated an asset base of \$163 million as the product of the average volume multiple from all ten transactions, computed as \$22 per GJ \times 7.4 PJ = \$163 million. In other words, if we applied equal weight to all transactions, and selected the multiple which provided the lower valuation estimate, the estimated asset base would be \$163 million, which is 18% below our base case assumption.

The estimated EBIT margin range of 11.4 – 15.0% translates into estimated EBITDA margins of 12.9 – 16.5% over three years, as shown in the lower panel of Table 11. In our work in relation to electricity, we estimated an EBIT margin range of 3.7 – 5.4, which translated into an EBITDA margin range of 4.5 – 6.3%. The difference between the margin estimates for electricity and gas results from estimating the asset base with respect to the same valuation multiples, but applied to businesses with fundamentally different levels of cost. Comparing the margins per GJ and margins per customer, at both the EBIT and EBITDA levels, we observe overlapping ranges in each of the three forecast years. As discussed in the introduction, we have prepared the present draft of our report without making an amendment to our methodology or estimation procedure. While we would not expect to observe continual EBITDA margins of approximately 15% for a retail business operating in a competitive market, we have not yet derived an alternative technique for estimating the asset base, or obtained more detailed information about our comparable firm set, in order to revise our estimates. In dollar terms the estimated EBIT margin over forecast years 1, 2 and 3 is \$2.22 – 3.32 per GJ, \$2.53 – 3.48 per GJ and \$2.66 – 3.65 per GJ. This translates to EBITDA margin ranges of \$2.74 – 3.64 per GJ, \$2.86 – 3.81 per GJ and \$3.01 – 4.00 per GJ.

In the base case the estimated margin flows through to estimated revenue of \$21.59, \$22.63 and \$23.75 per GJ over the three-year forecast horizon, when applied to cost estimates of \$18.73, \$19.64 and \$20.61 per GJ, as shown in the lower right-hand section of Table 10. The table also provides estimated margins per customer, which on average is expected to consume 28 GJ per year. This means that the estimated EBIT and EBITDA margins are \$102 – 113 and \$113 – 125 per customer over three years. After accounting for interest and tax, the estimated annual net profit per customer is \$54 – 61 over three years.

In Table 11 we present ranges for valuation multiples, computed as the market value at year zero, relative to revenue, earnings, GJ and customers over three years. These multiples range from 0.94 – 1.46 for Value/Revenue, 7.3 – 8.8 for Value/EBITDA, 8.5 – 9.7 for Value/EBIT and 10.5 – 12.8 for the price/earnings ratio (that is, equity value relative to net profit after tax). Historically the Australian equity market has traded on a price/earnings ratio of approximately 15 times. The price/earnings ratio reflects the market's expectations for expected earnings growth and the cost of equity capital. Given that standard gas retailers are expected to grow at lower rates than the typical listed firm, and are assumed to be exposed to the same level of systematic risk (that is, the assumed equity beta is one) the normal outcome is a price-earnings ratio which is less than the average in the broader market.

Table 11. Margin summary and valuation metrics according to the bottom-up analysis

	Year 1 ranges			Year 2 ranges			Year 3 ranges			2007 report (exp ret)		
	Low	Base	High	Low	Base	High	Low	Base	High	Low	Base	High
<i>Panel A: Gas</i>												
EBITDA margin												
% sales	12.9	14.7	16.5	12.9	14.7	16.5	12.9	14.7	16.5			
\$/GJ	2.74	3.17	3.64	2.86	3.32	3.81	3.01	3.49	4.00			
\$/Customer	97	113	129	103	119	136	108	125	144			
EBIT margin												
% sales	11.4	13.2	15.0	11.4	13.2	15.0	11.4	13.2	15.0			
\$/GJ	2.22	2.85	3.32	2.53	2.99	3.48	2.66	3.14	3.65			
\$/Customer	86	102	118	91	107	125	96	113	131			
Value (\$m)	163	199	237	168	205	245	172	211	251			
Book-to-mkt assets	0.72	0.58	0.49	0.71	0.58	0.49	0.71	0.58	0.49			
Value multiples:												
\$/GJ	22	27	32	22	27	32	22	27	32			
\$/Customer	783	958	1143	786	962	1148	787	963	1150			
\$/Revenue	1.04	1.25	1.46	0.99	1.19	1.39	0.94	1.13	1.32			
\$/EBITDA	8.0	8.5	8.8	7.7	8.1	8.4	7.3	7.7	8.0			
\$/EBIT	9.1	9.4	9.7	8.7	9.0	9.2	8.2	8.5	8.8			
Equity multiple:												
\$/NPAT	11.8	12.3	12.8	11.2	11.7	12.1	10.5	11.0	11.4			
<i>Panel B: Electricity</i>												
EBITDA margin												
% sales	4.6	5.4	6.3	4.6	5.5	6.3	4.5	5.3	6.1	4.3	5.1	6.4
\$/GJ	2.53	3.00	3.50	2.89	3.42	4.00	3.36	4.03	4.75	2.19	2.61	3.28
\$/Customer	85	102	119	98	117	137	116	138	163	44	52	66
EBIT margin												
% sales	3.7	4.5	5.4	3.7	4.5	5.3	3.7	4.5	5.3	3.5	4.3	5.5
\$/GJ	2.03	2.50	3.00	2.28	2.83	3.42	2.81	3.47	4.17	1.75	2.17	2.83
\$/Customer	69	85	102	78	97	116	96	119	143	35	43	57
Value (\$m)	591	742	905	614	770	938	625	785	957	460	574	774
Book-to-mkt assets	0.67	0.53	0.44	0.66	0.52	0.43	0.65	0.51	0.42	0.51	0.59	0.86
Value multiples:												
\$/GJ	22	27	33	22	28	34	23	28	34	26	32	43
\$/Customer	730	917	1118	749	941	1147	768	965	1177	511	638	860
\$/Revenue	0.39	0.49	0.59	0.35	0.44	0.53	0.30	0.37	0.44			
\$/EBITDA	8.5	9.0	9.4	7.6	8.1	8.4	6.6	7.0	7.2			
\$/EBIT	10.7	10.8	11.0	9.6	9.7	9.9	8.0	8.1	8.2			
Equity multiple:												
\$/NPAT	14.5	14.9	15.1	12.8	13.0	13.2	10.2	10.4	10.5			

4. Conclusion

We have performed analysis using three techniques in order estimate the EBIT margin which provides an expected return to a standard gas retailer which is consistent with cost of capital assumptions of the Tribunal and the CAPM which states that expected returns are determined by systematic risk, also termed economic, market or non-diversifiable risk. The estimated ranges for each technique were 5.9 – 7.5% for the expected returns approach, 5.6 – 6.0% from a benchmarking analysis and 11.4 – 15.0% for the bottom-up analysis.

There is reason to believe that recent transaction values which underpin our bottom-up analysis are due, in part, to three factors: (1) scale benefits, including scale benefits of being a dual fuel retailer; reduction of hedging costs, due to the natural hedge associated with vertical integration; and (3) the option value associated with being an incumbent in the Queensland market during the transition towards full retail contestability. In the absence of an objective measurement of the value associated with these factors, we computed equal-weighted average margin estimates derived from all three approaches, and secondly for the expected returns and benchmarking analysis only. If retailers' submissions were revised to include higher proposed margins, we would request some more detailed information about recent transactions in order to form more reliable estimates of an asset base for the bottom-up approach.

If equal weight were placed on these three estimation techniques, the average estimated EBIT margin range is 7.6 – 9.5%. This translates to an EBITDA margin range of 9.2 – 11.0% in forecast year one, 9.2 – 11.0% in forecast year two and 9.2 – 11.1% in forecast year three. It also implies an estimated EBIT margin of \$1.55 – 1.97 per GJ in forecast year one, \$1.62 – 2.06 per GJ in forecast year two and \$1.70 – 2.16 per GJ per year in forecast year three. Finally, the ranges implies an estimated EBITDA margin of \$1.87 – 2.29 per GJ in forecast year one, \$1.95 – 1.39 per GJ in forecast year two and \$2.06 – 2.52 per GJ in forecast year three.

If equal weight were placed on the expected returns and benchmarking analysis, the average estimated EBIT margin range is 5.7 – 6.7%. This translates to an EBITDA margin range of 7.3 – 8.3% in forecast year one, 7.3 – 8.3% in forecast year two and 7.4 – 8.3% in forecast year three. It also implies an estimated EBIT margin of \$1.14 – 1.67 per GJ in forecast year one, \$1.20 – 1.42 per GJ in forecast year two and \$1.26 – 1.49 per GJ per year in forecast year three. Finally, the ranges implies an estimated EBITDA margin of \$1.46 – 1.67 per GJ in forecast year one, \$1.53 – 1.75 per GJ in forecast year two and \$1.61 – 1.84 per GJ in forecast year three.

5. References

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6. Appendices

6.1 Binomial trees supporting the expected returns analysis

Volume expansion factor

	0	1	2	3	4	5	6	7	8	9	10
1.0000		1.0200	1.0404	1.0612	1.0824	1.1041	1.1262	1.1487	1.1717	1.1951	1.2190
		0.9800	0.9996	1.0196	1.0400	1.0608	1.0820	1.1036	1.1257	1.1482	1.1712
			0.9604	0.9796	0.9992	1.0192	1.0396	1.0604	1.0816	1.1032	1.1253
				0.9412	0.9600	0.9792	0.9988	1.0188	1.0392	1.0599	1.0811
					0.9224	0.9408	0.9596	0.9788	0.9984	1.0184	1.0387
						0.9039	0.9220	0.9404	0.9592	0.9784	0.9980
							0.8858	0.9036	0.9216	0.9401	0.9589
								0.8681	0.8855	0.9032	0.9213
									0.8508	0.8678	0.8851
										0.8337	0.8504
											0.8171

Expectation	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
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Volume

	0	1	2	3	4	5	6	7	8	9	10
7,206		7,545	7,710	7,874	8,032	8,192	8,356	8,523	8,694	8,868	9,045
		7,249	7,408	7,565	7,717	7,871	8,028	8,189	8,353	8,520	8,690
			7,118	7,269	7,414	7,562	7,714	7,868	8,025	8,186	8,349
				6,984	7,123	7,266	7,411	7,559	7,710	7,865	8,022
					6,844	6,981	7,120	7,263	7,408	7,556	7,707
						6,707	6,841	6,978	7,118	7,260	7,405
							6,573	6,704	6,838	6,975	7,115
								6,441	6,570	6,702	6,836
									6,313	6,439	6,568
										6,186	6,310
											6,063

Expectation	7,397	7,411	7,420	7,420	7,420	7,420	7,420	7,420	7,420	7,420	7,420
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Revenue

	0	1	2	3	4	5	6	7	8	9	10
		151,405	162,210	173,803	181,680	189,914	198,521	207,518	216,923	226,755	237,032
		145,467	155,849	166,987	174,555	182,466	190,736	199,380	208,417	217,862	227,736
			149,737	160,439	167,710	175,311	183,256	191,562	200,243	209,319	218,805
				154,147	161,133	168,436	176,070	184,049	192,391	201,110	210,225
					154,814	161,830	169,165	176,832	184,846	193,223	201,981
						155,484	162,531	169,897	177,597	185,646	194,060
							156,157	163,234	170,632	178,366	186,450
								156,833	163,941	171,371	179,138
									157,512	164,651	172,113
										158,194	165,363
											158,878

Expectation	148,436	155,911	163,778	167,844	172,011	176,281	180,657	185,142	189,738	194,448
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EBIT

	0	1	2	3	4	5	6	7	8	9	10
		10,889	12,539	14,353	15,944	17,630	19,416	21,308	23,311	25,430	27,672
		8,832	10,335	11,991	13,475	15,049	16,719	18,488	20,363	22,349	24,451
			8,217	9,722	11,103	12,570	14,127	15,779	17,531	19,388	21,356
				7,542	8,824	10,188	11,637	13,176	14,810	16,544	18,383
					6,635	7,899	9,244	10,675	12,196	13,811	15,527
						5,700	6,946	8,272	9,684	11,186	12,782
							4,737	5,964	7,271	8,663	10,145
								3,746	4,952	6,240	7,612
									2,725	3,911	5,177
										1,674	2,839
											592

Expectation	9,860	10,357	10,879	11,149	11,426	11,710	12,001	12,299	12,604	12,917
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Pre-tax profit											
	9,075	10,664	12,422	13,964	15,601	17,337	19,178	21,128	23,193	25,379	
	7,018	8,460	10,060	11,496	13,021	14,640	16,358	18,180	20,112	22,158	
		6,342	7,791	9,124	10,541	12,048	13,649	15,348	17,151	19,064	
			5,611	6,845	8,159	9,558	11,046	12,627	14,307	16,090	
				4,655	5,870	7,166	8,545	10,013	11,574	13,234	
					3,672	4,867	6,142	7,501	8,949	10,489	
						2,658	3,833	5,088	6,426	7,852	
							1,615	2,769	4,002	5,319	
								542	1,674	2,885	
									-564	546	
										-1,701	
Expectation	8,047	8,482	8,948	9,170	9,398	9,631	9,870	10,115	10,367	10,624	
Income tax expense											
	2,723	3,199	3,727	4,189	4,680	5,201	5,753	6,338	6,958	7,614	
	2,105	2,538	3,018	3,449	3,906	4,392	4,907	5,454	6,033	6,647	
		1,903	2,337	2,737	3,162	3,614	4,095	4,604	5,145	5,719	
			1,683	2,053	2,448	2,867	3,314	3,788	4,292	4,827	
				1,397	1,761	2,150	2,563	3,004	3,472	3,970	
					1,101	1,460	1,843	2,250	2,685	3,147	
						798	1,150	1,526	1,928	2,356	
							485	831	1,201	1,596	
								162	502	865	
									-169	164	
										-510	
Expectation	2,414	2,544	2,684	2,751	2,819	2,889	2,961	3,035	3,110	3,187	
NPAT											
	6,353	7,465	8,695	9,775	10,921	12,136	13,424	14,789	16,235	17,765	
	4,913	5,922	7,042	8,047	9,115	10,248	11,451	12,726	14,078	15,511	
		4,440	5,454	6,387	7,379	8,434	9,554	10,744	12,006	13,344	
			3,928	4,791	5,711	6,691	7,732	8,839	10,015	11,263	
				3,259	4,109	5,016	5,981	7,009	8,102	9,264	
					2,570	3,407	4,299	5,251	6,264	7,342	
						1,861	2,683	3,562	4,498	5,497	
							1,131	1,939	2,802	3,723	
								379	1,172	2,019	
									-394	382	
										-1,191	
Expectation	5,633	5,937	6,264	6,419	6,579	6,742	6,909	7,081	7,257	7,437	
Cash flows including tax benefits of imputation											
	0	1	2	3	4	5	6	7	8	9	
		6,021	7,457	9,072	10,309	11,623	13,018	14,497	16,065	17,727	19,488
		4,334	5,650	7,135	8,285	9,507	10,806	12,185	13,648	15,201	16,847
			3,913	5,274	6,340	7,474	8,680	9,963	11,326	12,773	14,309
				3,487	4,471	5,520	6,638	7,829	9,095	10,441	11,871
					2,676	3,644	4,677	5,778	6,951	8,200	9,529
						1,841	2,792	3,808	4,891	6,047	7,278
							981	1,914	2,913	3,979	5,116
								96	1,011	1,991	3,039
									-815	82	1,043
										-1,753	-875
											-2,718
Expectation	5,178	5,668	6,223	6,378	6,536	6,698	6,865	7,035	7,210	7,389	

Value including cash received in the year

	0	1	2	3	4	5	6	7	8	9	10
		92,111	107,840	124,239	141,185	159,180	178,278	198,537	220,017	242,780	266,892
		67,965	82,513	97,717	113,461	130,200	147,985	166,871	186,915	208,178	230,722
			58,179	72,235	86,824	102,356	118,879	136,446	155,111	174,933	195,970
				47,753	61,232	75,604	90,915	107,214	124,555	142,991	162,581
					36,644	49,901	64,047	79,129	95,197	112,303	130,501
						25,206	38,233	52,145	66,990	82,817	99,680
							13,431	26,219	39,889	54,488	70,067
								1,310	13,851	27,270	41,615
									-11,166	1,119	14,279
										-24,006	-11,985
											-37,219
Expectation	80,038	82,761	85,231	87,347	89,515	91,737	94,015	96,349	98,740	101,192	

Value excluding cash received in the year

	0	1	2	3	4	5	6	7	8	9	10
	72,396	86,090	100,382	115,167	130,876	147,557	165,261	184,041	203,952	225,053	247,404
		63,630	76,863	90,582	105,176	120,693	137,179	154,686	173,267	192,977	213,875
			54,266	66,961	80,485	94,882	110,199	126,483	143,786	162,160	181,661
				44,266	56,761	70,083	84,276	99,386	115,460	132,550	150,710
					33,968	46,257	59,370	73,351	88,246	104,102	120,972
						23,366	35,441	48,337	62,098	76,770	92,401
							12,450	24,305	36,976	50,510	64,951
								1,214	12,839	25,279	38,576
									-10,351	1,038	13,236
										-22,253	-11,110
											-34,501
Expectation	74,860	77,094	79,008	80,969	82,979	85,039	87,150	89,313	91,531	93,803	

Cumulative value assuming 100% reinvestment

	0	1	2	3	4	5	6	7	8	9	10
	72,396	92,111	115,382	142,804	175,065	212,926	257,257	309,058	369,472	439,812	521,578
		67,965	88,284	112,319	140,688	174,160	213,543	259,763	313,885	377,128	450,891
			62,143	82,969	107,660	136,915	171,543	212,401	260,477	316,902	382,977
				54,684	75,871	101,131	131,190	166,897	209,164	259,038	317,726
					45,268	66,701	92,420	123,178	159,863	203,444	255,034
						33,591	55,130	81,172	112,495	150,029	194,800
							19,309	40,785	66,985	98,709	136,929
								2,031	23,243	49,402	81,327
									-18,681	2,026	27,905
										-43,326	-23,404
											-72,464
Expectation	80,038	88,523	97,919	108,283	119,728	132,373	146,348	161,797	178,875	197,756	

Cumulative firm return

	0	1	2	3	4	5	6	7	8	9	10
		27.2%	59.4%	97.3%	141.8%	194.1%	255.3%	326.9%	410.3%	507.5%	620.4%
		-6.1%	21.9%	55.1%	94.3%	140.6%	195.0%	258.8%	333.6%	420.9%	522.8%
			-14.2%	14.6%	48.7%	89.1%	136.9%	193.4%	259.8%	337.7%	429.0%
				-24.5%	4.8%	39.7%	81.2%	130.5%	188.9%	257.8%	338.9%
					-37.5%	-7.9%	27.7%	70.1%	120.8%	181.0%	252.3%
						-53.6%	-23.8%	12.1%	55.4%	107.2%	169.1%
							-73.3%	-43.7%	-7.5%	36.3%	89.1%
								-97.2%	-67.9%	-31.8%	12.3%
									-125.8%	-97.2%	-61.5%
										-159.8%	-132.3%
											-200.1%
Expected	10.6%	22.3%	35.3%	49.6%	65.4%	82.8%	102.1%	123.5%	147.1%	173.2%	
Annualised	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%	10.6%

Equity value including cash received in the year

	0	1	2	3	4	5	6	7	8	9	10
		67,400	81,066	95,390	110,273	126,093	142,899	160,742	179,675	199,756	221,043
		45,633	58,204	71,445	85,243	99,928	115,548	132,151	149,789	168,515	188,387
			36,287	48,438	61,194	74,789	89,270	104,682	121,075	138,500	157,011
				26,443	38,088	50,636	64,022	78,290	93,487	109,661	126,865
					16,131	27,430	39,764	52,933	66,980	81,954	97,902
						5,677	16,458	28,570	41,514	55,333	70,074
							-5,934	5,163	17,046	29,756	43,338
								-17,326	-6,463	5,182	17,650
									-29,050	-18,429	-7,030
										-41,113	-30,742
											-53,525
Expectation	56,516	58,440	60,185	61,681	63,213	64,765	66,373	68,021	69,709	71,440	

Equity value excluding cash received in the year

0	1	2	3	4	5	6	7	8	9	10
50,687	62,453	74,814	87,675	101,355	115,896	131,342	147,742	165,144	183,601	203,167
	42,373	53,759	65,667	78,349	91,847	106,203	121,464	137,675	154,887	173,151
		33,579	44,521	56,245	68,741	82,050	96,216	111,283	127,299	144,313
			24,314	35,007	46,541	58,844	71,958	85,926	100,793	116,605
				14,846	25,212	36,549	48,652	61,563	75,326	89,984
					5,262	15,127	26,260	38,156	50,858	64,407
						-5,454	4,745	15,667	27,349	39,833
							-15,925	-5,940	4,763	16,223
								-26,700	-16,938	-6,461
									-37,788	-28,256
										-49,196
Expectation	52,413	53,978	55,319	56,693	58,102	59,527	61,005	62,519	64,071	65,662

Free cash flow to equityholders

0	1	2	3	4	5	6	7	8	9	10
	4,947	6,252	7,715	8,918	10,198	11,557	13,000	14,531	16,155	17,877
	3,260	4,445	5,778	6,894	8,082	9,345	10,688	12,114	13,629	15,236
		2,708	3,917	4,949	6,049	7,220	8,466	9,792	11,201	12,698
			2,130	3,080	4,095	5,178	6,332	7,561	8,869	10,260
				1,285	2,218	3,216	4,281	5,417	6,628	7,918
					415	1,331	2,311	3,357	4,475	5,667
						-480	418	1,379	2,406	3,505
							-1,401	-523	419	1,427
								-2,349	-1,490	-569
									-3,325	-2,486
										-4,329
Expectation	4,104	4,463	4,866	4,987	5,111	5,238	5,368	5,501	5,638	5,778

Equity value including reinvestment

50,687	67,400	87,487	111,549	140,301	174,545	215,213	263,386	320,316	387,449	466,463
	45,633	62,814	83,547	108,454	138,326	174,021	216,539	267,036	326,854	397,549
		39,079	56,597	77,857	103,527	134,445	171,529	215,846	268,636	331,337
			30,775	48,419	70,093	96,421	128,284	166,663	212,700	267,721
				20,418	37,939	59,887	86,734	119,409	158,958	206,601
					7,808	24,766	46,814	74,008	107,324	147,877
						-8,805	8,453	30,388	57,714	91,456
							-27,971	-11,513	10,050	37,247
								-51,024	-35,715	-14,835
									-78,566	-64,822
										-111,285
Expectation	56,516	63,049	70,345	78,459	87,496	97,539	108,759	121,267	135,211	150,760

Cumulative equity return										
0	1	2	3	4	5	6	7	8	9	10
	33.0%	72.6%	120.1%	176.8%	244.4%	324.6%	419.6%	531.9%	664.4%	820.3%
	-10.0%	23.9%	64.8%	114.0%	172.9%	243.3%	327.2%	426.8%	544.8%	684.3%
		-22.9%	11.7%	53.6%	104.2%	165.2%	238.4%	325.8%	430.0%	553.7%
			-39.3%	-4.5%	38.3%	90.2%	153.1%	228.8%	319.6%	428.2%
				-59.7%	-25.2%	18.2%	71.1%	135.6%	213.6%	307.6%
					-84.6%	-51.1%	-7.6%	46.0%	111.7%	191.7%
						-117.4%	-83.3%	-40.0%	13.9%	80.4%
							-155.2%	-122.7%	-80.2%	-26.5%
								-200.7%	-170.5%	-129.3%
									-255.0%	-227.9%
										-319.6%
Expected	11.5%	24.4%	38.8%	54.8%	72.6%	92.4%	114.6%	139.2%	166.8%	197.4%
Annualised	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%

Market return										
0	1	2	3	4	5	6	7	8	9	10
	31%	70%	122%	190%	278%	394%	545%	741%	998%	1333%
	-8%	21%	58%	106%	168%	250%	357%	496%	678%	915%
		-14%	12%	46%	90%	148%	224%	323%	452%	620%
			-21%	3%	35%	76%	130%	200%	291%	410%
				-27%	-4%	25%	63%	112%	177%	262%
					-32%	-12%	15%	51%	96%	156%
						-37%	-18%	7%	39%	82%
							-42%	-24%	-1%	29%
								-46%	-30%	-9%
									-50%	-35%
										-54%
Expected	11.5%	24.3%	38.6%	54.6%	72.3%	92.2%	114.3%	138.9%	166.4%	197.0%
Annualised	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%

Variance of market returns										
0	1	2	3	4	5	6	7	8	9	10
	4%	21%	70%	184%	425%	911%	1852%	3627%	6912%	12895%
	4%	0%	4%	26%	92%	249%	589%	1277%	2619%	5161%
		15%	7%	1%	3%	31%	120%	338%	813%	1787%
			35%	26%	14%	3%	2%	37%	155%	454%
				66%	59%	46%	27%	7%	1%	42%
					109%	108%	98%	78%	49%	17%
						168%	176%	175%	162%	133%
							244%	267%	281%	283%
								343%	386%	423%
									470%	540%
										631%
Variance	4%	9%	17%	29%	46%	69%	102%	147%	208%	292%

Annualised market returns										
0	1	2	3	4	5	6	7	8	9	10
	30.50%	30.50%	30.50%	30.50%	30.50%	30.50%	30.50%	30.50%	30.50%	30.50%
	-7.50%	9.87%	16.36%	19.74%	21.82%	23.23%	24.24%	25.00%	25.60%	26.09%
		-7.50%	3.74%	9.87%	13.72%	16.36%	18.28%	19.74%	20.89%	21.82%
			-7.50%	0.81%	6.15%	9.87%	12.60%	14.70%	16.36%	17.70%
				-7.50%	-0.91%	3.74%	7.20%	9.87%	11.99%	13.72%
					-7.50%	-2.04%	2.06%	5.24%	7.79%	9.87%
						-7.50%	-2.84%	0.81%	3.74%	6.15%
							-7.50%	-3.43%	-0.15%	2.56%
								-7.50%	-3.89%	-0.91%
									-7.50%	-4.26%
										-7.50%
Expected	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%

Market value

0	1	2	3	4	5	6	7	8	9	10
100	131	170	222	290	378	494	645	841	1,098	1,433
	93	121	158	206	268	350	457	596	778	1,015
		86	112	146	190	248	324	423	552	720
			79	103	135	176	230	300	391	510
				73	96	125	163	212	277	362
					68	88	115	151	196	256
						63	82	107	139	182
							58	76	99	129
								54	70	91
									50	65
										46

Probabilities

0	1	2	3	4	5	6	7	8	9	10
	50%	25%	13%	6%	3%	2%	1%	0%	0%	0%
	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%	2%	4.4%
									0%	1.0%
										0.1%

6.2 Listed retailers – mean estimates and number of observations

6.2.1 Australia

Industry	Name	N	EBITDA mgn	EBIT mgn	Lev	B/M Equity	B/M Ass	V/EBIT
Apparel Retailers	COUNTRY ROAD	18	0.05	0.02	0.09	0.76	0.76	13.0
Apparel Retailers	NONI B	9	0.09	0.07	0.09	0.52	0.53	10.2
Apparel Retailers	OROTONGROUP	12	0.12	0.09	0.12	0.37	0.44	10.8
Apparel Retailers	RCG	3	-0.03	-0.05	0.21	1.24	1.10	15.8
Apparel Retailers	SPECIALTY FASHION GROUP	10	0.07	0.05	0.19	0.29	0.41	10.2
Broadline Retailers	CASH CONVERTERS INTL.	6	0.28	0.25	0.25	0.88	0.67	12.7
Broadline Retailers	DAVID JONES	13	0.08	0.06	0.15	0.61	0.67	9.9
Broadline Retailers	HARVEY NORMAN HOLDINGS	7	0.34	0.27	0.20	0.52	0.53	13.6
Broadline Retailers	THE REJECT SHOP	5	0.08	0.06	0.04	0.16	0.19	13.1
Drug Retailers	AUSTRALIAN PHARM.INDS.	9	0.03	0.02	0.06	0.54	0.57	14.6
Drug Retailers	HEALTH	2	0.09	0.07	0.20	1.01	1.07	2.2
Drug Retailers	HEALTHZONE	2	0.14	0.14	0.34	0.58	0.63	11.1
Drug Retailers	SIGMA PHARMS.	7	0.06	0.05	0.14	0.70	0.73	14.2
Food Retailers & Wholesalers	ALLIED BRANDS	3	0.15	0.13	0.15	0.90	0.94	19.0
Food Retailers & Wholesalers	METCASH	15	0.03	0.02	0.22	0.63	0.67	14.1
Food Retailers & Wholesalers	WOOLWORTHS	16	0.05	0.03	0.08	0.19	0.25	14.6
Home Improvement Retailers	JOYCE	6	0.06	0.03	0.48	1.13	1.05	9.5
Home Improvement Retailers	NICK SCALI	4	0.18	0.17	0.01	0.17	0.18	10.3
Home Improvement Retailers	WESFARMERS	21	0.14	0.10	0.16	0.41	0.48	13.2
Specialized Consumer Services	CELTEX	1	-0.48	-0.64	0.15	0.95	0.96	-3.0
Specialized Consumer Services	EARLY LEARNING SERVICES	2	-0.08	-0.12	0.57	3.28	1.44	48.1
Specialized Consumer Services	GREENCROSS	1	0.14	0.13	0.52	1.50	1.24	5.7
Specialized Consumer Services	INVOCARE	6	0.30	0.25	0.27	0.15	0.37	13.6
Specialized Consumer Services	KIP MCGRATH ED.CENTS.	1	0.35	0.24	0.01	0.30	0.30	24.4
Specialized Consumer Services	NAVITAS	3	0.21	0.19	0.00	0.16	0.16	14.6
Specialized Consumer Services	THORN GROUP	2	0.15	0.13	0.07	0.78	0.80	6.3
Specialty Retailers	ADTRANS GROUP	12	0.03	0.03	0.38	0.59	0.73	8.2
Specialty Retailers	ADULTSHOP.COM	7	-0.02	-0.10	0.01	1.61	1.60	-5.3
Specialty Retailers	AP EAGERS	12	0.03	0.03	0.51	1.10	1.04	10.5
Specialty Retailers	ARB	8	0.20	0.17	0.04	0.24	0.27	12.4
Specialty Retailers	AUTOMOTIVE HOLDINGS GP.	3	0.04	0.03	0.56	1.38	0.89	12.5
Specialty Retailers	BEYOND SPORTSWEAR INTL.	2	0.07	0.06	0.24	0.49	0.53	7.7
Specialty Retailers	CLIVE PEETERS	4	0.05	0.04	0.23	1.53	0.75	11.9
Specialty Retailers	JB HI-FI	5	0.06	0.05	0.11	0.12	0.22	17.5
Specialty Retailers	SUPER CHEAP AUTO GP.	5	0.09	0.06	0.21	0.34	0.48	26.0
Specialty Retailers	TWT GROUP	2	0.19	0.19	0.30	1.03	1.03	4.5
Specialty Retailers	VITA GROUP	4	0.12	0.09	0.22	0.68	0.57	8.0

6.2.2 United Kingdom

Industry	Name	N	EBITDA mgn	EBIT mgn	Lev	B/M Equity	B/M Ass	V/EBIT
Apparel Retailers	ALEXON GROUP	22	0.09	0.06	0.11	0.66	0.68	5.1
Apparel Retailers	ASOS	5	-0.05	-0.18	0.01	0.33	0.34	20.2
Apparel Retailers	BLACKS LEISURE	20	0.08	0.06	0.20	0.62	0.66	16.3
Apparel Retailers	BROWN (N) GROUP	22	0.15	0.13	0.16	0.30	0.40	14.6
Apparel Retailers	FRENCH CONNECTN.GROUP	21	0.09	0.06	0.18	0.82	0.69	11.5
Apparel Retailers	JACQUES VERT	16	0.07	0.05	0.23	0.60	0.62	4.7
Apparel Retailers	JD SPORTS FASHION	12	0.08	0.06	0.15	0.54	0.60	10.8
Apparel Retailers	JJB SPORTS	12	0.15	0.11	0.25	0.55	0.61	13.5
Apparel Retailers	LIBERTY	7	-0.06	-0.11	0.34	0.97	0.93	-26.4
Apparel Retailers	MOSS BROTHERS GROUP	21	0.09	0.05	0.01	0.89	0.89	13.4
Apparel Retailers	MULBERRY GROUP	10	0.07	0.05	0.15	0.37	0.45	17.4
Apparel Retailers	NEXT	21	0.16	0.13	0.10	0.29	0.33	12.6
Apparel Retailers	SPORTS DIRECT INTL.	2	0.11	0.08	0.45	0.45	0.69	9.5
Apparel Retailers	TED BAKER	10	0.21	0.17	0.01	0.16	0.17	13.2
Broadline Retailers	BEALE	12	0.06	0.03	0.30	1.36	1.21	14.3
Broadline Retailers	DEBENHAMS	2	0.16	0.10	0.72	0.41	0.82	8.3
Broadline Retailers	HOME RETAIL GROUP	5	0.10	0.06	0.12	0.84	0.89	20.5
Broadline Retailers	IDEAL SHOPPING DIRECT	9	0.00	-0.03	0.17	0.38	0.47	8.2
Broadline Retailers	INSTORE	16	0.01	-0.02	0.23	0.80	0.86	-0.2
Broadline Retailers	MARKS & SPENCER GROUP	29	0.13	0.11	0.11	0.37	0.43	14.9
Broadline Retailers	MOTHERCARE	20	0.09	0.05	0.07	0.64	0.64	18.2
Food Retailers & Wholesalers	BOOKER GROUP	2	0.02	0.02	0.23	0.68	0.75	9.1
Food Retailers & Wholesalers	GREGGS	22	0.12	0.08	0.01	0.35	0.36	9.7
Food Retailers & Wholesalers	MORRISON(WM)SPMKTS.	29	0.07	0.05	0.06	0.39	0.42	11.0
Food Retailers & Wholesalers	SAINSBURY (J)	28	0.07	0.05	0.14	0.48	0.53	15.5
Food Retailers & Wholesalers	SNACKTIME	2	0.18	0.09	0.16	0.34	0.43	33.8
Food Retailers & Wholesalers	TESCO	29	0.08	0.06	0.13	0.46	0.53	12.0
Food Retailers & Wholesalers	THORNTONS	21	0.15	0.08	0.19	0.43	0.53	8.5
Home Improvement Retailers	ASHLEY(LAURA) HOLDINGS	23	0.06	0.02	0.12	0.47	0.52	14.6
Home Improvement Retailers	CARPETRIGHT	13	0.16	0.13	0.04	0.12	0.15	10.7
Home Improvement Retailers	DUNELM GROUP	3	0.15	0.12	0.05	0.24	0.28	8.9
Home Improvement Retailers	KINGFISHER	26	0.09	0.07	0.19	0.62	0.66	16.7
Home Improvement Retailers	TOPPS TILES	7	0.17	0.15	0.02	0.12	0.14	14.0
Home Improvement Retailers	UNITED CARPETS GROUP	4	0.12	0.09	0.02	0.66	0.67	6.5
Specialized Consumer Services	DIGNITY	3	0.33	0.27	0.39	0.09	0.45	14.0
Specialized Consumer Services	JUST CAR CLINICS	7	-0.02	-0.04	0.23	0.58	0.74	23.1
Specialized Consumer Services	STAGECOACH THEATRE ARTS	7	0.10	0.08	0.02	0.41	0.42	13.8
Specialized Consumer Services	SWAN (JOHN) & SONS	9	0.13	0.08	0.05	0.93	0.94	14.8
Specialty Retailers	CAFFYNS	21	0.02	0.02	0.39	1.70	1.35	9.7
Specialty Retailers	CLINTON CARDS	20	0.09	0.07	0.12	0.57	0.60	7.0
Specialty Retailers	DISCOVER LEISURE	1	0.05	0.03	0.29	0.25	0.47	32.5
Specialty Retailers	DSG INTERNATIONAL	27	0.08	0.06	0.17	0.46	0.51	11.5
Specialty Retailers	ECO CITY VEHICLES	4	-0.03	-0.03	0.09	0.61	0.65	-12.3
Specialty Retailers	EXPANSYS	1	-0.01	-0.03	0.52	3.34	2.13	-2.2
Specialty Retailers	FINDEL	24	0.13	0.11	0.23	0.44	0.54	10.0
Specialty Retailers	GAME GROUP	20	0.06	0.03	0.09	0.38	0.43	24.7
Specialty Retailers	HALFORDS GROUP	4	0.16	0.13	0.22	0.30	0.44	10.0
Specialty Retailers	HMV GROUP	1	0.06	0.03	0.08	0.13	0.20	7.5
Specialty Retailers	HR OWEN	18	0.01	0.00	0.57	0.89	0.93	15.5
Specialty Retailers	INCHCAPE	25	0.05	0.04	0.25	0.64	0.69	8.4
Specialty Retailers	JESSOPS	2	0.07	0.04	0.25	0.76	0.81	12.2
Specialty Retailers	KESA ELECTRICALS	6	0.06	0.04	0.19	0.38	0.51	9.8
Specialty Retailers	LOOKERS	21	0.04	0.02	0.46	1.48	1.16	6.7
Specialty Retailers	MAJESTIC WINE	13	0.08	0.06	0.01	0.28	0.28	15.5
Specialty Retailers	MALLETT	21	0.17	0.16	0.04	1.08	1.05	8.9
Specialty Retailers	PENDRAGON	19	0.04	0.03	0.34	0.84	0.86	8.2
Specialty Retailers	STANLEY GIBBONS GROUP	8	0.14	0.11	0.02	0.84	0.83	7.1
Specialty Retailers	VERTU MOTORS	1	0.01	0.00	0.67	4.59	2.19	29.0
Specialty Retailers	WH SMITH	6	0.06	0.03	0.05	0.39	0.42	8.6

6.2.3 United States

Industry	Name	N	EBITDA mgn	EBIT mgn	Lev	B/M Equity	B/M Ass	V/EBIT
Apparel Retailers	ABERCROMBIE & FITCH	4	0.22	0.19	0.04	0.14	0.18	9.9
Apparel Retailers	AEROPOSTALE	7	0.15	0.13	0.00	0.17	0.17	11.3
Apparel Retailers	AMER.EAG.OUTFITTERS	5	0.15	0.12	0.02	0.61	0.62	6.1
Apparel Retailers	ANN TAYLOR STORES	18	0.13	0.09	0.18	0.72	0.78	13.9
Apparel Retailers	BAKERS FTWR.GP.	4	0.05	0.02	0.13	1.05	0.86	11.1
Apparel Retailers	BEBE STORES	7	0.20	0.17	0.00	0.27	0.27	15.1
Apparel Retailers	BIDZ.COM	2	0.12	0.11	0.01	0.24	0.25	7.5
Apparel Retailers	BLUEFLY	7	-0.10	-0.13	0.12	0.60	0.61	-7.8
Apparel Retailers	BROWN SHOE	29	0.06	0.04	0.27	0.75	0.80	17.8
Apparel Retailers	BUCKLE	16	0.17	0.13	0.00	0.41	0.41	10.2
Apparel Retailers	CACHE	13	0.08	0.05	0.03	0.55	0.57	12.0
Apparel Retailers	CASUAL MALE RETAIL GP.	17	0.05	0.02	0.20	1.01	0.99	13.3
Apparel Retailers	CATO 'A'	17	0.09	0.07	0.01	0.55	0.55	9.9
Apparel Retailers	CHARLOTTE RUSSE HLDG.	9	0.12	0.08	0.00	0.50	0.51	11.8
Apparel Retailers	CHARMING SHOPPES	27	0.09	0.07	0.11	0.66	0.64	10.0
Apparel Retailers	CHICO'S FAS	9	0.15	0.12	0.06	0.39	0.43	17.3
Apparel Retailers	CHILDRENS PLACE RET. STORES	11	0.11	0.07	0.02	0.36	0.37	17.0
Apparel Retailers	CHRISTOPHER & BKS.	14	0.12	0.09	0.14	0.62	0.57	6.6
Apparel Retailers	CITI TRENDS	4	0.09	0.07	0.01	0.36	0.37	21.4
Apparel Retailers	COLDWATER CREEK	9	0.09	0.07	0.00	0.28	0.28	23.4
Apparel Retailers	COLLECTIVE BRANDS	12	0.10	0.06	0.14	0.49	0.54	12.6
Apparel Retailers	DELIA*S	2	0.00	-0.03	0.03	0.87	0.87	-28.7
Apparel Retailers	DESTINATION MATERNITY	14	0.07	0.04	0.64	0.67	0.88	19.4
Apparel Retailers	DILLARDS 'A'	27	0.11	0.08	0.39	0.96	0.86	11.0
Apparel Retailers	DRESS BARN	18	0.11	0.08	0.04	0.52	0.53	11.4
Apparel Retailers	DSW 'A'	4	0.08	0.07	0.03	1.07	1.08	5.6
Apparel Retailers	FINISH LINE 'A'	11	0.07	0.05	0.02	1.00	0.99	11.3
Apparel Retailers	FOOT LOCKER	26	0.07	0.04	0.21	0.80	0.79	5.0
Apparel Retailers	GAP	26	0.14	0.11	0.06	0.28	0.32	13.9
Apparel Retailers	GENESCO	29	0.06	0.04	0.38	0.91	0.84	10.5
Apparel Retailers	GUESS	13	0.15	0.11	0.16	0.37	0.45	8.7
Apparel Retailers	GYMBOREE	15	0.12	0.09	0.01	0.40	0.41	13.4
Apparel Retailers	HOT TOPIC	11	0.14	0.10	0.00	0.43	0.43	14.6
Apparel Retailers	J CREW GROUP	1	0.16	0.13	0.14	0.18	0.30	5.0
Apparel Retailers	JOS A BANK CLOTHIERS	14	0.09	0.06	0.21	0.97	0.84	9.2
Apparel Retailers	KOHL'S	16	0.12	0.10	0.06	0.20	0.24	23.4
Apparel Retailers	LIMITED BRANDS	29	0.15	0.12	0.10	0.30	0.36	11.5
Apparel Retailers	MEN'S WEARHOUSE	16	0.11	0.08	0.05	0.40	0.42	15.9
Apparel Retailers	NEW YORK & CO.	5	0.09	0.06	0.08	0.55	0.57	10.5
Apparel Retailers	NORDSTROM	28	0.12	0.09	0.18	0.33	0.45	12.8
Apparel Retailers	PACIFIC SUNWEAR OF CAL.	8	0.13	0.10	0.00	0.22	0.22	23.3
Apparel Retailers	POLO RALPH LAUREN 'A'	11	0.15	0.12	0.18	0.83	0.84	6.8
Apparel Retailers	RETAIL VENTURES	16	0.05	0.03	0.38	1.03	0.90	13.2
Apparel Retailers	ROSS STORES	19	0.09	0.07	0.06	0.34	0.37	10.3
Apparel Retailers	SAKS	16	0.08	0.05	0.36	0.89	0.87	20.5
Apparel Retailers	SHOE CARNIVAL	15	0.06	0.04	0.11	0.84	0.85	10.7
Apparel Retailers	SIGNET JEWELERS	8	0.15	0.13	0.14	0.82	0.77	8.6
Apparel Retailers	STAGE STORES	7	0.09	0.07	0.04	0.85	0.83	11.2
Apparel Retailers	STEIN MART	16	0.06	0.05	0.02	0.49	0.50	15.3
Apparel Retailers	SYMS	22	0.09	0.07	0.03	1.05	1.06	5.8
Apparel Retailers	TALBOTS	15	0.12	0.08	0.14	0.62	0.54	15.5
Apparel Retailers	TJX COS.	28	0.08	0.06	0.16	0.32	0.40	11.0
Apparel Retailers	TWEEN BRANDS	9	0.14	0.10	0.09	0.46	0.43	11.3
Apparel Retailers	URBAN OUTFITTERS	15	0.17	0.14	0.00	0.26	0.26	19.3
Apparel Retailers	WET SEAL 'A'	4	-0.05	-0.08	0.04	0.32	0.35	-3.2
Apparel Retailers	ZALE	15	0.09	0.07	0.25	1.01	0.84	15.9
Apparel Retailers	ZUMIEZ	4	0.14	0.10	0.01	0.26	0.26	28.8
Broadline Retailers	AMAZON.COM	1	0.07	0.05	0.03	0.12	0.14	23.2
Broadline Retailers	BIG LOTS	23	0.07	0.05	0.10	0.52	0.56	11.3
Broadline Retailers	BJ'S WHOLESALE CLUB	11	0.04	0.03	0.03	0.38	0.40	12.8
Broadline Retailers	BON-TON STORES	11	0.06	0.04	0.50	2.16	1.39	3.8
Broadline Retailers	COSTCO WHOLESALE	16	0.04	0.03	0.10	0.36	0.42	15.8
Broadline Retailers	DUCKWALL-ALCO STORES NEW	10	0.04	0.02	0.33	1.86	1.44	11.5
Broadline Retailers	FRED'S 'A'	13	0.04	0.03	0.05	0.70	0.71	19.0
Broadline Retailers	GAIAM 'A'	8	0.04	0.01	0.01	0.68	0.69	24.3
Broadline Retailers	MACY'S	16	0.12	0.08	0.41	0.81	0.85	12.5
Broadline Retailers	PENNEY JC	28	0.09	0.07	0.37	0.77	0.82	8.4
Broadline Retailers	PRICESMART	11	0.02	0.00	0.23	1.01	0.87	-1.8
Broadline Retailers	SEARS HOLDINGS	5	0.06	0.04	0.17	0.81	0.74	0.8
Broadline Retailers	TARGET	28	0.09	0.07	0.28	0.41	0.57	11.5
Broadline Retailers	WAL MART STORES	28	0.08	0.07	0.10	0.16	0.24	19.1

Industry	Name	N	EBITDA mgn	EBIT mgn	Lev	B/M Equity	B/M Ass	V/EBIT
Drug Retailers	ALLION HEALTHCARE	2	0.05	0.03	0.18	1.02	0.92	46.4
Drug Retailers	AMERISOURCEBERGEN	11	0.02	0.01	0.20	0.42	0.54	13.5
Drug Retailers	CARDINAL HEALTH	25	0.03	0.03	0.16	0.33	0.42	17.4
Drug Retailers	CVS CAREMARK	29	0.08	0.06	0.09	0.43	0.48	11.3
Drug Retailers	DRUGSTORE.COM	7	-0.05	-0.08	0.02	0.42	0.42	-15.5
Drug Retailers	MCKESSON	13	0.02	0.01	0.17	0.43	0.52	26.1
Drug Retailers	NYER MED.GP.	7	0.01	0.00	0.06	0.84	0.84	13.5
Drug Retailers	OMNICARE	28	0.11	0.08	0.17	0.62	0.67	20.0
Drug Retailers	PETMED EXPRESS	7	0.05	0.04	0.12	0.26	0.27	11.6
Drug Retailers	RITE AID	23	0.08	0.06	0.26	0.43	0.56	13.7
Drug Retailers	WALGREEN	29	0.06	0.05	0.04	0.28	0.30	15.1
Food Retailers & Wholesalers	ARDEN GROUP 'A'	29	0.07	0.05	0.25	0.94	0.83	7.3
Food Retailers & Wholesalers	CASEY'S GENERAL STORES	24	0.07	0.04	0.20	0.47	0.56	13.0
Food Retailers & Wholesalers	CORE MARK HOLDING	4	0.01	0.01	0.18	0.82	0.86	10.4
Food Retailers & Wholesalers	GT.ATL.& PAC.TEA CO.	26	0.03	0.01	0.46	0.97	0.91	8.0
Food Retailers & Wholesalers	INGLES MKTS.'A'	15	0.06	0.04	0.78	2.25	1.25	7.7
Food Retailers & Wholesalers	KROGER	16	0.05	0.03	0.36	0.44	0.63	11.5
Food Retailers & Wholesalers	NASH FINCH	29	0.03	0.02	0.46	1.04	0.97	10.5
Food Retailers & Wholesalers	NATURAL HEALTH TRENDS	8	-0.07	-0.08	0.07	0.81	0.80	1.8
Food Retailers & Wholesalers	PANTRY	8	0.04	0.03	0.59	0.45	0.75	12.3
Food Retailers & Wholesalers	RUDDICK	29	0.06	0.04	0.26	0.76	0.78	9.2
Food Retailers & Wholesalers	SAFEWAY	18	0.07	0.05	0.35	0.28	0.53	13.4
Food Retailers & Wholesalers	SPARTAN STRS.	8	0.02	0.01	0.42	0.69	0.75	14.0
Food Retailers & Wholesalers	SUPERVALU	29	0.04	0.03	0.33	0.53	0.65	10.5
Food Retailers & Wholesalers	SYSCO	29	0.05	0.04	0.10	0.23	0.30	14.3
Food Retailers & Wholesalers	UTD.NTRL.FOODS	12	0.04	0.03	0.17	0.32	0.42	24.7
Food Retailers & Wholesalers	VILLAGE SPRMKT.'A'	14	0.03	0.02	0.49	2.76	1.61	5.2
Food Retailers & Wholesalers	WEIS MARKETS	28	0.10	0.08	0.00	0.54	0.54	10.3
Food Retailers & Wholesalers	WHOLE FOODS MARKET	17	0.07	0.04	0.10	0.32	0.37	19.1
Food Retailers & Wholesalers	WINN-DIXIE STORES	2	0.03	0.02	0.03	0.91	0.91	15.8
Home Improvement Retailers	BEACON ROOFING SUPPLY	4	0.07	0.06	0.32	0.51	0.63	11.9
Home Improvement Retailers	HAVERTY FRTR.COS.	29	0.09	0.07	0.50	1.45	1.14	7.6
Home Improvement Retailers	HOME DEPOT	24	0.10	0.08	0.07	0.20	0.25	23.6
Home Improvement Retailers	JENNIFER CVS.	6	0.02	0.01	0.01	0.66	0.64	1.0
Home Improvement Retailers	LOWE'S COMPANIES	28	0.08	0.07	0.11	0.36	0.42	18.1
Home Improvement Retailers	LUMBER LIQUIDATORS	2	0.07	0.06	0.00	0.39	0.39	10.0
Home Improvement Retailers	PIER 1 IMPORTS	28	0.10	0.08	0.23	0.55	0.63	9.4
Home Improvement Retailers	REX STORES	25	0.06	0.05	0.21	1.04	0.95	15.3
Specialized Consumer Services	AARON'S	15	0.35	0.09	0.23	0.75	0.78	9.0
Specialized Consumer Services	ABLEAUCTIONS.COM	4	-0.07	-0.11	0.05	0.90	0.92	23.9
Specialized Consumer Services	AMERCO	14	0.20	0.10	0.59	0.91	0.92	11.6
Specialized Consumer Services	AMERICAN PUBLIC ED.	1	0.29	0.25	0.00	0.08	0.08	25.3
Specialized Consumer Services	APOLLO GP.'A'	8	0.29	0.25	0.00	0.09	0.09	21.8
Specialized Consumer Services	BLOCKBUSTER 'A'	5	0.00	-0.06	0.66	1.28	1.08	7.2
Specialized Consumer Services	CAREER EDUCATION	11	0.17	0.12	0.04	0.33	0.35	17.4
Specialized Consumer Services	CARRIAGE SERVICES 'A'	11	0.27	0.19	0.64	1.32	1.07	13.6
Specialized Consumer Services	CHEMED	28	0.12	0.09	0.20	0.45	0.56	20.4
Specialized Consumer Services	CHINA DSN.ED.HDG.ADS	1	0.30	0.26	0.00	0.52	0.52	30.9
Specialized Consumer Services	CHINA EDUCATION ALLIANCE	1	0.37	0.33	0.20	1.15	1.12	2.8
Specialized Consumer Services	COLLECTORS UNIVERSE	1	0.11	0.07	0.00	1.07	1.07	12.4
Specialized Consumer Services	COPART	13	0.32	0.25	0.01	0.35	0.36	19.9
Specialized Consumer Services	CORINTHIAN COLLEGES	10	0.16	0.13	0.03	0.21	0.24	24.0
Specialized Consumer Services	CPI	26	0.14	0.08	0.15	0.42	0.48	10.6
Specialized Consumer Services	DEVRY	16	0.18	0.13	0.06	0.17	0.22	24.1
Specialized Consumer Services	EBAY	7	0.32	0.24	0.01	0.23	0.24	61.4
Specialized Consumer Services	EDIETS.COM	2	-0.08	-0.13	0.06	0.11	0.17	9.4
Specialized Consumer Services	GALLERY OF HISTORY	7	-0.31	-0.44	0.24	0.39	0.52	-41.0
Specialized Consumer Services	GRAND CANYON EDUCATION	1	0.11	0.08	0.04	0.07	0.10	63.3
Specialized Consumer Services	H&R BLOCK	19	0.26	0.21	0.09	0.21	0.28	17.1
Specialized Consumer Services	HILLENBRAND	1	0.26	0.23	0.09	0.28	0.34	7.3
Specialized Consumer Services	ITT EDUCATIONAL SVS.	2	0.32	0.29	0.02	0.08	0.10	13.6
Specialized Consumer Services	JACKSON HEWITT TAX SER.	2	0.33	0.27	0.25	0.44	0.57	14.3
Specialized Consumer Services	K12	2	0.10	0.05	0.02	0.23	0.25	97.2
Specialized Consumer Services	LEARNING TREE INTL.	10	0.16	0.12	0.00	0.23	0.23	25.3
Specialized Consumer Services	MAC-GRAY	12	0.20	0.08	0.51	0.95	0.92	16.3
Specialized Consumer Services	MATTHEWS INTL.'A'	15	0.21	0.17	0.06	0.34	0.38	10.5
Specialized Consumer Services	MERCADOLIBRE	2	0.26	0.23	0.04	0.26	0.29	35.4
Specialized Consumer Services	MIDAS	11	0.11	0.06	0.35	0.37	0.56	10.9
Specialized Consumer Services	MONRO MUFFLER BRAKE	15	0.16	0.11	0.27	0.66	0.71	10.5
Specialized Consumer Services	NOBEL LRNG.COMMNS.	15	0.09	0.05	0.35	0.77	0.79	13.7

Industry	Name	N	EBITDA mgn	EBIT mgn	Lev	B/M Equity	B/M Ass	V/EBIT
Specialized Consumer Services	PRE PAID LEGAL SVS.	20	0.22	0.17	0.17	0.66	0.56	14.7
Specialized Consumer Services	PRINCETON REVIEW	7	-0.01	-0.07	0.05	0.40	0.43	1.7
Specialized Consumer Services	PROVIDENCE SERVICE	5	0.12	0.10	0.10	0.40	0.46	19.5
Specialized Consumer Services	REGIS	18	0.11	0.07	0.26	0.43	0.55	12.7
Specialized Consumer Services	RENT A CENTER	14	0.35	0.13	0.34	0.59	0.70	10.5
Specialized Consumer Services	ROLLINS	27	0.11	0.09	0.02	0.20	0.21	16.7
Specialized Consumer Services	SERVICE CORP.INTL.	28	0.24	0.18	0.36	0.64	0.72	18.2
Specialized Consumer Services	SOTHEBY'S	18	0.16	0.12	0.18	0.48	0.54	7.7
Specialized Consumer Services	SPARK NETWORKS	1	0.19	0.16	0.12	0.39	0.46	6.7
Specialized Consumer Services	STAMPS.COM	6	0.07	-0.05	0.00	0.46	0.46	8.8
Specialized Consumer Services	STANDARD PARKING	4	0.12	0.10	0.26	0.10	0.34	13.4
Specialized Consumer Services	STEWART ENTS.'A'	18	0.22	0.16	0.40	1.12	0.91	8.8
Specialized Consumer Services	STONEMOR PARTNERS	5	0.13	0.09	0.50	1.05	1.02	20.9
Specialized Consumer Services	STRAYER ED.	3	0.36	0.33	0.00	0.10	0.10	19.7
Specialized Consumer Services	SUNAIR SERVICES	18	0.13	0.09	0.06	1.29	1.23	10.5
Specialized Consumer Services	VCA ANTECH	8	0.21	0.18	0.25	0.17	0.38	16.3
Specialized Consumer Services	WEIGHTWATCHERS INTL.	2	0.30	0.29	0.10	0.05	0.14	16.3
Specialty Retailers	1-800-FLOWERS.COM 'A'	9	0.02	-0.01	0.14	1.01	0.96	5.0
Specialty Retailers	99 CTS.ONLY STRS.	11	0.13	0.11	0.01	0.33	0.34	24.1
Specialty Retailers	AC MOORE ARTS & CRAFTS	11	0.06	0.04	0.04	0.70	0.71	20.1
Specialty Retailers	ADV.AUTO PARTS	8	0.10	0.08	0.17	0.24	0.38	13.9
Specialty Retailers	AMERICAS CAR MART	10	0.14	0.13	0.32	0.76	0.76	21.8
Specialty Retailers	ASBURY AUTOMOTIVE GP.	5	0.03	0.03	0.68	0.97	0.98	11.8
Specialty Retailers	AUTOBYTEL	8	-0.18	-0.21	0.00	0.69	0.69	2.7
Specialty Retailers	AUTONATION	16	0.07	0.04	0.37	0.87	0.88	14.8
Specialty Retailers	AUTOZONE	13	0.16	0.13	0.13	0.15	0.26	14.2
Specialty Retailers	BARNES & NOBLE	15	0.08	0.05	0.13	0.49	0.56	9.9
Specialty Retailers	BED BATH & BEYOND	14	0.15	0.13	0.00	0.15	0.15	22.8
Specialty Retailers	BEST BUY	20	0.05	0.03	0.16	0.47	0.49	16.7
Specialty Retailers	BIG 5 SPTG.GOODS	6	0.08	0.06	0.22	0.30	0.42	10.1
Specialty Retailers	BLUE NILE	3	0.10	0.09	0.00	0.12	0.12	31.6
Specialty Retailers	BOOKS-A-MILLION	16	0.08	0.05	0.20	1.26	1.00	13.9
Specialty Retailers	BORDERS GROUP	13	0.07	0.03	0.11	0.61	0.64	8.4
Specialty Retailers	CABELA'S	5	0.09	0.07	0.26	0.93	0.85	10.6
Specialty Retailers	CARMAX	11	0.03	0.02	0.13	1.00	0.85	11.6
Specialty Retailers	CHINA AUTO LOGISTICS	1	0.03	0.03	0.66	4.85	2.32	2.0
Specialty Retailers	CHINA INTGRTD.ENERGY	1	0.10	0.10	0.08	2.19	2.10	2.1
Specialty Retailers	CONN'S	6	0.10	0.08	0.01	0.64	0.65	9.1
Specialty Retailers	COST PLUS	11	0.09	0.06	0.11	0.68	0.59	14.8
Specialty Retailers	DGSE COMPANIES	14	0.05	0.04	0.23	0.39	0.51	18.8
Specialty Retailers	DICK'S SPORTING GOODS	7	0.07	0.06	0.13	0.34	0.41	11.2
Specialty Retailers	DOLLAR TREE	14	0.13	0.10	0.04	0.23	0.26	10.5
Specialty Retailers	DOVER SADDLERY	4	0.01	0.00	0.34	0.67	0.74	10.4
Specialty Retailers	DREAMS	4	0.04	0.02	0.27	0.87	0.78	3.8
Specialty Retailers	EDUCATIONAL DEV.	15	0.14	0.13	0.04	0.49	0.51	12.1
Specialty Retailers	FAMILY DOLLAR STORES	29	0.09	0.08	0.01	0.34	0.34	11.6
Specialty Retailers	GAMESTOP	7	0.08	0.06	0.15	0.76	0.83	13.3
Specialty Retailers	GANDER MOUNTAIN	4	0.03	0.00	0.55	1.99	1.23	20.8
Specialty Retailers	GOLFSMITH INTL.HOLDINGS	1	-0.07	-0.09	0.46	1.16	1.09	-3.1
Specialty Retailers	GROUP 1 AUTOMOTIVE	11	0.03	0.03	0.53	0.77	0.86	10.8
Specialty Retailers	GSI COM.	8	-0.01	-0.05	0.13	0.34	0.43	27.6
Specialty Retailers	HASTINGS ENTERTAINMENT	9	0.10	0.02	0.34	1.28	1.15	12.1
Specialty Retailers	HIBBETT SPORTS	12	0.12	0.09	0.01	0.24	0.25	15.7
Specialty Retailers	IPARTY	8	0.02	0.00	0.44	1.47	0.99	14.0
Specialty Retailers	JO-ANN STORES	27	0.06	0.04	0.33	1.27	1.05	11.8
Specialty Retailers	KIRKLAND'S	6	0.07	0.04	0.04	0.42	0.46	30.3
Specialty Retailers	LAZARE KAPLAN INTL.	14	0.02	0.02	0.44	1.35	1.13	13.3
Specialty Retailers	LITHIA MTRS.A	12	0.04	0.04	0.65	1.20	1.04	10.4
Specialty Retailers	MARINEMAX	10	0.06	0.06	0.38	0.79	0.84	13.8
Specialty Retailers	NAVARRE	13	0.01	0.00	0.19	0.60	0.68	10.5
Specialty Retailers	NETFLIX	4	0.22	0.04	0.01	0.26	0.27	8.5
Specialty Retailers	O REILLY AUTOMOTIVE	16	0.14	0.11	0.06	0.37	0.41	14.6
Specialty Retailers	OFFICE DEPOT	21	0.04	0.03	0.12	0.45	0.48	19.5
Specialty Retailers	OFFICEMAX	29	0.08	0.04	0.52	1.11	1.03	20.3
Specialty Retailers	OVERSTOCK COM	5	-0.03	-0.06	0.10	0.17	0.26	-24.7
Specialty Retailers	PC MALL	9	0.01	0.00	0.25	1.03	0.88	17.6
Specialty Retailers	PENSKE AUTOMOTIVE GP.	11	0.02	0.02	0.62	1.05	0.96	12.6
Specialty Retailers	PEP BOYS MANNY MOE&JACK	27	0.10	0.07	0.28	0.71	0.68	11.0
Specialty Retailers	PERFUMANIA HOLDINGS	3	0.11	0.10	0.74	1.18	1.03	6.3
Specialty Retailers	PETSMART	14	0.07	0.05	0.15	0.33	0.41	31.7

Industry	Name	N	EBITDA mgn	EBIT mgn	Lev	B/M Equity	B/M Ass	V/EBIT
Specialty Retailers	RADIOSHACK	29	0.13	0.11	0.13	0.37	0.45	9.5
Specialty Retailers	REALNETWORKS	3	0.00	-0.33	0.00	0.47	0.47	-16.3
Specialty Retailers	RUSH ENTS.'B'	11	0.05	0.04	0.69	1.71	1.10	9.8
Specialty Retailers	SALLY BEAUTY HOLDINGS	1	0.09	0.08	0.01	0.72	0.72	7.8
Specialty Retailers	SHUTTERFLY	3	0.17	0.07	0.00	0.59	0.60	33.0
Specialty Retailers	SONIC AUTOMOTIVE 'A'	10	0.04	0.03	0.71	1.19	1.04	10.2
Specialty Retailers	SOURCEFORGE	5	-0.09	-0.16	0.00	0.41	0.41	-2.8
Specialty Retailers	SPORT CHALET 'B'	11	0.05	0.03	0.11	1.08	1.02	7.1
Specialty Retailers	STAPLES	17	0.07	0.06	0.06	0.22	0.27	25.6
Specialty Retailers	SUBURBAN PROPANE PTNS.	12	0.12	0.08	0.41	0.18	0.51	16.7
Specialty Retailers	SUSSER HOLDINGS	3	0.02	0.01	0.50	0.67	0.82	19.0
Specialty Retailers	TIFFANY & CO	21	0.18	0.15	0.09	0.26	0.33	15.4
Specialty Retailers	TITAN MACHINERY	2	0.04	0.04	0.38	0.20	0.51	23.3
Specialty Retailers	TRACTOR SUPPLY	15	0.07	0.05	0.11	0.58	0.57	9.8
Specialty Retailers	TRANS WORLD ENTM.	20	0.08	0.05	0.14	0.94	0.93	10.5
Specialty Retailers	TUESDAY MORNING	6	0.10	0.09	0.05	0.34	0.35	12.5
Specialty Retailers	ULTA SALON CO&FRA.	2	0.09	0.05	0.10	0.32	0.38	18.8
Specialty Retailers	VALUEVISION MDA.'A'	2	0.01	-0.01	0.01	0.79	0.79	-37.2
Specialty Retailers	WAYSIDE TECHNOLOGY GROUP	14	0.02	0.01	0.02	0.75	0.75	9.5
Specialty Retailers	WEST MARINE	13	0.07	0.04	0.23	0.87	0.84	12.2
Specialty Retailers	WILLIAMS SONOMA	25	0.09	0.07	0.04	0.27	0.30	25.4
Specialty Retailers	WINMARK	15	0.14	0.12	0.11	0.19	0.28	16.3

The association between changes in gas demand and GDP growth

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1. Introduction

Strategic Finance Group: SFG Consulting has been engaged by the Independent Pricing and Regulatory Tribunal (IPART) to provide advice in relation to retail gas tariffs from 1 July 2010 – 30 June 2013. Our specific advice relates to the estimate of the retail profit margin we would expect to prevail in a competitive market. We recently provided similar advice with respect to retail electricity tariffs.

One of our three approaches to estimating the retail margin is the expected returns approach, which is discussed at length in our paper *Estimation of the regulated profit margin for electricity retailers in New South Wales: Methodology and assumptions* (SFG, 2009a). One of the inputs into the expected returns approach is an estimate of the expected percentage change in gas volumes in the case where the economy is performing above or below expectation. We rely upon a model of the economy where all aspects of the economy are systematically performing above or below expectations. In the good state of the economy, there is above-average economic growth, share market returns are high and gas volumes rise. The question for our modelling then becomes, “If economic conditions were one standard deviation above or below expectations, by what percentage would we expect gas volumes to deviate from expectations?”

In our work in relation to electricity, we assumed that volumes would be 2% above expectations in the good economic state, and have adopted the same assumption for gas. The figure of 2% is the historical standard deviation of annual percentage changes in real gross domestic product (GDP) from 1960 – 2009. It is important to emphasise that it is the percentage changes in gas volumes in good and bad economic states which is incorporated into our modelling. Changes in GDP are merely a proxy for fluctuations in economic conditions.

In relation to electricity, we wrote a supplementary piece of analysis in order to determine whether this is a reasonable assumption, entitled *The association between changes in electricity demand and GDP growth* (SFG, 2009b). In that report we concluded that the relationship between growth in residential electricity volumes and unexpected changes in GDP growth is consistent with a one-for-one relationship. In the current paper we replicate the empirical analysis in the context of gas demand. For a review of the literature on this issue, please refer to our previous discussion. We address this issue from the typical research perspective of a null or baseline hypothesis, and ask whether there is sufficient information to reject this prior expectation. Our null hypothesis is that there is a one-for-one relationship between percentage changes in GDP and percentage changes in gas volumes.

2. Method

We perform two sets of analysis. First, we examine the association between annual changes in both electricity and gas volumes and changes in GDP. Second, we examine the association between annual changes in household expenditure on energy, total household expenditure and GDP. We rely upon annual data in order to avoid the seasonal impact of energy consumption due to weather conditions. Of course our data is still impacted by unexpected weather events, but these are unlikely to be highly correlated over years.

Our research method is the commonly-used ordinary least squares (OLS) regression technique in which we model percentage changes in dependent variables (either percentage changes in electricity volume, gas volume, household energy expenditure or household total expenditure) against percentage changes in independent variables (either GDP or household total expenditure). In time series data, the use of percentage changes is standard because the use of levels (that is, GWh or dollars) can result in the derivation of spurious relationships between the variables. This occurs because in time series data both the variables may be drifting upwards at a relatively steady rate despite there being no actual association between those variables. In statistical terms, the variables are said to be non-stationary – the mean and variance of the variables are non-constant over time. Converting to percentage changes generally alleviates the problem, because the percentage changes in the variables are likely to be stationary (Granger and Newbold, 1974).

OLS regression models a linear relationship between the dependent and independent variables. This means that it estimates an intercept or constant term and a series of coefficients on the independent variables which provide the best fit between the actual independent variables and the predicted values according to the coefficients. The criteria for the best fit is to minimise the sum of the squared error terms, where an error term represents the difference between the actual and predicted values. The regression models we estimate are presented in the equations below, which include a number of lag terms. We present alternative specifications of the models incorporating different numbers of lagged terms. More details of the specific variables used in the analysis are presented in Section 3. The models are:

$$\%ChgVol_t = \alpha + \beta_1 \%ChgGDP_t + \beta_2 \%ChgGDP_{t-1} + \beta_3 \%ChgGDP_{t-2} + \beta_4 \%ChgVol_{t-1} + \beta_5 \%ChgRP_t + \beta_6 \%ChgNP_t$$

$$\%ChgEnergy_t = \alpha + \beta_1 \%ChgTotal_t + \beta_2 \%ChgTotal_{t-1} + \beta_3 \%ChgTotal_{t-2} + \beta_4 \%ChgEnergy_{t-1} + \beta_5 \%ChgEnergy_{t-2}$$

$$\%ChgEnergy_t = \alpha + \beta_1 \%ChgGDP_t + \beta_2 \%ChgGDP_{t-1} + \beta_3 \%ChgGDP_{t-2} + \beta_4 \%ChgEnergy_{t-1} + \beta_5 \%ChgEnergy_{t-2}$$

$$\%ChgTotal_t = \alpha + \beta_1 \%ChgGDP_t + \beta_2 \%ChgGDP_{t-1} + \beta_3 \%ChgGDP_{t-2} + \beta_4 \%ChgTotal_{t-1} + \beta_5 \%ChgTotal_{t-2}$$

where:

$\%ChgVol$ = annual percentage change in electricity or gas volumes estimated across Australia;

$\%ChgGDP$ = annual percentage change in real GDP;

$\%ChgRP$ = annual percentage change in electricity prices for residential customers;

$\%ChgNP$ = annual percentage change in electricity prices for non-residential customers;¹

$\%ChgEnergy$ = annual percentage change in household expenditure on energy; and

$\%ChgTotal$ = annual percentage change in total household expenditure.

¹ We use electricity prices in the model for both the gas and electricity regressions because we have an extended time series of price data for electricity and expect prices of gas and electricity to be positively correlated.

Lagged terms are used for economic and statistical reasons. Economically, we use up to two lags of percentage changes in GDP because there may well be an association between changes in GDP and changes in energy volume or changes in household energy expenditure which does not fully show up in the national accounts at the same point in time. Investment and production form a part of GDP computations but increases or decreases in this component of economic activity may flow through to increases or decreases in household energy consumption at a later stage. Yet our modelling of retail margin assumes that changes in energy volumes and market returns occur contemporaneously each year. If we were to model the relationship between changes in the economy and changes in energy volumes over a rolling period of say, three years, our modelling would incorporate this lagged relationship. But the complexity of the modelling would increase substantially without there necessarily being an improvement in the precision of the estimated EBIT margin. By computing the sum of the coefficients on changes in GDP growth, we are measuring the cumulative association between volume changes and changes in economic conditions, regardless of whether this occurs contemporaneously, or with a lag of one or two years.

Statistically we use lag terms because, even if there is no genuine lagged consumer response to changes in economic conditions, and the true response does occur at the same point in time, this contemporaneous association may not reliably appear in economic data. Both GDP and household expenditure are imprecise measures of economic activity. In general, as noise in the measurement of the independent variable increases, we will observe a downward bias in the coefficient on that variable and an upward bias in the intercept term. In our case, even if there is genuinely a one-for-one relationship between changes in energy volume and changes in economic activity, the more noise in the measurement of economic activity (as measured by GDP) the more we expect the measured relationship to be biased downward, and correspondingly the intercept term will increase. Incorporating lagged values of the independent variable may reduce the noise in the data and therefore shed light on the true relationship between the variables.

We also use lagged terms of the dependent variable for statistical reasons. Values for the dependent variable over time may themselves be correlated, and in fact this does occur in our data. Changes in residential energy volume over time are negatively correlated but changes in household energy expenditure over time are positively correlated. This problem may lead to the statistical problem of serial (that is, time series) correlation in error terms. This means the error terms – the difference between actual values of the dependent variable and values predicted by the model – are positively or negatively correlated in time, which leads to statistical significance being overstated. Incorporating lagged values for the dependent variable in the analysis generally mitigates against this problem meaning we have increased confidence in the statistical significance of the results.

3. Data

Our data is drawn from the 47-year period from the year to June 1963 to the year to June 2009. Annual percentage changes in GDP are derived from figures published by the ABS.² Annual percentage changes in household final consumption expenditure are also derived from figures published by the ABS and were supplied by IPART.³ This data was analysed by IPART in a briefing to the Tribunal on 10 September 2009 entitled “Exploratory analysis of the association between household energy expenditure and economic activity.” Annual percentage changes in natural gas and electricity volumes were obtained from ABARE for the 30-year period from the year to June 1978 to the year to June 2008.

Estimated real changes in residential and non-residential electricity prices are an aggregation of a number of series. As a proxy for residential prices we first estimated the percentage changes in the electricity index component of the consumer price index, which is available from September 1980 onwards.⁴ Second, we augmented this data with percentage changes in the utilities component of the consumer price index, which is available from September 1972, because changes in the utilities price index and changes in the electricity price index are highly correlated.⁵ Third, for years prior to the availability of the utilities price index we incorporated estimated changes in NSW residential electricity prices compiled by Frontier Economics, relying on data from the ESAA. All percentage changes were converted to real terms using the changes in the consumer price index.⁶

As a proxy for non-residential prices we first estimated the percentage changes in the electricity supply component of the producer price index for manufacturing, which is available from March 1970.⁷ For earlier years we use estimated changes in NSW non-residential electricity prices, again compiled by Frontier Economics, relying upon data from the ESAA. Percentage changes are converted to real terms using changes in the consumer price index. We use the consumer price index for this conversion, rather than a producer price index, because we want to convert all prices to real terms using a common base, rather than examine changes in non-residential electricity costs relative to changes on other costs incurred by producers.

We present descriptive statistics in Table 1. The mean estimate of changes in GDP is 3.7% over the sample period with a standard deviation of 1.9%. The descriptive statistics on household energy expenditure and household total expenditure approximate the descriptive statistics on GDP. This is to be expected, considering that household consumption is one component of the GDP computation. There has been relatively higher annual growth in gas versus electricity volumes over the last 30 years, with mean volume changes of 5.2 and 3.7%, respectively.

² Catalogue 5206.0. Australian National Accounts: National Income, Expenditure and Product. Table 30. Key Aggregates and analytical series, Annual, Series ID A2304755F.

³ Catalogue 5204.0 Australian System of National Accounts. Table 42. Household final consumption expenditure, Series ID A2422136C and A2422459W.

⁴ Catalogue 6401.0 Consumer Price Index, Australia. Table 7. CPI: Group, Sub-group and Expenditure Class, Weighted Average of Eight Capital Cities, Series ID A2328141J.

⁵ Catalogue 6401.0 Consumer Price Index, Australia. Table 7. CPI: Group, Sub-group and Expenditure Class, Weighted Average of Eight Capital Cities, Series ID A2326521X.

⁶ Catalogue 6401.0. Consumer Price Index, Australia. Tables 1 and 2. CPI: All Groups, Index Numbers and Percentage Changes.

⁷ Catalogue 6427.0. Producer Price Indexes, Australia. Tables 12 and 13. Materials used in Manufacturing Industries, Division Index Numbers and Percentage Changes in Industry of Origin Index Numbers, Series ID A2309192C.

Table 1. Percentage changes in GDP, electricity volumes, gas volumes and household expenditure from the year to June 1963 to the year to June 2009 (N = 47)

	Mean	Median	Standard deviation
GDP _t (N=47; Table 3)	3.65	3.90	1.89
GDP _{t-1} (N=47; Table 3)	3.66	3.90	1.88
GDP _{t-2} (N=47; Table 3)	3.63	3.90	1.89
GDP _t (N=30; Table 2)	3.35	3.80	1.66
GDP _{t-1} (N=30; Table 2)	3.25	3.80	1.72
GDP _{t-2} (N=30; Table 2)	3.24	3.73	1.72
Household energy expenditure _t (N=47; Table 3)	3.70	3.90	2.76
Household energy expenditure _{t-1} (N=47; Table 3)	3.79	4.07	2.73
Household energy expenditure _{t-2} (N=47; Table 3)	3.84	4.07	2.78
Household total expenditure _t (N=47; Table 3)	3.64	3.78	1.62
Household total expenditure _{t-1} (N=47; Table 3)	3.68	3.78	1.57
Household total expenditure _{t-2} (N=47; Table 3)	3.64	3.73	1.59
Natural gas volume (N=30; Table 2)	5.20	4.12	4.43
Natural gas volume _{t-1} (N=30; Table 2)	5.36	4.12	4.54
Electricity volume (N=30; Table 2)	3.72	3.65	1.88
Electricity volume _{t-1} (N=30; Table 2)	3.77	3.73	1.86
Real residential electricity price (N=30; Table 2)	0.79	0.85	3.59
Real non-residential electricity price (N=30; Table 2)	-2.23	-0.41	4.76
Subsets of household energy expenditure (N = 11):			
Gas expenditure _t	3.51	3.09	2.99
Gas expenditure _{t-1}	3.05	3.09	3.73
Gas expenditure _{t-2}	3.66	3.13	3.98
Electricity expenditure _t	3.87	3.03	2.96
Electricity expenditure _{t-1}	3.44	3.03	2.54
Electricity expenditure _{t-2}	3.16	2.87	2.63

4. Results

In this section we first consider the association between changes in energy volume and GDP. We then proceed to examine the association between changes in household energy expenditure, household total expenditure and GDP. In each of the two results tables we present the coefficient estimates, the standard error of the estimate (which is used to estimate statistical significance) and the p -value for a significance test of whether the coefficient is significantly different from zero. The p -value is the probability that we have observed the coefficient being different from zero purely as a result of sampling error. The term sampling error means that our sample of annual observations is only a fraction of a population of data. There is a population of economic outcomes we could have observed over the last few decades and even earlier, but we are only able to observe one sample of data, so there is some chance that an observed relationship is purely coincidental.

Of course the significance test we are most interested in is whether the sum of coefficients on our measure of economic conditions (GDP or household total expenditure) is significantly different from one. If so we would have statistical evidence to reject our null hypothesis. In the lower section of each table we present the summation of these coefficients, along with significance tests of whether that summation is significantly different from one or zero.

4.1 Electricity volume, gas volume and GDP

The results from analysis of the relationship between percentage changes in residential energy volume and percentage changes in GDP are presented in Table 2. The results show that we are unable to reject the hypothesis that there is a one-for-one relationship between percentage changes in gas volume and percentage changes in GDP. We are most interested in the sum of the coefficients on changes in GDP, which includes up to two lags. These summations range from 1.08 – 1.30, and in no case is there a statistically significant difference from one. P-values for this significance test are reported below the summations. In this instance, with respect to electricity the summations of the coefficients on GDP growth range from 0.41 – 0.64 and are significantly lower than one. However, in our previous analysis with respect to electricity, which used a longer time series of 46 annual observations, these summed coefficients range from 0.92 – 1.35 and were insignificantly different from one. Hence, the lower coefficients on electricity growth are the result of using only 30 years of data, to coincide with the period for which gas consumption data is available.

The R-squared statistic measures the proportion of annual variation in energy volumes which is explained by the independent variables. As expected, the R-squared statistic increases as lagged changes in GDP are incorporated, to the point where we can explain 36% of the variation in gas volume changes, and 56% of the variation in electricity volume changes. The adjusted R-squared statistic accounts for the statistical problem that incorporating any additional independent variable into the analysis is likely to increase the R-squared statistic, regardless of whether there is a true underlying relationship between that variable and the dependent variable. According to this measure of goodness-of-fit, the model which incorporates one lagged change in GDP would be preferred. However, our preferred model incorporates two lags for changes in GDP growth because we are merely incorporating additional measures of the same variable in time, rather than a new conceptual variable which might result in a spurious increase in the R-squared statistic. Furthermore, the reduction in the adjusted R-squared statistic is relatively minor subsequent to the inclusion of the second lagged change in GDP growth.

Table 2. Relationship between percentage changes in electricity volume or gas volume and percentage changes in GDP and percentage price changes from the year to June 1963 to the year to June 2008 (N = 30)

	No lagged changes in GDP		One lagged change in GDP		Two lagged changes in GDP	
	Gas	Elec	Gas	Elec	Gas	Elec
Intercept (%)	1.28	1.16	-0.73	0.44	-1.35	0.60
(standard error)	1.98	0.89	2.33	0.92	3.30	1.24
\hat{p} -val vs $H_0 = 0$	0.52	0.90	0.76	0.64	0.69	0.63
ChgGDP _t	1.30	0.64	1.30	0.65	1.35	0.64
(standard error)	0.48	0.18	0.49	0.18	0.52	0.19
\hat{p} -val vs $H_0 = 0$	0.01	0.00	0.01	0.00	0.02	0.00
ChgGDP _{t-1}			-0.22	-0.24	-0.23	-0.24
(standard error)			0.48	0.19	0.49	0.20
\hat{p} -val vs $H_0 = 0$			0.65	0.22	0.65	0.23
ChgGDP _{t-2}					0.14	-0.04
(standard error)					0.52	0.19
\hat{p} -val vs $H_0 = 0$					0.79	0.94
ChgDem _{t-1}	0.32	0.35	0.36	0.47	0.35	0.48
(standard error)	0.17	0.15	0.19	0.18	0.20	0.18
\hat{p} -val vs $H_0 = 0$	0.08	0.03	0.08	0.01	0.09	0.02
ChgResPrice	0.47	0.12	0.43	0.10	0.49	0.08
(standard error)	0.30	0.11	0.32	0.11	0.38	0.14
\hat{p} -val vs $H_0 = 0$	0.14	0.29	0.18	0.42	0.21	0.56
ChgNonResPrice _t	-0.09	-0.07	-0.10	-0.06	-0.12	-0.05
(standard error)	0.23	0.08	0.23	0.08	0.25	0.09
\hat{p} -val vs $H_0 = 0$	0.71	0.43	0.67	0.49	0.64	0.57
SumGDP Coeff	1.30	0.64	1.08	0.41	1.26	0.56
\hat{p} -val vs $H_0 = 1$	0.53	0.06	0.91	0.03	0.79	0.09
\hat{p} -val vs $H_0 = 0$	0.01	0.00	0.13	0.12	0.20	0.33
R ² (%)	25.2	48.3	35.8	51.5	36.0	51.6
Adj-R ² (%)	24.8	40.0	22.4	41.4	19.3	38.9

4.2 Household expenditure on energy

We also analysed the relationship between percentage changes in household energy expenditure, household total expenditure and GDP and present the results in Table 3. There is insufficient time series data to separately analyse household energy expenditure on gas versus electricity. However, for the 11 years of data in which this disaggregation is available, we observe very similar descriptive statistics for these percentage changes, as shown in Table 1.

The left panel presents results of the regression of changes in energy expenditure versus total expenditure, the middle panel presents results of the regression of changes in energy expenditure versus GDP and the right panel presents results of the regression of changes in total expenditure on GDP. The rows with coefficients are labelled as “Ind var” and “Dep var” for independent variable and dependent variable. In the first panel the independent variable is percentage change in total expenditure and the dependent variable is percentage change in energy expenditure.

Examining the relationship between changes in energy versus total expenditure in the first panel, we observe that changes in household total expenditure can explain 43 – 52% of the variation in changes in household expenditure on energy. The coefficient on changes in total expenditure is 1.12, which is insignificantly different from one and the intercept term is insignificantly different from zero. If we incorporate lagged changes in expenditure into the regression, we observe increased explanatory power and the sum of the coefficients on changes in total expenditure increase to 1.35 and 1.51. However, these summations remain insignificantly different from zero. This means that we cannot reject the hypothesis that household energy consumption fluctuates in line with total consumption.

Table 3. Relationship between percentage changes in household energy expenditure, household total expenditure and GDP from the year to June 1963 to the year to June 2009 (N = 47)

	Energy vs total expenditure			Energy expenditure vs GDP			Total expenditure vs GDP		
	No lags	One lag	Two lags	No lags	One lag	Two lags	No lags	One lag	Two lags
Intercept (%)	-0.38	-1.33	-2.26	1.07	0.15	-1.13	1.74	0.56	0.89
(standard error)	0.76	0.93	1.09	0.78	0.97	1.03	0.42	0.58	0.65
\hat{p} -val vs $H_0 = 0$	0.62	0.16	0.04	0.18	0.88	0.28	0.00	0.34	0.18
Ind var _t	1.12	1.03	1.01	0.72	0.66	0.64	0.52	0.48	0.48
(standard error)	0.19	0.20	0.20	0.19	0.20	0.19	0.10	0.10	0.10
\hat{p} -val vs $H_0 = 0$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ind var _{t-1}		0.33	0.31		0.15	0.08		0.19	0.14
(standard error)		0.26	0.26		0.22	0.22		0.13	0.13
\hat{p} -val vs $H_0 = 0$		0.21	0.23		0.49	0.69		0.14	0.29
Ind var _{t-2}			0.19			0.45			0.16
(standard error)			0.25			0.21			0.13
\hat{p} -val vs $H_0 = 0$			0.45			0.04			0.23
Dep var _{t-1}		0.02	-0.06		0.15	0.06		0.17	0.18
(standard error)		0.15	0.15		0.15	0.14		0.14	0.16
\hat{p} -val vs $H_0 = 0$		0.89	0.70		0.31	0.68		0.23	0.27
Dep var _{t-2}			0.16			0.09			-0.20
(standard error)			0.14			0.14			0.14
\hat{p} -val vs $H_0 = 0$			0.24			0.55			0.17
Sum Coeff	1.12	1.35	1.51	0.72	0.82	1.17	0.52	0.67	0.78
\hat{p} -val vs $H_0 = 1$	0.53	0.22	0.18	0.15	0.47	0.57	0.00	0.01	0.20
\hat{p} -val vs $H_0 = 0$	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
R ² (%)	43.2	46.9	52.4	24.1	28.7	39.5	36.8	48.7	51.4
Adj-R ² (%)	41.9	43.2	46.5	22.4	23.7	32.1	35.4	45.1	45.5

Examining the relationship between household energy expenditure and GDP provides evidence consistent with the results presented in Table 2. Referring to the middle panel, the summation of coefficients on GDP ranges from 0.72 – 1.17, all of which are insignificantly different from zero. Incorporating lagged terms also systematically increases explanatory power, even when referring to the adjusted R-squared statistic.

When we examine total household expenditure, the summation of the coefficients on changes in GDP range from 0.52 – 0.78, with the higher value being insignificantly different from one. This result highlights the limitation of analysing a small sample of imprecisely measured data. Changes in GDP are meant to capture changes in an economy's productivity, which we would expect to flow through to proportionate changes in consumption. But both GDP and household expenditure are imperfect measures of economic activity, which means that the results should be treated with caution. Over the sample period, the average percentage change in both of these variables is the same, at an annual rate of 3.7 per cent, and they have approximately the same standard deviation (1.6 per cent for household expenditure and 1.9 per cent for GDP). Yet if we did not include lagged terms we would observe a significantly positive intercept term of 1.74 and what would appear to be a less than one-for-one relationship between economic growth as measured by GDP and changes in household expenditure. The more reasonable interpretation of the evidence, as suggested by the analysis which includes lagged terms, is that both changes in GDP and household expenditure are both measures of economic activity which are not necessarily perfectly matched in terms of timing.

5. Conclusion

In this paper we examine the association between changes in economic conditions and energy consumption. Changes in economic conditions were measured as changes in GDP and household expenditure, while changes in energy consumption were measured in terms of volume and household energy expenditure. Analysis of this issue is impeded by the small sample of economic data which is available – we rely upon a maximum of 47 annual observations– meaning that our tests have low power to reject the null hypothesis of a one-for-one relationship.

In aggregate the results are consistent with there being a one-for-one relationship between changes in economic conditions and changes in energy consumption for both gas and electricity. The estimated elasticity of changes in gas volume relative to changes in GDP is 1.26, incorporating two lagged changes in GDP, which is insignificantly different from one. Furthermore, there was no instance in which our measurement of elasticity of gas consumption to economic conditions was significantly different from one.

6. References

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