Appendix 1.0

ENERGEX Materials and Cost Escalation Forecasts for 2010-15

Sinclair Knight Merz – January 2010

Energex Forecast Materials Cost Escalation Rates for 2010-15

- Final
- 28 January 2010

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Limitation Statement

Forecasts are by nature uncertain. SKM has prepared these projections as an indication of one possible outcome it considers likely in a range of possible outcomes. SKM does not warrant or represent the selected outcome to be more likely than other possible outcomes and does not warrant or represent the forecasts to be more accurate than other forecasts. These forecasts represent the authors' opinion regarding the outcomes considered possible at the time of production, and are subject to change without notice

SKM has used a number of publicly available sources, other forecasts it believes to be credible, and its own judgement and estimates as the basis for developing the cost escalators contained in this report. The actual outcomes will depend on complex interactions of policy, technology, international markets, and multiple suppliers and end users, all subject to uncertainty.

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1. Executive Summary

Sinclair Knight Merz (SKM) was engaged by Energex Limited (Energex) to assist in developing an enhanced understanding of the underlying cost pressures likely to be faced by the organisation through price movements in their material costs over the period 2008-15.

In recent decisions for electricity network service providers (including Powerlink, SP AusNet, ElectraNet and the NSW Distribution Businesses'), the AER has allowed for costs related to capex and opex provisions to be escalated in real terms. Prior to these decisions Australian National CPI was the rate permitted by the AER as a proxy to account for the escalation expected to materialise in relation to these network costs.

The methodologies accepted by the AER in these recent decisions sought to model the changing price of equipment and project costs through combining independent forecast movements in the price of input components (Cost Drivers), with 'weightings' that identify the relative contribution of each of the cost drivers to final equipment/project costs. This in turn generated real cost forecasts for the regulatory control period under review.

In developing its forecast materials cost escalation rates for Energex's capex forward program, SKM has maintained consistency with the methodology for modelling cost escalation as accepted by the AER in its recent NSW Distribution Business's Final Decision.[1]

The escalation factors presented within this report represent SKM's calculated best estimate of likely materials cost escalation components for use within project estimation to account for the predicted movement in project materials cost drivers over the periods June 2008 to June 2015, relative to Australian National CPI.

The escalation factors presented are specific to the operating environment faced by Energex, and are based on the most up-to-date information available at the time of compilation.

Rates were established for network asset categories nominated by Energex and thereafter aggregated to the program level by the proportion that costs attributed to Materials in each of Energex's asset categories, was found to contribute to the total program materials cost in each of the five years.

Table 1 below provides the results of SKM's modelling of Materials Cost Driver Weightings in Energex's Capital Program.

[1] AER 2009, NSW DNSP Final Decision. Available as a download from: http://www.aer.gov.au/content/index.phtml/itemId/728076

The Energex Capex Program Level Materials Cost Escalation Rates developed during this assignment are presented in Table 2

- **Table 1 Materials Cost Driver Weightings in Energex's Capital Program**

Materials Escalation Cost Driver	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Mfr - Local (CPI)	31.3%	29.4%	28.9%	27.8%	29.4%	29.0%	28.2%
Mfr - Import (TWI x CPI)	4.8%	6.5%	5.9%	6.7%	5.8%	6.1%	7.5%
Aluminium	15.3%	14.5%	15.9%	15.4%	15.5%	15.1%	15.0%
Copper	6.3%	5.5%	4.6%	4.6%	5.2%	5.9%	6.5%
Steel	17.1%	16.8%	16.5%	15.8%	16.2%	15.6%	15.6%
Oil	3.6%	3.1%	2.3%	2.1%	2.5%	2.6%	2.4%
CPI	3.9%	4.7%	5.2%	6.2%	6.1%	7.8%	6.0%
TWI	5.2%	5.1%	5.2%	5.3%	5.1%	4.9%	4.9%
Civil Works	6.4%	7.7%	8.1%	8.7%	6.9%	6.4%	7.1%
Oil (As proxy for Energy)	6.0%	6.6%	7.4%	7.5%	7.2%	6.8%	6.8%

- **Table 2 Energex Capex Program Level Materials Cost Escalation Rates**

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
weighted annual nominal index	1.000	0.985	1.133	1.077	1.003	0.988	0.990
weighted annual nominal %	0.04%	-1.5%	13.3%	7.7%	0.3%	-1.2%	-1.0%
weighted annual real index	0.986	0.960	1.108	1.051	0.978	0.964	0.966
weighted annual real %	-1.4%	-4.0%	10.8%	5.1%	-2.2%	-3.6%	-3.4%

2. Introduction

Sinclair Knight Merz (SKM) was engaged by Energex Limited (Energex) to assist in developing an enhanced understanding of the underlying cost pressures faced by the organisation through forecasts movements in the price of materials over the period 2008-15

SKM has been actively researching the increasing cost of capital infrastructure works for some time, particularly in the electricity and gas industries, and has developed a cost escalation modelling process which captures the likely impact of expected movements of specific input cost drivers on future electricity infrastructure pricing, providing robust cost escalation rates.

The World Bank's June 2008 report entitled; "*Study of Equipment Prices in the Energy Sector"* stated that;

"In the past four years, global demand has led to substantial increases in equipment and material prices in the power sector. This is mainly due to significant increases in the escalation of raw material materials and labor associated with the manufacture and fabrication of equipment"

Research undertaken by SKM in 2006 demonstrated that from around 2003 prices for electrical equipment, which had previously been assumed to escalate in line with increases in the Australian Consumer Price Index (CPI), were escalating substantially in excess of CPI.

An independent survey of seven Distribution Network Service Providers (DNSP) undertaken by SKM in 2009 also identifies that this above CPI trend has been a real underlying cost pressure faced by DNSPs, particularly over the last four to five years.

It was from this knowledge, derived from long-term interactions with Transmission and Distribution network service providers throughout Australia and abroad, that SKM pioneered the modelling of non-CPI based network capex cost escalation modelling in Australia.

The escalation factors presented in this report represent SKM's calculated best estimate of likely materials cost escalation for use in Capex project estimation to account for the predicted movement in the underlying divers of materials cost over the period June 2008 to June 2015, relative to Australian National CPI, being the base inflation factor used by the AER.

The escalation factors presented are specific to the operating environment faced by Energex, and are based on the most up-to-date information available at the time of compilation.

2.1. SKM's relevant experience

SKM has assisted several electricity utilities, both at the transmission and distribution level, in analysing the impact of movements in commodity prices and labour on the costs of network assets, as well as in providing independent validation of their capex and opex modelling processes.

These projects have included:

ETSA Utilities – 2009(a)

SKM was engaged to provide an independent review of the cost escalation rates within the South Australian DNSP's Opex models. This project was initiated as part of ETSA Utilities' preparation for the submission of its revenue proposal to the AER.

ETSA Utilities – 2009(b)

In a separate assignment, SKM was engaged to provide inputs to the development of materials cost escalation rates within the South Australian DNSP's capex model, as part of ETSA Utilities' preparation for the submission of its revenue proposal to the AER.

TRANSCO (Philippines) – 2009

SKM was engaged to apply its cost escalation modelling experience to escalate TransCo's internal asset unit rates to current pricing levels

Transend Networks – 2009

SKM was engaged to investigate the long-term average transmission network materials and labour cost escalation rates in Tasmania.

Ergon Energy – 2009

SKM was engaged to provide an update of cost escalation rates developed the previous year. The effect of rapid movements in a number of underlying cost drivers was required to be modelled in order to provide a more recent set of outputs. The resulting cost escalation rates are to be included as part of Ergon Energy's official revenue proposal to the AER.

ElectraNet – 2009

SKM was engaged to apply its cost escalation modelling experience to escalate ElectraNet's internal opex model unit rates to current pricing levels.

Ergon Energy – 2008

SKM was engaged to map key cost drivers within its model, to internal opex cost estimation unit rates within Ergon Energy models.

Ergon Energy – 2008

SKM undertook Stage 2 of the Ergon assignment relating to Electricity Industry Labour, Commodity and Asset Price & Cost Indices. During this period the SKM cost escalation model underwent extensive enhancements.

Transend Networks – 2008

SKM were engaged to provide cost escalators factors in order to promote Transend's most recent asset valuation , having been based in June 2006 AUD$ terms, to June 2008 amounts as part of the TNSP's regulatory proposal. The established SKM Capex Cost Escalation Model was again utilised for this project.

TransGrid – 2008

During this assignment, SKM reviewed TransGrid's Capex model, corrected errors in their methodology, and provided an independent validation for use during TransGrid's revenue proposal to the AER.

ActewAGL - 2008

SKM to provided an independent assessment of the escalation factors that apply to ActewAGL's capital works programmes and projects going forward over the period 2007/8 (the base year) to 2013/14 (the final year of the next regulatory period). This was included in Actew AGL's submission to the AER.

Ergon – 2008

SKM undertook Stage 1 of the Ergon assignment relating to Electricity Industry Labour, Commodity and Asset Price & Cost Indices.

AER – 2007/2008

In July 2007, SKM was engaged by the Australian Energy Regulator (AER) to review the regulatory revenue proposal submitted by ElectraNet for their next regulatory reset period 2008 to 2013.

During this assignment the SKM model was both updated and enhanced through consideration of elements presented by ElectraNet. The AER accepted SKM's approach to calculating cost escalation indices.

SP AusNet - 2007

SKM was engaged by SP AusNet to analyse the likely drivers of cost escalation on capital expenditure forecasts over the remaining two years of their current determination (2006/07 and 2007/08), and for the next regulatory reset period (2008/09 to 2012/13, commencing 1 April 2008).

The SKM SP AusNet assignment set the precedent for above CPI escalation of capex costs. The AER accepted the SKM methodology noting that it produced robust figures for the purpose intended.

Energex - 2007

SKM was engaged by Energex to provide forward estimates of budget figures relating to the Energex Program of Works.

Energex - 2005

SKM conducted a multi-utility study of equipment procurement strategies and prices, which examined current market and contract costs for a variety of assets including power transformers, circuit breakers, current and voltage transformers and conductor.

3. Objective & Scope

This section presents SKM's understanding of the Objective and Scope of this assignment.

3.1. Objective

SKM understood the objective of the assignment was to provide Energex with SKM's view of the forecast movement of these underlying drivers of materials and equipment cost, apply these movements to the weightings identified within the SKM cost escalation model, and provide Energex with a program level materials cost escalation rate for each annual year to June period between year to June 2009 and 2015 (inclusive).

This was to be accomplished through the production of an independent consultant's report, documenting the process undertaken by SKM's in identifying the relevant direct and indirect drivers affecting the cost of materials within Energex's capital expenditure program over the period June 208 – June 2015, for which there were credible forecasts;

3.2. Scope

SKM understood the assignment was to consist of a desk top modelling exercise that entailed an application of SKM's Cost Escalation Model, as well as components of its internal workings.

Steps understood to be required in completing this assignment included:

- Mapping of Energex Capex forward program asset categories to asset categories contained within the SKM Cost Escalation Model.
- Assigning weightings of the various underlying drivers of materials cost[2] to each asset category in the Energex capex forward program.[3]
- The aggregation of individual weightings developed at the asset category level to total program level weightings, through applying the relevant proportion by which each of Energex's materials asset categories contributes to the total materials costs of the capex forward program.
- The presentation of Capex forward *program level* cost driver weightings developed by SKM to Energex in an excel spreadsheet[4].
- The development of SKM forecast movements for each underlying driver of materials costs

[2] Drivers of materials cost include Base metals, Steel, Forex, Oil, CPI, etc and describe the underlying factors to which the overall cost of network materials are known to be sensitive.

[3] Details of these asset level weightings did not appear in spreadsheets for the final report as they are considered to be SKM Intellectual Property.

[4] This was a project deliverable

- The application of these forecast movements to the program level weightings developed during the assignment.
- The presentation of a set of annual total program level materials cost escalation rates in an excel spreadsheet[5]
- The development and presentation of a final SKM report detailing the process involved in undertaking the assignment.[6]

[5] This was a project deliverable
[6] This was a project deliverable

4. Project Outcomes

SKM understood the assignment required three distinct deliverables, being:

a) An excel spreadsheet containing percentage weightings by which the total program level materials component of Energex's total capex forward program can be described as being sensitive to movements in underlying drivers of materials cost (eg. Aluminium, Copper, Steel, Forex etc)

b) An excel spreadsheet containing SKM's view of suitable program level materials cost escalation rates, developed through application of the weightings described in point 1) above to forecast movements in the underlying drivers of cost developed by SKM.

c) A finals written report describing the methodology employed by SKM in developing and delivering the project outcomes described in points 1) and 2) above.

SKM further understood that the report was required to be compiled in a manner suitable for inclusion with Energex documentation provided to the Australian Energy Regulator.

5. Methodology

In recent decisions for electricity network service providers (including Powerlink, SP AusNet, ElectraNet and the NSW Distribution Businesses'), the AER has allowed the costs related to capex provisions to be escalated in real terms. Prior to these decisions CPI was generally used as a proxy to account for the escalation expected in relation to these network costs.

The methodologies accepted by the AER in these decisions sought to better characterise the likely escalation in price of equipment/project costs through combining independent forecast movements in the price of input components, with 'weightings' for the relative contribution of each of the components to final equipment/project costs. This in turn generates real cost forecasts for the regulatory control period under review.

In its Final Decision for the NSW Distribution Businesses the AER stated that:

"In light of these external factors, it was considered that cost escalation at CPI no longer reasonably reflected a realistic expectation of the movement in some of the equipment and labour costs faced by electricity network service providers (NSPs). It was also communicated by the AER at the time of allowing real cost escalations that the regime should symmetrically allow for real cost decreases. This was to allow end users to receive the benefit of real cost reductions as well as facing the cost of real increases."[7]

SKM confirms that its methodology for modelling the forecast changes in the costs of materials used in Electricity Network capex and opex programs is consistent with the approach accepted by the AER in its recent NSW Final decision.

This section of the report provides a step by step description of the methodology employed by SKM in modelling forward capex cost escalation. In describing this methodology, it is also considered appropriate to provide an account of the history behind SKM's Capex Cost Escalation Model.

The consistency of SKM methodology with the method accepted by the AER in its recent NSW Final decision is outlined in the following section (Chapter 6), which outlines the process through which the underlying drivers of the price of materials are updated.

[7] AER 2009, NSW DNSP Final Decision P478. Available as a download from: http://www.aer.gov.au/content/index.phtml/itemId/728076

5.1. The need for a Materials Cost Escalation Model

SKM has believed for some time that movements in the CPI did not accurately reflect the relative movements in costs associated with electricity network projects, and sought to establish an enhanced understanding of specific escalation rates that captured the movements in a network service providers' costs for the various items of Plant and Equipment within a typical program of Capex and Opex works.

This view was echoed through The World Bank's June 2008 report entitled; "*Study of Equipment Prices in the Energy Sector"* which stated that;

> *"In the past four years, global demand has led to substantial increases in equipment and material prices in the power sector. This is mainly due to significant increases in the escalation of raw material materials and labor associated with the manufacture and fabrication of equipment"*
>
> *"From 2006 to 2008 alone, energy projects financed by the World Bank experienced 30%-50% increases above the original cost estimates, requiring additional financing, a reduction in scope of the project, or schedule delays."*

The opportunity to develop an enhanced understanding of the drivers of network asset costs originally presented itself to SKM during a multi-utility strategic procurement assignment. It was from this study that SKM was able to demonstrate that prices were increasing faster than CPI, and was able to develop and calibrate a model that described this escalation.

5.2. Multi - Utility Strategic Procurement study

During this 2006 study, the nine (9) Australian transmission and distribution study participants surveyed by SKM provided confidential contract information for the purchase of common items of plant, equipment and materials for the period 2002 to 2006.

The survey responses SKM received for this project resulted in a large database of contract pricing. In order to generate meaningful comparisons a number of steps were taken to analyse and collate this information.

5.2.1. SKM interviews with Equipment Manufacturers / Suppliers

A number of network asset equipment manufacturers and/or suppliers were surveyed to provide a greater understanding of the cost drivers underlying equipment pricing.

Prior to any interviews, a letter of introduction was supplied to each manufacturer / supplier, stating key issues to be explored, being:

- Their view of the most cost effective contracting forms (e.g. lump sum prices, period contracts, performance based contract, alliance contracts, etc).
- The relative importance of underlying cost drivers in determining market prices (e.g. commodity prices such as steel, aluminium, copper, the cost of local labour, international exchange rates, etc).
- The extent to which individual technical specifications for equipment or services may be so onerous as to result in a premium price being paid.
- The extent to which commercial terms and conditions for supply of equipment or services may be so onerous as to result in a premium price being paid.
- Whether they considered that there were any factors which might result in State by State differences in overall market prices for plant / equipment and contract services?
- What cost drivers they believed would impact on the cost of electricity infrastructure in the next 5 to 10 years.

5.2.2. SKM Knowledge Base

SKM also drew on information within studies undertaken on contract cost information for a number of turnkey substation and overhead distribution line projects (including plant equipment, materials, construction, testing, and commissioning). SKM's knowledge base of Network management operational and asset procurement experience was also drawn upon during this establishment of cost drivers.

5.2.3. Identification of Key Cost Drivers

The results of SKM's research indicated that there are a number of common factors driving the rapid rises in networks' capital infrastructure costs.

The primary factors (in no particular order) influencing cost movements are considered to be changes in the market pricing position for:

- Oil;
- Labour *;
- Construction costs;
- Foreign exchange rates;
- The Trade Weighted index;
- Metals such as copper, aluminium, and steel;
- Wood Poles; and
- Other Cost Components (which include e.g. Supplier's Transport costs and profit margins sought in the supply chain, to which CPI is assigned as a proxy for cost escalation).

**Labour, as a cost driver within the SKM cost escalation model, is only included when modelling the installed cost of an asset. This particular component models cost drivers related to the labour involved in the on-site construction and commissioning of plant and equipment. In the project referred to through this report, Energex requested "materials only" escalators, and no labour costs were included during SKM's modelling.*

5.2.4. Assignment of individual cost component weightings per project component

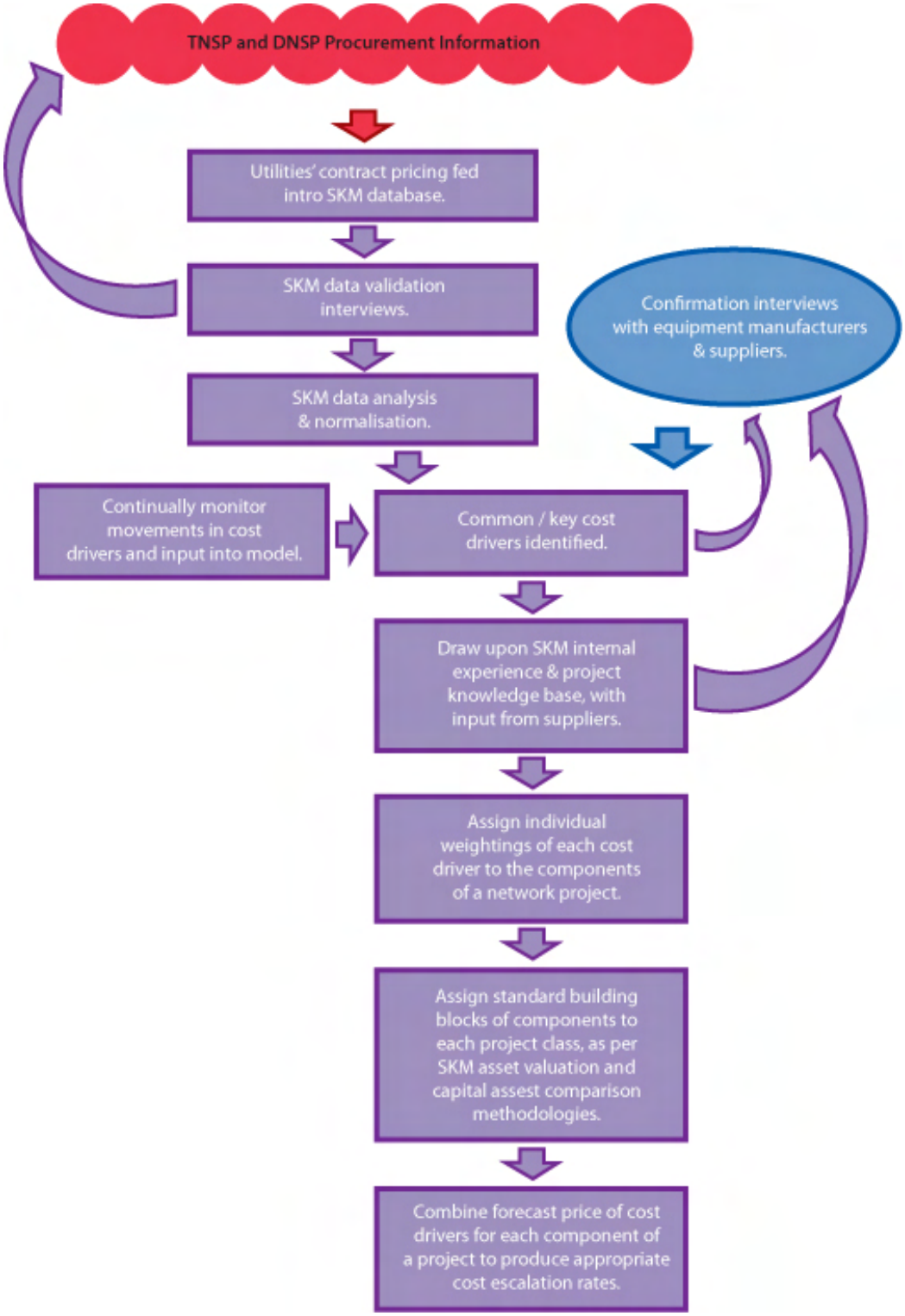
Having now identified these Key Cost Drivers, SKM examined each of the main items of plant equipment and materials within its database, in order to establish a suitable percentage contribution, or weighting, by which each of these underlying cost drivers were considered to influence the total price of each completed item.

In its determination and application of final cost driver weightings for these network assets, SKM drew on a wide range of information such as its knowledge of commercial rise and fall clauses contained within confidential network procurement contracts supplied to SKM during market price surveys, information passed on during its interviews with Equipment Suppliers and Manufacturers; as well as industry knowledge held within its large internal pool of professional Estimators, Procurement specialists, Financiers, Economists, Engineers and Operational personnel.

With appropriate weightings now developed and assigned to each component, the Key Cost Drivers thus provided a means by which changes in the forecast price of each underlying cost driver might be foreseen to affect the overall cost of the network asset itself.

Figure 1illustrates the SKM modelling process.

- **Figure 1 SKM's Capex Cost Escalation Model**



A follow-up study covering the period 2006 to 2009 is currently in its final stages of completion, and SKM's analysis of the results of this Study is due to be completed by March 2010.

5.3. Developing Cost escalators for Individual DNSP Asset Categories

At the start of the assignment SKM was provided data from the Energex Capital Program that had been broken down into a set of Energex nominated asset categories. SKM understood that the breakdown of the Energex Capital program data supplied for this assignment had come from the DNSP's Post Tax Revenue Model (PTRM).

As SKM had undertaken similar assignments for Australian DNSPs using data from Capital programs distributed amongst asset categories in PTRM formats, the process of mapping the categories in the Energex data to asset categories within the SKM Cost Escalation model was found to be relatively straight forward, as the SKM model had previously been set up to develop cost driver weightings in this form.

The procedure was also overseen by SKM personnel from the Networks Business Unit of SKM's Power and Energy Division. The personnel chosen to oversee the mapping process were selected through their strong experience in an electricity network operational and asset management environment.

5.4. Refining and enhancing the Model

With previous Sections having described the formation of the SKM Capex Cost Escalation Model, this section follows on by describing the methodology by which the model is refined and updated. Section 6 describes how updates of the predicted movements in the underlying Key Cost Drivers are fed into the SKM model.

Both SKM's database of capital costs and the cost escalation model itself have been progressively refined and updated since their first introduction. These enhancements have been undertaken by various means, including:

- obtaining updated budget price information from suppliers and contractors for individual plant, equipment and projects;
- conducting market price surveys and plant / equipment procurement studies whereby utilities share their pricing information on a confidential basis with SKM;
- other external project costs for non-utility clients that are project managed by SKM;

- Input through reviews of the SKM model by external parties;
- Input through consideration of alternative methodologies within external models; and
- Input through consideration of alternative methodologies suggested within SKM's internal peer and practice reviews.

While there are benefits in maintaining consistency, particularly with past precedents, SKM has incorporated improvements to its modelling method when there was a clear need, particularly in response to regulatory decisions and as improved cost information becomes available.

5.5. The 2009 SKM DNSP Market Price Survey

SKM is in the final stage of completing a forth market price survey, providing an update to its Multi-Utility Strategic Procurement Study, as described in section 5.2.

Using the findings of this study, SKM will be in a position to reassess and potentially update certain aspects of its cost escalation modelling, and thereby include more recently obtained information within the forecast escalation rates developed through its modelling process.

As the AER has shown a preference for including the most up to date information within its forecasts, SKM deemed that the inclusion of this information would be appropriate to the process of establishing reasonable costs that Energex is likely to incur going forward.

The process was considered aligned to the AER process of including a consideration of more recent changes in macro economic conditions, present within updated CPI and forex forecasts, themselves not known at the time of initial CPI / forex forecast submissions, are correctly included by the AER in its subsequent formal decisions.

6. Updating Movements in Key Cost Drivers

In order to remain current, forecast positions of the key cost drivers within the SKM model are updated on a quarterly basis, to ensure the most practical recent/current date information is used as the basis of each assignment requiring the model's application.

The following sections present a discussion of the methods by which the forecast movements of each cost driver are updated.

6.1. CPI

The CPI for all historic dates is taken from statistics published by the Reserve Bank of Australia (RBA)[8].

To develop CPI figures going forward, SKM has applied the method of forecasting CPI as used by the AER in the Draft Decision for Energex[9]. This methodology applies;

- two years of forecasts as published within the most recent RBA Statement of Monetary Policy—(using the November 09 Monetary Policy Statement[10], forecasts); and
- thereafter adopting the RBA inflation target's midpoint of 2.5%.

The CPI figures used during SKM modeling are presented in Table 3.

Table 3 Energex forecast CPI figures

Year to June	2009*	2010	2011	2012	2013	2014	2015
CPI Forecast	1.5%	2.5%	2.25%	2.5%	2.5%	2.5%	2.5%

*This is the actual RBA published year to June CPI

6.2. The US$ to AUD Exchange rate

The SKM Cost Escalations modelling process uses specific US$ / AUD$ exchange rates, in order to restate US$ based market prices of commodities, namely Copper, Aluminium, Steel and Oil, into

[8] Available as an Excel spreadsheet download from: http://www.rba.gov.au/statistics/by-subject.html
[9] Available as a download from: http://www.aer.gov.au/content/index.phtml/itemId/732092
[10] Available as a download from: http://www.rba.gov.au/publications/smp/2009/nov/pdf/1109.pdf

their comparable Australian Dollar pricing movements. This is undertaken in order to account for any potential movements of base currency commodity market price movements through a strengthening or weakening of the Australian Dollar.

The US$ / AUD exchange rate has been extremely volatile for a number of months, *inter alia*, as a result of effects of the Global Financial Crisis on commodity investment.

In November 2009 statement of monetary policy the RBA stated that;

"The Australian dollar has appreciated further against all major currencies in recent months, continuing the trend from around March 2009. The Australian dollar is now close to its July 2008 peak and is around 20 per cent above its post-float average in trade-weighted terms...

...Volatility in the exchange rate of the Australian dollar against the US dollar remains above its long-run average, but well below levels seen in late 2008"

When modelling cost escalation rates for network infrastructure assets, and there associated materials, SKM's preference is to adopt FOREX forecasts as presented in the most recent forecast available from a credible source experienced in developing exchange rate forecasts.

The most recent such forecast was established to be the Econtech August 2009 ANSIO forecast, as appearing in the AER's Draft Decision for Ergon[11]. The data is presented in Figure 2.

- **Figure 2 Econtech forecast for the Ergon Draft Decision**

Table H.17: AER conclusion on exchange rate forecasts for Ergon Energy (per cent)

	2008–09	2009–10	20010–11	2011–12	2012–13	2013–14	2014–15
USD/AUD exchange rate	0.744	0.800	0.656	0.603	0.585	0.581	0.580

Source: AER analysis; Econtech, ANSIO, 20 August 2009, p. 110.

6.3. The Trade Weighted Index

Just as movements in the US$/AUD exchange rate are intuitively understood to affect the price of US$ priced commodities bought by an Australian based business entity, the cost of imported plant

[11] AER 2009: Final Decision New South Wales Distribution Determination 2009-10 to 2013-14, 28 April, Section L.9.3, p502 http://www.aer.gov.au/content/item.phtml?itemId=728110&nodeId=4f4df21a216baa4054a6f28966bcd40f&fn=NSW%20DNSPs%20final%20decision.pdf

and equipment being purchased by an Australian DNSP is likewise affected by the exchange rate to the currency of the country from which the equipment is sourced.

The SKM market price surveys have shown there is a real and significant underlying cost pressure placed on Australian DNSPs through the influence that movements in foreign exchange rates (forex) have on the overall price of network infrastructure assets. The surveys have also identified which items of plant and equipment are identified as being imported into Australia from overseas manufacturers.

In the case of DNSPs the proportion of plant and equipment that is imported is limited when compared to TNSPs (e.g. TNSPs import their higher rated Power Transformers), and tends to consist of mainly metering, and other electronic components.

Within the SKM cost escalation methodology, Australia's Trade Weighted Index[12] (TWI) is used as an input cost component to model the affect of these exchange rate movements.

The currencies relevant to the countries / regions of origin for typically imported items of electricity network plant and equipment were found to be (*in no particular order*) US$; Pound Sterling (£); Euro (€); Singapore Dollar (SGD), Chinese Yuan (CNY¥), and the Japanese YEN (¥), all of which were confirmed to be incorporated within the TWI figures published by the RBA[13].

In developing an annual escalation rate for this specific driver of equipment pricing, the SKM methodology is to take the average of the RBA year to June TWI figure for each year, then to generate the inverse of this averaged figure, being the relative affect on costs to an Australian purchaser, and finally to calculate the annual changes in the figures thereby presented.

In the absence of a recent publically available forecast developed by a reputable source, SKM have assumed the 10 year average of the RBA's data for year to June TWI, at 59.2 post actual historical data. The results of this process are presented in Table 4 below.

6.3.1. Manufacturing costs

In the absence of better information regarding manufacturing cost drivers, SKM has assumed manufacturing costs increase in line with CPI – that is no real price escalation.

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12 Further information on the development of the TWI is available from: http://www.rba.gov.au/PublicationsAndResearch/Bulletin/bu_oct02/bu_1002_1.pdf

13 Updated weightings tabled at: http://www.rba.gov.au/MediaReleases/2007/mr_07_17.html

For locally manufactured equipment, the Australian CPI is used to escalate manufacturing costs. For imported equipment, SKM has calculated a proxy escalator by adding the TWI index (to account for A$ movements) and CPI (based on a simplified assumption that average manufacturing costs in other countries would change at the same rate as Australia).

If the TWI stays constant, the local and imported manufacturing escalators will then be equal.

- **Table 4 SKM calculation of underlying TWI based cost pressure**

	2008	2009	2010	2011	2012	2013	2014	2015
Average year to June position of TWI	70.06	60.11	59.18	59.18	59.18	59.18	59.18	59.18
Inverse of TWI	0.014	0.017	0.017	0.017	0.017	0.017	0.017	0.017
Annual Change	0.929	1.166	1.016	1.000	1.000	1.000	1.000	1.000
CPI *(Manufacturing costs of locally sourced equipment)*	1.045	1.015	1.025	1.023	1.025	1.025	1.025	1.025
Inverse of TWI + CPI *(Manufacturing cost of imported equipment)*	0.971	1.183	1.041	1.023	1.025	1.025	1.025	1.025

SKM notes the AER has previously expressed concerns with this approach, on the basis that CPI can differ between countries, and that this could introduce errors due to modelled overseas manufacturing costs using Australian CPI when the country specific CPI could be different.

SKM acknowledges this is in theory a slight risk introduced into the modelling, but considers the difference in CPI amongst Australia's major trading partners, particularly those from which the majority of electrical equipment is sourced, to be small relative to the significant movements in TWI that have been experienced in recent periods.

For example, between 2008 and 2009 the TWI moved by more than 10%, putting significant cost pressure on the procurement of any imported equipment. To ignore this material shift in underlying costs because of small differences in CPI would result in the potential for errors in final modelled prices *increasing*, rather than *decreasing*, which would undoubtedly have been the AER's intention.

6.4. Construction Costs

Construction Costs is included in the model as a key driver underlying network project costs, in order to account for increases in both the labour and materials elements of the civil works or "supporting infrastructure" components of electricity network capex projects. This would typically comprise individually identifiable pieces of civil works, such as the foundations required for a substation establishment project.

The Australian Construction Industry Forum (ACIF)[14] is the peak consultative organisation of the building and construction sectors in Australia. The ACIF has established the Construction Forecasting Council (CFC)[15] through which it provides a tool kit of analysis and information.

In commenting on activity in construction related to the electricity industry, the Construction Forecasting Council (CFC) notes that,

> *" Electricity and pipeline construction is set to be a major growth area over coming years thanks to a combination of the development of Australia's natural gas deposits in Queensland and on the North-West Shelf, the need for replacement of our coal-fired electricity generation network, and a desire to replace these with "greener" electricity generation" [16].*

The CFC also provides a forecast of related construction costs going forward, through which annual growth rates in the cost of construction are able to be developed. These figures are provided through KPMG Econtech forecasts.

As the CFC considers electricity and pipeline construction to fall within the sector it presents entitled as "Engineering", SKM has adopted these movements presented as Australian National "Engineering" construction cost forecasts as the likely movements in the Construction cost component of relevance to Energex within cost escalation modelling. [17]

The price index is presented in its nominal form, therefore in order to ensure consistency in the use of CPI rates, the index is made real and the re-nominalised using the figures obtained whilst following the AER preferred method of forecasting CPI, as discussed in Section 6.1.

Table 5 shows the steps and results of this process

[14] http://www.acif.com.au/

[15] http://www.cfc.acif.com.au/cfcinfo.asp

[16] http://www.cfc.acif.com.au/summary.asp

[17] http://www.cfc.acif.com.au/forecasttotal_results.asp

- **Table 5 Adoption of construction price indices**[18]

Year to June	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
CFC Engineering Price Index (original)	1.056	1.091	1.130	1.150	1.187	1.243	1.294	1.323
Annual Change (nominal)		1.033	1.036	1.017	1.032	1.047	1.041	1.022
CPI Assumption used by CFC		1.015	1.020	1.026	1.026	1.026	1.026	1.026
Annual Change (real)		1.018	1.016	0.991	1.006	1.021	1.015	0.996
AER CPI		1.015	1.025	1.023	1.025	1.025	1.025	1.025
Nominal engineering CFC forecast annual escalation using AER CPI		1.033	1.041	1.014	1.031	1.046	1.040	1.021

6.5. Commodity Prices

This section of the report presents the methodology employed by SKM in updating the commodity price inputs to its cost escalation model.

6.5.1. Commodities and the use of Futures contract pricing

In seeking to develop appropriate cost escalation rates, that affectively characterize the underlying infrastructure asset cost pressures faced by network service providers within Australia, the SKM modelling methodology incorporates the use of commodity futures contract prices into cost escalation rate computations.

The inclusion of Forward contracts pricing, as a means to predict likely market pricing positions of the various commodities going forward, is considered suitable, as these contracts represent the firm position of market participants who have actively placed money behind their predictions.

Although it may be argued that professional economists are putting valuable reputations on the line when providing their own market predictions, the forward contract markets are considered to provide greater and more immediate financial risk than the various economic forecasts that do not involve any direct financial risk to the forecasters.

[18] Ibid

SKM noted that in a December 2005 paper presented by the Federal Reserve Bank of San Francisco (FRBSF), the use of futures prices in the oil market, to predict spot prices in the medium to long term, was discussed. The study concluded with the FRBSF taking a position that the use of futures contract prices is appropriate in developing models for commodity forecasting, as;

> *"futures prices contain important information about future price movements…. In particular, taking into account the relationship between current spot and futures prices instead of considering only the raw futures price can significantly improve forecasting accuracy."* [19]

SKM has thus adopted futures prices into its forecast method. This is discussed in further detail in section 6.5.3.

6.5.2. Credible views of a range of Professional forecasters

It was established that the price of Oil futures contracts were available that covered the majority of the revenue control period under investigation. However in the case of other inputs such as copper and aluminium, London Metals Exchange (LME) futures contracts only go out as far as 27 months.

In order to estimate prices beyond this corresponding 27 month date, it is necessary to revert to economic forecasts as the most robust source of future price expectations. SKM considers this to be superior to "trend" based analysis approaches.

SKM's methodology conforms to the approach accepted by the AER in the NSW Final Decision in utilising Consensus Economics' quarterly publication "*Energy and Metals Consensus Forecasts*" as its source from which the long-term position of the Copper and Aluminium market prices are sourced.

Consensus Economics Inc.[20] is a leading international economic survey organization based in the United Kingdom. Its publication "*Energy & Metals Consensus Forecasts*" is a subscription based comprehensive quarterly survey of over 30 of the world's most prominent commodity forecasters.

These quarterly reports provide details of the price forecasts, of each professional analyst surveyed, for the next 10 quarters. "*Energy & Metals Consensus Forecasts*" also provides the "mean" or "consensus" of these various individual market predictions. In doing so, the publication allows the

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19 http://www.frbsf.org/publications/economics/letter/2005/el2005-38.pdf

20 http://www.consensuseconomics.com/index.htm

user to gather an overall market perception, without the need to apply a weighting to individual predictions in terms of gauging the organisation's perceived strength in forecasting, historical accuracy or such.

In developing year to June price movements for Copper and Aluminium, SKM uses a method of linear interpolation, between the relevant3, 15 & 27 month LME contract prices and the Consensus Economics long term predictions of price movements, as described in section 6.5.3.

In the Draft decisions for ETSA and ERGON, the AER stated that "*prices for aluminium and copper futures contracts have become available for a period that covers the next regulatory control period* [being the 63M and 123M LME contracts]. *As a result it is no longer necessary to rely on economic forecasts as an indicator of future aluminium and copper prices*"

The AER goes on to state that; "*SKM's preferred approach is to use commodity futures contract prices in preference to economic forecasts, on the basis that [inter alia]:*

- *Forward contract markets for aluminium and copper are well established and sufficiently liquid to indicate future prices"*

SKM notes that while its preferred approach is indeed to use commodity futures contract prices in preference to economic forecasts, this stated preference is subject to an assessment of how reasonable and representative the futures prices are, by considering factors such as the liquidity and volumes present within the future contract markets.

Section 6.5.2.1 brings into account SKM's assessment of the use of the 63M and 123M LME contract prices.

6.5.2.1. Assessment of suitability of the 63M and 123M LME futures

On 10th July 2009, the London Metal Exchange's (LME) released a statement[21] providing its trading volumes during the first six months of 2009.

The LME reported strong growth in trading of its newly extended contracts stating that, in total, 153,191 lots of the new extended prompt dates were traded between January and June 2009.

However SKM notes that this figure includes all newly extended LME futures contracts, being;

[21] http://lme.com/8163.asp

- Aluminium and Copper Grade A contracts, which were extended from 63 months to 123 months (ten years);
- Special High Grade Zinc and Primary Nickel, extended from 27 months to 63 months (five years); and
- Standard Lead, which had been extended from 15 months to 63 months (five years).

Therefore the aggregate of trading volume in the LME's entire range of newly extended prompt dates, including not only Aluminium and Copper; but also Zinc, Nickel and Lead; amounted to only 1% of its Copper forward contracts market activity, and 0.6% of its Aluminium forward trade.

With only small volumes being traded, when compared to the LME's more established 3, 15 and 27 month forward trades; SKM has concerns with the level of liquidity present in the 63 and 123 month LME forward trades.

Further inquiries by SKM have established that the 63 and 123 month prices are deemed by a quotations committee within the LME, based on its assessment of expected future prices including factors such as holding costs, and available to participants at that price only. Shorter dated 3, 15 and 27 month contracts are set by conventional market mechanisms of bids and offers.

Based on this information, and the AER's previous position relating to illiquid futures for steel, SKM does not consider the LME 63 and 123 month contracts to be superior to the previously adopted economic consensus method. Further, access to these longer dated contracts is only available through a costly market data subscription, and cannot be considered "publicly available" and hence reproducible by others.

In light of these findings, SKM considers the use of the LME's 63 and 123 month contracts has a number of shortcomings:

- The prices are not set according to conventional futures market mechanisms
- The prices are set by a single entity, which is not considered to incorporate the same diversity of market views and information as the previously adopted economic consensus method
- The volumes are low and trading illiquid
- The data is not in the public domain, is not verifiable or reproducible by others, and hence lacks transparency
- Its use is inconsistent with the AER's final decision for NSW DNSPs and other recent decisions.

SKM considers the method originally through using LME 3, 15 and 27 month futures contracts, then interpolating to long-term economic consensus prices is more reasonable and transparent.

The introduction of a need to capture LME futures contract pricing out to 123 months, would also entail additional levels of cost and complexity on the part of the DNSPs[22].

SKM has updated the long-term Aluminium and Copper pricing positions using the Consensus Economics Survey results published on the 27th October 2009 and corresponding October 2009 market prices.

6.5.3. SKM's Application of Futures Contract Pricing and the Consensus Long-term Forecast in Specific Cost Drivers

When updating the position of the Key Cost drivers, SKM employs various combinations of futures contract prices and a range of views from credible forecasting professionals to develop likely Year to June price positions of specific Key cost components.

6.5.3.1. Aluminium and Copper

When updating the position of the Key Cost drivers of Aluminium and Copper within its model, SKM undertakes a seven step approach in order to produce specific data points between which linear interpolation is applied in order to arrive at the implied year to June future pricing positions.

Because of the volatility in daily spot and futures market prices, SKM uses monthly averages of prices within its modelling process.

The steps involved are:

1. Plot the average of the last 30 days of LME Spot prices
2. Plot the average 3 month LME contract price
3. Plot the average 15 month LME contract price
4. Plot the average 27 month LME contract price
5. Plot the most recent Consensus Long-Term Forecasts position[23](after converting it to its nominal equivalent[24])
6. Apply linear interpolation between plot points.

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22 An example of this would be the need to purchase a Bloomberg L.P terminal which requires a dedicated subscription costing over $20,000 per year.

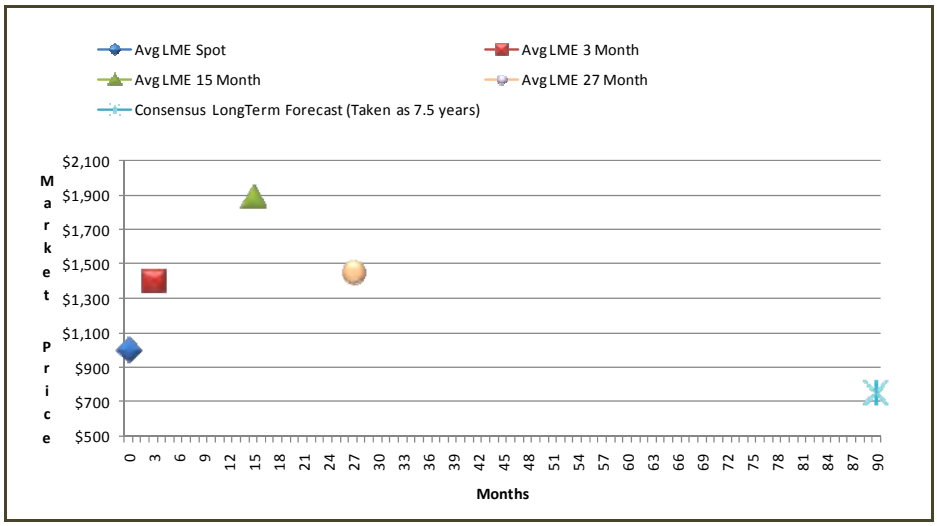
23 The Consensus Long-term forecast is listed in the publication as a 5 – 10 year position. In an attempt to apply this in a reasonable manner, SKM consider the position to refer to the mid-point of this range, being 7.5 years, or 90 months hence.

24 See Details of SKM's conversion from real to nominal in Section 6.5.3.2

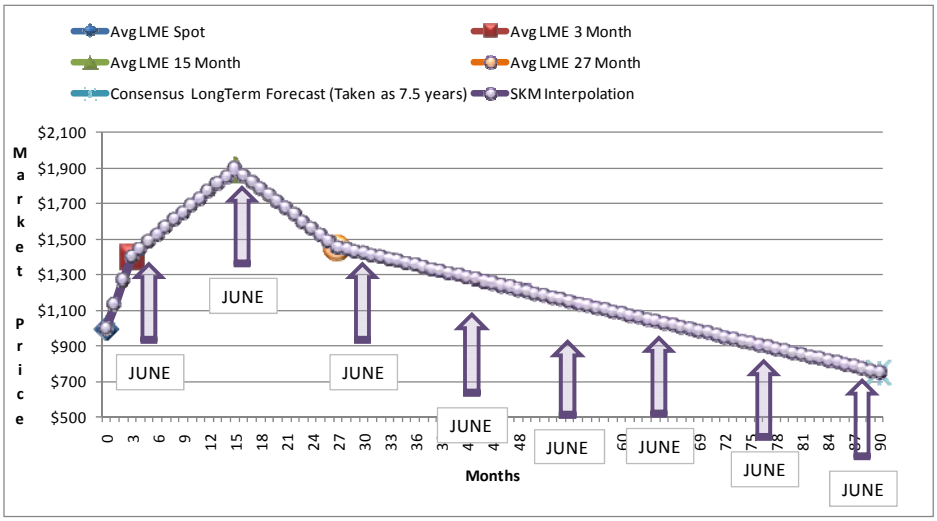
7. Identify the Corresponding June points in the interpolated results, and feed the average prices for all year to June periods into the model.

This methodology is represented[25] in Figure 3 and Figure 4.

- **Figure 3 Diagram of methodology (Steps 1-5)**



- **Figure 4 Diagram of Methodology (Steps 6 & 7)**



[25] ***All figures are illustrative only and do not refer to the actual position/price of any particular commodity.***

6.5.3.2. Interpolation of "real" consensus long-term forecast pricing positions

When interpolating between "nominal" LME market prices and the "real" long-term Consensus Economics pricing position for any commodity, it is necessary to convert the "real" long-term Consensus Economics pricing positions to their "nominal" form.

In modelling cost movements during this study, SKM converted the real to nominal using forecasts for US CPI taken from the US Congressional Budget Office's website.[26]

The full range of US$ based nominal prices are then converted into their AUD equivalence using exchange rates developed according to the AER's preferred methodology for exchange rate forecasting.[27]

6.5.4. Price movements for commodities

With the well publicised fall in market pricing for major commodities such as oil, copper aluminium and steel, having followed a period of unprecedented growth in market volumes and prices for these resources, it would be tempting to foresee further falling or at least levelling of market prices for these commodities going forward.

However, having fallen so dramatically in the 2008 and 2009 periods, prices for these commodities are forecast to recover in the short term, before levelling out, and thereby reflecting more consistent annual supply and demand conditions, around the year to June 2011 and 2012 periods.

Figure 5 shows the predicted movements in the AUD equivalent market prices of the various commodities that influence the price of network plant and equipment.

[26] http://www.cbo.gov/doc.cfm?index=10521

[27] See details in Section 6.2.

- **Figure 5 Forecast Annual Commodity Price Movements (Nominal- AUD$ based)**

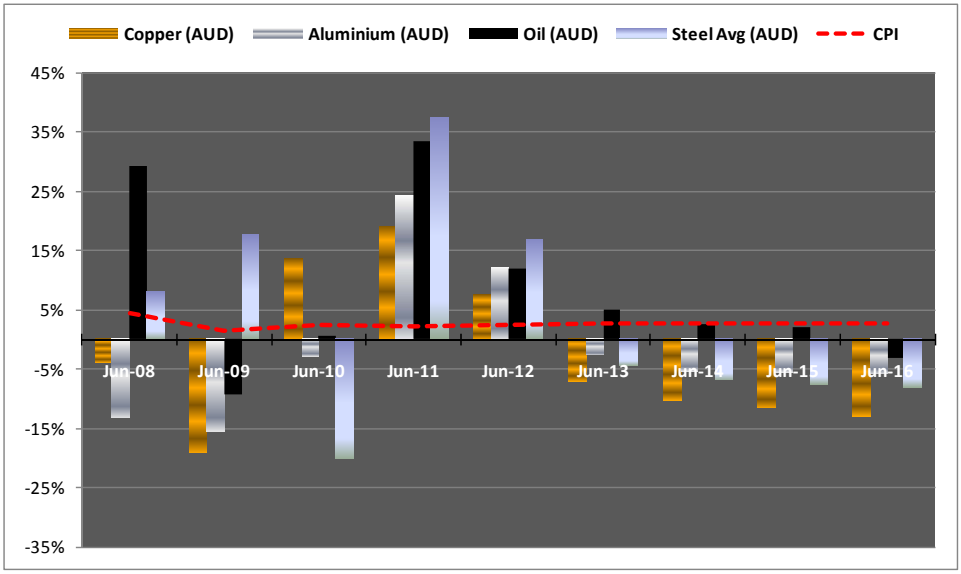
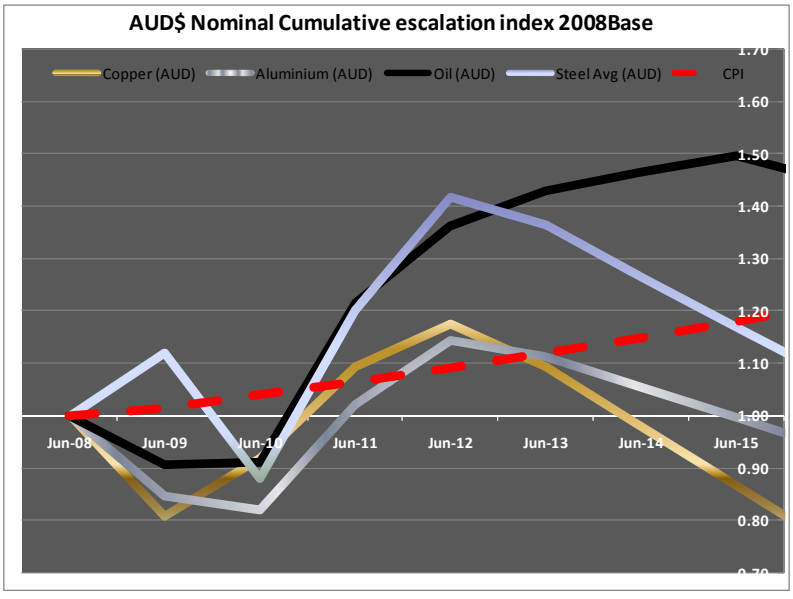


Figure 6 presents the affect of the cumulative average annual movements of these commodities (against CPI) indexed to their average year to June 2008 position.

- **Figure 6 Forecast Cumulative Nominal AUD Commodity Price Movements (indexed to June 2008 base)**



The average year to December input numbers used during SKM's modelling of the Copper and Aluminium market prices are presented in Table 6 and Table 7.

- **Table 6 Relative AUD based price of Copper**

Year to	Jun-08	Jun-09	Jun-10	Jun-11	Jun-12	Jun-13	Jun-14	Jun-15
Average period Price (AUD)	8620	6976	7921	9436	10143	9423	8452	7481
Annual Change	-3.8%	-19.1%	13.5%	19.1%	7.5%	-7.1%	-10.3%	-11.5%

- **Table 7 Relative AUD based price of Aluminium**

Year to	Jun-08	Jun-09	Jun-10	Jun-11	Jun-12	Jun-13	Jun-14	Jun-15
Average period Price (AUD)	2955	2497	2424	3015	3382	3289	3116	2943
Annual Change	-13.3%	-15.5%	-2.9%	24.4%	12.2%	-2.7%	-5.3%	-5.6%

6.5.5. Oil

World Oil markets provide future contracts with settlement dates sufficiently far forward to accommodate their use in updating this specific cost driver, without the need to refer to the quarterly forecasts for oil market prices presented in the Consensus Economics survey.

SKM uses the Energy Information Administration's historical monthly average historical crude oil prices[28] to calculate average year to June actual historical oil price positions, and the New York Mercantile Exchange's (NYMEX) light crude oil contracts[29] in order to plot market price data points, interpolate, and thereby update the likely year to June movements of this specific cost driver going forward.

The NYMEX Division light, sweet crude oil futures contract is the world's largest-volume futures contract trading on any physical commodity. Providing unmatched liquidity and price transparency, the contract is therefore used as the principal international pricing benchmark.

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28 http://tonto.eia.doe.gov/dnav/pet/hist/rbrtem.htm (Downloaded 05/08/2009)

29 http://futures.tradingcharts.com/marketquotes/index.php3?market=CL (Downloaded 05/08/2009)

Using the NYMEX light crude oil contracts[30] in order to plot market price data points, interpolate, and thereby update the likely year to June movements of this specific cost driver, SKM's modelling has resulted in market prices and forecast escalation factors as presented in Figure 7.

- **Figure 7 Relative AUD based price of Oil**

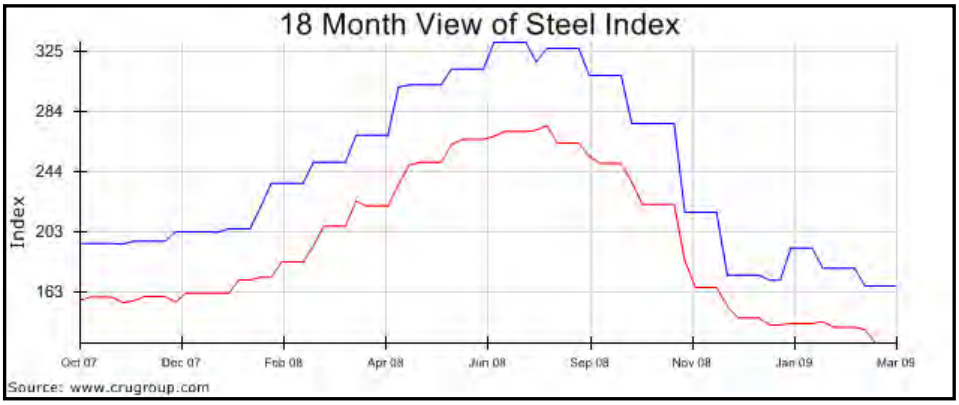
Year to	Jun-08	Jun-09	Jun-10	Jun-11	Jun-12	Jun-13	Jun-14	Jun-15
Average period Price (AUD)	106	96	97	129	145	152	156	159
Annual Change	29.3%	-9.4%	0.7%	33.4%	11.9%	5.0%	2.5%	2.1%

6.5.6. Steel

SKM's research found that in 2008 both European and Asian steel mills had agreed to over 300% increases in premium hard coking coal contract prices. Japanese and Korean Steel mills were also reported to have accepted a 65% rise in the price of iron ore within their contracts.

These factors contributed to the CRU[31] index of Steel prices (CRUspi) having increased by 66% over the year to June 2008, as illustrated in Figure 8.However through the drop off in demand from China, and the overall lower level of development as a result of the Global Financial Crisis, market prices fell dramatically between June 2008 and January 2009.

- **Figure 8 Recent 18 month Movements in the CRUspi[32]**



The Red Line represents the Flat Steel index, with the Blue line showing the movement of the Longs.

30 (note: SKM uses the "Settlement" price as its input to modelling)

31 CRU was founded in 1969 and was previously known as Commodities Research Unit. CRU is widely acknowledge as an authoritative source of information and data in areas such metals and mining.

32 CRU Steel Price Index. Available at: http://cruonline.crugroup.com

An application of the methodology used for Oil, Copper and Aluminium was not possible due to the lack of a liquid Steel futures market. SKM note that the LME commenced trading in steel futures in February 2008.[33] However, the LME has communicated that this new steel futures market is undergoing a purposely planned "soft launch", and its liquidity is still being built up.

SKM considers the LME steel futures are still not yet sufficiently liquid to provide a robust price outlook, but expects it will incorporate these prices in future developments of its price forecast.

SKM has selected the Consensus Economics forecast to be the best currently available outlook for steel prices. Consensus provides quarterly forecast prices in the short term, and a "long term" (5-10 year) price.

Steel prices for all historical periods are taken from an average of the Bloomberg US and EU steel prices.

The most recent Consensus Survey available at the time of compiling this report was their October 2009 Survey. This publication provided quarterly forecast market prices for steel from December 2009 to March 2012, as well as a Long-term forecast pricing position.

Consensus Economics provides two separate forecasts for Steel, both being for Hot Rolled Coil (HRC) variety, with the first being relative to the USA domestic market and the other the European domestic market.

The Consensus Economics US HRC price forecasts are presented US$ per *Short Ton*. As historical prices are all quoted in US$ per *Metric Tonne*, it is necessary to convert these prices into their Metric Tonne equivalent. This is a simple operation with the US HRC prices multiplied by a factor of 1.1023, being the standard conversion rate for the number of short tons per Metric Tonne.

The results of this process are shown in Table 8.

Once converted to their Metric Tonne pricing position, SKM uses the average of these two forecasts (US HRC and EU HRC) as its Steel price inputs to the cost escalation modelling process.

The figures used as inputs to SKM's modelling are presented in Table 9.

SKM's methodology of integrating Consensus Steel price forecasts into the development of cost escalation factors adheres to the methodology for cost escalation as accepted by the AER in the NSW Distribution Business's Final Decisions.

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[33] http://www.lme.co.uk/5723.asp

- **Table 8 Conversion of Short tons to Metric tonnes. (USD nominal)**

Consensus forecast	Oct-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12
US Short Ton	553.0	575.6	621.3	631.2	643.6	647.1	670.9	683.6	705.0	706.3	701.7
Tonnes Equivalent	609.6	634.5	684.9	695.8	709.4	713.3	739.5	753.6	777.1	778.6	773.5

- **Table 9 Relative AUD Pricing position of average HRC steel prices (AUD nominal)**

Year to	Jun-08	Jun-09	Jun-10	Jun-11	Jun-12	Jun-13	Jun-14	Jun-15
Average period Price (AUD)	872	976	769	1048	1237	1189	1105	1021
Annual Change	8.1%	17.6%	-20.2%	37.2%	16.9%	-4.4%	-7.0%	-7.5%

7. Conclusion

The SKM cost escalation modelling methodology provides a rigorous and transparent process through which reasonable and appropriate cost escalation rates are able to be developed in relation to the prices of network plant and equipment.

The escalation factors established during this assignment were developed with specific consideration of the operating environment faced by the clients, being Energex Limited, and were based on the most up-to-date information available at the time of compilation.

These escalation rates therefore constitute SKM's calculated opinion of appropriate materials cost escalation rates that can reasonably be expected to affect the planned Capital forward Program of Energex over the year to June periods 2008 to 2015 inclusive.

In exerting expected cost pressures on Energex's Capital forward Program, SKM concluded that these escalation rates form a component of the "*capital expenditure that would be incurred by an efficient DNSP over the regulatory control period*"[34]

SKM therefore recommends that Energex apply these materials cost escalation rates to their various individual asset classes, as depicted in the tables supplied by SKM and in the relevant accompanying excel file attachment entitled:

- *SKM Materials Cost escalators for Energex Limited 2008 to 2015 Final.xls;*

Tables of the Cost Driver weightings, Forecast movements in the various Cost Drivers, and the resulting Annual Materials cost escalation rates are presented in their Nominal and Real forms through Table 10, Table 11, Table 12 and Table 13 below.

[34] NER, transitional chapter 6 rules, clause 6.5.7 (e) (4).

Table 10 Materials Cost Driver Weightings in Energex's Capital Program

Materials Escalation Cost Driver	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Mfr - Local (CPI)	31.3%	29.4%	28.9%	27.8%	29.4%	29.0%	28.2%
Mfr - Import (TWI x CPI)	4.8%	6.5%	5.9%	6.7%	5.8%	6.1%	7.5%
Aluminium	15.3%	14.5%	15.9%	15.4%	15.5%	15.1%	15.0%
Copper	6.3%	5.5%	4.6%	4.6%	5.2%	5.9%	6.5%
Steel	17.1%	16.8%	16.5%	15.8%	16.2%	15.6%	15.6%
Oil	3.6%	3.1%	2.3%	2.1%	2.5%	2.6%	2.4%
CPI	3.9%	4.7%	5.2%	6.2%	6.1%	7.8%	6.0%
TWI	5.2%	5.1%	5.2%	5.3%	5.1%	4.9%	4.9%
Civil Works	6.4%	7.7%	8.1%	8.7%	6.9%	6.4%	7.1%
Oil (As proxy for Energy)	6.0%	6.6%	7.4%	7.5%	7.2%	6.8%	6.8%
Total	100%	100%	100%	100%	100%	100%	100%

Table 11 SKM Forecast Cost Driver Escalation Rates - *Nominal*- Cumulative

Cost Driver	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Mfr - Local (CPI)	1.000	1.015	1.040	1.063	1.090	1.117	1.145	1.174
Mfr - Import (TWI x CPI)	1.000	1.183	1.231	1.259	1.290	1.323	1.356	1.390
Aluminium	1.000	0.845	0.821	1.021	1.145	1.113	1.055	0.996
Copper	1.000	0.809	0.919	1.095	1.177	1.093	0.981	0.868
Steel	1.000	1.120	0.881	1.202	1.418	1.364	1.267	1.170
Oil	1.000	0.906	0.912	1.216	1.361	1.429	1.464	1.496
CPI	1.000	1.015	1.040	1.063	1.090	1.117	1.145	1.174
TWI	1.000	1.166	1.184	1.184	1.184	1.184	1.184	1.184
Civil Works	1.000	1.033	1.075	1.090	1.124	1.176	1.223	1.249
Oil (As proxy for Energy)	1.000	0.906	0.912	1.216	1.361	1.429	1.464	1.496

Table 12 SKM Forecast Cost Driver Escalation Rates - Real- Cumulative

Cost Driver	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Mfr - Local (CPI)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Mfr - Import (TWI x CPI)	1.000	1.166	1.184	1.184	1.184	1.184	1.184	1.184
Aluminium	1.000	0.833	0.789	0.960	1.050	0.996	0.921	0.849
Copper	1.000	0.798	0.884	1.029	1.080	0.978	0.856	0.739
Steel	1.000	1.104	0.848	1.130	1.301	1.221	1.107	0.997
Oil	1.000	0.893	0.877	1.144	1.249	1.279	1.279	1.274
CPI	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
TWI	1.000	1.149	1.138	1.113	1.086	1.060	1.034	1.009
Civil Works	1.000	1.018	1.034	1.025	1.031	1.053	1.068	1.064
Oil (As proxy for Energy)	1.000	0.893	0.877	1.144	1.249	1.279	1.279	1.274

Table 13 Energex Capex Program Level Materials Cost Escalation Rates

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
weighted annual nominal index	1.000	0.985	1.133	1.077	1.003	0.988	0.990
weighted annual nominal %	0.04%	-1.5%	13.3%	7.7%	0.3%	-1.2%	-1.0%
weighted annual real index	0.986	0.960	1.108	1.051	0.978	0.964	0.966
weighted annual real %	-1.4%	-4.0%	10.8%	5.1%	-2.2%	-3.6%	-3.4%

February 2010

Appendix 2.0

Response to AER determination on Escalations PricewaterhouseCoopers – February 2010

ENERGEX

Response to AER draft determination

February 2010

PRICEWATERHOUSECOOPERS

Contents

Executive summary

Scope

PricewaterhouseCoopers (PwC) has been engaged by ENERGEX to examine the Australian Energy Regulator's (AER) *Queensland Draft Distribution Determination 2010-11 to 2014-15* (released on 25 November 2009) in relation to its deliberations regarding ENERGEX's labour, contractors, land and easements costs escalation rates.

With the exception of its submission relating to escalation rates for land and easements costs, the AER rejected ENERGEX's arguments and proposals for escalation rates relating to labour, contractors, and materials costs. ENERGEX has separately engaged Sinclair Knight Merz (SKM) to review the AER's deliberations regarding materials costs escalation.

The purpose of this report is to conduct an econometric, quantitative and qualitative review of the AER's proposed escalation rates and methodology. In particular, to:

- review the AER's draft decision on escalation rates and CPI adjustment and provide a brief overview
- review the reasonableness of the AER's approach to establishing the escalation rates, including any departures from the approach proposed by ENERGEX and its consultants KPMG
- consider the reasonableness and 'fit for purpose' of the AER's escalation rates for selected cost categories (land, easements, and labour), particularly given the high demand for labour and resources from utilities mining and construction sectors in support of projects currently underway and planned for South East Queensland, and
- as necessary, propose a modified forecast methodology that, as appropriate, addresses the AER's concerns – including documenting the methodology, outlining PwC's rationale for accepting or rejecting the AER's position on various issues and proposing escalation rates for the relevant cost components.

Considering the foregoing, PwC has adopted an approach to forecasting the cost escalation rates that is based on modelling previously employed by KPMG, with adjustments necessary to address the AER's concerns. Our approach and its results are summarised in the remainder of this section.

Assessment framework

Our approach for evaluating the AER's forecasts can be summarised as follows:

- first, we assessed whether the AER's method was the most appropriate forecasting method, applying the principles that we consider reflect best practice forecasting
- secondly, where it is not possible to evaluate the AER method directly due to a lack of supporting information, we have constructed our own forecasts to test the validity of those obtained by the AER – in circumstances where material and unexplained variances exist, we have recommended that our forecasts be applied, and
- thirdly, we have addressed a number of conceptual issues associated with the application of the relevant forecasts. Our issues in this regard relate to the application of labour cost forecasts, the principal of which is the question of whether it is correct to assume that internal and external labour is provided in separate markets.

The most robust and appropriate forecasting method depends on a variety of factors concerning the subject matter, including:

- the availability and reliability of relevant information
- the extent to which recent historical trends are useful predictors of expected future trends, and
- the reliability of the relevant statistical model in generating forecasts.

However, in all cases, the most appropriate modelling approach should be consistent with the following broad principles.

- The most recent available data should be used.
- Where actual prices are available, these prices should be used rather than relying on forecasts. This includes agreed price rises in the ENERGEX Union Collective Agreement (EUCA).
- Where actual prices are not available, future prices must be determined using robust forecasting models. These models should be:
  - based on the most relevant information
  - demonstrably robust
  - well documented and transparent, and
  - consistently applied.

Summary of our assessment of the AER's forecasts

The instance where we conclude that the AER's forecast is inappropriate and therefore recommend that our forecast be applied

is in the case of labour costs, specifically Access Economics' forecasts of specialist utilities and general labour in Queensland.

Our concerns about this forecast are outlined in the relevant sections below. However, broadly, a key concern is that, given the methodology by which it was determined is proprietary, PwC is unable to assess the robustness, appropriateness and accuracy of this forecast. In addition, PwC has compared the AER's results against those that are generated by a transparent and robust forecasting method and found material variances that cannot be explained.

PwC's own approach for this input, is described in more detail in the relevant sections of this report, relies on an approach known as Unobserved Component Modelling Structured Time Series (STS) regression modelling. We recommend using a time series model for forecasting because it provides a way of weighting the data that is determined by the properties of the time series. STS models are formulated in terms of unobserved components, such as trends and cycles, that have a direct interpretation. Thus they are designed to focus on the salient features of the series and to project these into the future. In order to demonstrate the robustness of these models, the model diagnostics have been provided.

In addition, we consider that the AER has made three errors in relation to the application of the labour cost escalators, which are as follows:

- Internal vs. external labour – the AER has assumed implicitly that the wage rates for internal and external labour can move independently. We disagree with this assumption as it assumes that the resources are traded in different markets, which clearly is not the case. In our view, the labour cost escalators that apply to internal labour should be applied also to external labour. This matter is discussed in more detail below.
- Year zero (2007/08) wage escalation – while the AER has assumed that wages under the new EUCA are fixed in nominal terms during the course of each year, in contrast to this it assumed that nominal wages in the last year of the old EUCA had declined substantially during that year. The result was that when the AER calculated the change in the average (across the year) wage from one year to the next, the substantial increase in wages that occurred between 2007/08 and 2008/09 was counter-intuitively interpreted as a fall in nominal wages. This outcome is illogical. In our view, wages under the old EUCA should be assumed to be fixed in nominal terms during each year just as the AER has assumed under the new EUCA.
- Application of the EUCA – the AER has refused to apply the agreed wage rises under the EUCA for the last year of the EUCA (2010-11). The AER's reason for this is to avoid incentive problems – the year in question is within the new regulatory period and if the AER allowed a recovery of the

actual wage rise then it may reduce ENERGEX's incentives to argue hard next time (or at least to argue hard for any years that span a regulatory period). In our view, the AER has overemphasised the incentive issues and has ignored the central purpose of the forecasts, which is to come up with an unbiased forecast of future input price movements.

Summary of forecasting methodology

PwC's approach to forecasting escalation rates for each of the relevant cost items is summarised in the table below.

Cost item	Summary of our approach
Land & easements	Notwithstanding the AER's concerns with respect to verifying the robustness of ENERGEX's escalation rate forecasts for land & easements (namely, observing the model diagnostics) the AER accepted that the forecasts provided by ENERGEX were reasonable. As such, PwC has not sought to adjust modelling of cost escalation rates for this cost item. However, PwC did replicate the KPMG model in order to reproduce and examine the model diagnostics which were found to be robust – pass the appropriate statistical tests. PwC therefore concludes that the KPMG model used to forecast escalation rates for land and easements was statistically well-specified.
Labour (including contractors)	Labour costs (including contractors) escalation rates were forecast based on historical data relating to the average compensation of employees in Queensland (calculated from the ABS' Labour Force, Australia and Australian National Accounts publications). Escalation rates were determined for specialist (electrical) labour and general labour. Specialist labour escalation rates were based on data relating to the compensation of employees in the utilities, mining and construction industries. General labour escalation rates were based on data from all industries. Forecasts of future average compensation were determined using STS regression modelling. These estimates were deflated using RBA inflation forecasts. A composite labour escalation rate was calculated as a weighted average of the specialist and general escalation rates. For internal labour, specialist labour was given a 95% weighting, general 5%. For contractors, the weightings were 71% and 29% respectively.

Summary of findings

On the basis of our adjusted modelling of the expected escalation in various cost items of ENERGEX, PwC considers the following cost escalation rates to be appropriate.

Escalation rates (%) Real	Source	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Land & easements – real	AER	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	PwC	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
Labour (internal) – real	AER	-0.03	2.51	0.69	0.57	1.20	1.56	1.54
	PwC	**3.4**	**1.7**	**2.5**	**0.9**	**0.8**	**0.7**	**0.6**
Contractors - real	AER	0.77	1.38	0.14	0.58	1.17	1.54	1.53
	PwC	**3.4**	**1.7**	**2.5**	**1.1**	**1.0**	**0.8**	**0.7**
RBA Inflation	RBA	1.5	2.5	2.25	2.5	2.5	2.5	2.5

Response to key issues raised by AER

In this section we summarise our conclusions on a number of conceptual issues that were raised by the AER in relation to ENERGEX's proposal.

With respect to certain issues PwC did not consider the AER's position to be appropriate. In these cases, an alternative approach is articulated and applied. PwC's rationale for rejecting the AER's approach is also outlined in the body of this report.

Following below are the key issues raised by the AER in relation to ENERGEX's proposed escalation rates, and PwC's measures to address these concerns or, where appropriate, PwC's rationale for rejecting the AER's approach.

Forecasts do not adequately account for expected volatility over the forecast horizon

With respect to ENERGEX's proposed escalation rates for labour costs the AER did not consider that ENERGEX's forecasts were appropriate given the degree of volatility in the current economic environment. In particular, the AER did not consider that a constant escalation rate over the period adequately accounted for the volatility and uncertainty in the relevant markets.

While PwC accepts the AER's general position that a constant escalation rate over the forecast period is not equivalent to a series of differing escalation rates whose average is equal to the constant rate, PwC considers that, in some circumstances, it may be appropriate to assume a constant rate as a default position. These circumstances include, in particular, times of extreme uncertainty and volatility that render the use of data-based methods inappropriate.

In addition, PwC notes that in the presence of a volatile and uncertain market, a forecasting model is not necessarily reliable,

accurate or robust merely because its forecasts demonstrate volatility. Forecasting models must be evaluated on their characteristics (such as the validity of the model assumptions, the explanatory power, etc.) rather than simply their outputs. In particular, the volatile and uncertain environment will mean the level of confidence in any forecast is likely to be reduced. For 'volatile' forecasts to be produced, a reason for predicting the 'volatility' is required.

AER does not have insight into the statistical robustness of the models

The statistical modelling undertaken by ENERGEX passes all of the relevant diagnostic tests used to ensure that the model itself is well-specified and the results are statistically robust. This report provides the critical diagnostics of each of its forecast models, namely: *normality*, *functional form*, *heteroscedasticity*, and *serial correlation*. KPMG's modelling of land and easements escalation rates is also reproduced to provide the relevant diagnostics.

We note, in relation to the question of statistical robustness, that the AER commissioned a report into labour cost growth, undertaken by KPMG Econtech (25 March 2009). The KPMG Econtech report does not report the results of any diagnostic tests. According to the report, the Labour Cost Model (LCM) developed specifically for the AER, "is a model based on regression equations… ". Any model based on regression equations has the capacity to generate relevant diagnostic tests and goodness-of-fit measures, although the KPMG Econtech report published by the AER on 25 March 2009 fails to do so. The report states that the underlying modelling assumptions are contained in Attachment A – The Labour Cost Model (LCM) of the Labour Cost Growth Forecasts 2007/08 to 2016/17 report authored by Econtech on behalf of the AER (published 19 September 2008). However, this attachment does not provide any insights into the modelling assumptions, nor does it provide statistical justification (via the report of diagnostic tests) of its forecasts. To this extent, the level of detail provided by ENERGEX in its original submission is consistent with practices adopted by the AER and its consultants.

Use of more recent information

The AER noted that some aspects of KPMG's forecasting did not represent the latest available data. KPMG's forecast modelling used the most up to date information available at the time ENERGEX submitted its proposal. The time lapsed between the submission by ENERGEX and consideration by the AER means that the AER will always have the benefit of more recent information. PwC considers that it is inappropriate to reject a proposed forecasting methodology on the basis that it does not consider the most recent information. Rather, the proposed escalation rates should be assessed based on the robustness and appropriateness of the forecast methodology.

PwC's forecasts have included the most up to date information available at the time of writing this report.

Choice of forecast methodology

The AER, in its draft determination, rejected the use of ENERGEX's (KPMG's) labour cost forecasts in favour of forecasts from Access Economics.

PwC is not in a position to accept the use of the Access Economics forecasts as they were based on proprietary information and methodologies that are not publicly available. As such, PwC is unable to consider the statistical and economic robustness of the forecast. Considering a range of quantitative and qualitative information from a variety of sources, PwC considers that the forecasts provided by Access Economics may not accurately represent the underlying macroeconomic conditions facing electricity distribution businesses in South-East Queensland.

For these reasons, discussed in more detail in the body of this report, PwC has rejected the AER's forecasts in favour of PwC's forecasting methodology. This methodology is supported by relevant model diagnostics.

Separation of 'internal' and 'external' labour

The AER's position was that, given that external labour (that is, contract labour) is not entitled to directly benefit from provisions of the ENERGEX UCA, cost escalation rates for the external labour should not reflect the EUCA's guaranteed wage increases. Rather, cost escalation rates for external labour are sourced from forecasts.

PwC's position is that the terms of the EUCA should be considered as a manifestation of the labour market conditions ENERGEX faces and, as such, as a reliable indicator of likely cost increases for all labour (internal and external).

In addition, the high degree of substitutability (from both ENERGEX's and workers' perspectives) between contract and employee labour suggests that price movements in each should closely mirror each other. The lack of available skilled labour in Queensland and the mobility with which specialists and non-specialist labour can migrate between industry sectors (in particular, mining, construction and utilities) means that over time market forces (supply and demand for labour) will push contractor and internal labour rates closer to an equilibrium. According to the Queensland Government:

> *The buoyant state economy has resulted in significant skills shortages which need to be addressed in order to facilitate current and continued economic growth and prosperity.*[1]

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[1] Queensland Government Submission, *House of representatives Standing Committee on Employment and Workplace Relations – Inquiry into Pay and Equity and Associated Issues Related to Increasing Female Participation in the Workforce (25/11/2008)*, p. 4.

The skill shortage referred to by the Queensland Government provides an incentive for labour to continually seek out high wages and compensation. To maintain their required pools of specialist and non-specialist labour, firms (including regulated entities) adjust their labour compensation packages accordingly which can involve equating internal and external labour rates.

As such, PwC does not consider it appropriate to separate internal and external labour for cost escalation forecasting purposes. Rather, the forecast cost increases for internal labour (including those sourced from the provisions of the EUCA) should also be applied to external contract labour.

Notwithstanding, PwC accepts the AER's use of different proportions of specialist and general labour for contractors as compared to employees.

Introduction

Objective

PricewaterhouseCoopers (PwC) has been engaged by ENERGEX to examine the Australian Energy Regulator's (AER) *Queensland Draft Distribution Determination 2010-11 to 2014-15* (released on 25 November 2009) in relation to its deliberations regarding ENERGEX's labour, contractors, land and easements costs escalation rates.

With the exception of its submission relating to escalation rates for land and easements costs, the AER rejected ENERGEX's arguments and proposals for escalation rates relating to labour, contractors, and materials costs. ENERGEX has separately engaged Sinclair Knight Merz (SKM) to review the AER's deliberations regarding materials costs escalation.

The purpose of this report is to conduct an econometric, quantitative and qualitative review of the AER's proposed escalation rates and methodology. In particular, to:

- review the AER's draft decision on escalation rates and CPI adjustment and provide a brief overview
- review the reasonableness of the AER's approach to establishing the escalation rates, including any departures from the approach proposed by ENERGEX and its consultants KPMG
- consider the reasonableness and 'fit for purpose' of the AER's escalation rates for selected cost categories (land, easements, and labour), particularly given the high demand for labour and resources from utilities mining and construction sectors in support of projects currently underway and planned for South East Queensland, and
- as necessary, propose a modified forecast methodology that, as appropriate, addresses the AER's concerns – including documenting the methodology, outlining PwC's rationale for accepting or rejecting the AER's position on various issues and proposing escalation rates for the relevant cost components.

CPI Adjustment

The output that is required is a series of annual escalation rates for the various input categories that are addressed in this report in real terms, that is, after the effect of forecast general (CPI) inflation is removed.

For the purpose of this analysis, we have employed the Reserve Bank of Australia's (RBA) forecast rates of inflation to convert

nominal forecasts of input price changes to real forecasts. The rate of inflation is a function of the RBA's monetary policy objectives. According to the RBA:

> *The inflation target is defined as a medium-term average rather than as a hard-edged target band within which inflation is to be held at all times. This formulation allows for the inevitable uncertainties that are involved in forecasting, and lags in the effects of monetary policy on the economy. Experience in Australia and elsewhere has shown that inflation is not amenable to fine-tuning within a narrow band. The inflation target is, necessarily, forward-looking, as evidenced by the operation of monetary policy since its introduction. This approach allows a role for monetary policy in dampening the fluctuations in output over the course of the business cycle. When aggregate demand in the economy is weak, for example, inflationary pressures are likely to be diminishing and monetary policy can be eased, which will give a short-term stimulus to economic activity.*[2]

The RBA goes on to say that:

> *in line with previous understandings between the Government and the Reserve Bank, issued in the form of several statements on the conduct of monetary policy from 1996 onwards, in the Statement on the Conduct of Monetary Policy issued in 2007* ***the Governor and the Treasurer agreed that the appropriate target for monetary policy is to achieve an inflation rate of 2-3 per cent on average,*** *over the cycle, which is a rate sufficiently low that it does not materially distort economic decisions in the community. The inflation target is thus the centrepiece of the monetary policy framework. It provides discipline for monetary policy decision-making, and serves as an anchor for private sector inflation expectations*[3]*.*

The rate of inflation used by the AER in its analysis falls within the stated target range of 2-3 per cent, i.e. 2.45 per cent.[4] In analysis, PwC employs an inflation of 2.50 per cent consistent with that employed by SKM in its review of materials cost escalation rates.[5]

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2 RBA website: http://202.14.156.68/MonetaryPolicy/about_monetary_policy.html, under the section entitled – The Monetary Policy Framework.

3 Ibid.

4 The AER's draft Determination, Table 20, page, xxxvii.

5 SKM has also been engaged by ENERGEX to review the materials cost escalation rates proposed by the AER in its draft determination.

Table 0.1 Energex forecast CPI figures[6]

Year to June	2009*	2010	2011	2012	2013	2014	2015
CPI Forecast	1.5%	2.5%	2.25%	2.5%	2.5%	2.5%	2.5%

*This figure is the actual inflation the RBA published for the year in accordance with June CPI.

Structure of this Report

Following the introduction, this report is structured as follows:

- **Section 1**: *Labour and Contractors* – including an analysis of the appropriateness in distinguishing between general labour and specialist labour, and an outline of PwC's econometric approach to forecasting labour rates and recommended escalation rates.
- **Section 2:** *Land and easements* – this section includes an outline of the model diagnostics and discusses the appropriateness of data-based methods in relation to forecasting land and easements.

To facilitate the analysis throughout the report it has been necessary in some cases to replicate the econometric analysis undertaken by KPMG. This has been possible as PwC has a license to the same econometric software used by KPMG, namely *Structural Time Series Analyser, Modeller and Predictor* (STAMP) developed by Koopman, Harvey, Doornik and Shephard (2006)[7]. Furthermore, the information (input data) used by KPMG is available in the public domain and easily accessible and the reports of KPMG described in detail the inputs and functional specifications that it employed.

[6] Obtained from SKM report: *Weighting of Energex Materials Cost Escalators*, 5/02/2010, p. 20.

[7] STAMP is published by Timberlake Consultants Ltd. (www.timberlake.co.uk).

1 Labour

This section summarises the key issues outlined in the AER's draft determination with respect to ENERGEX's labour and contractor cost escalation rates. It considers the reasonableness of the AER's arguments as well as the advice relied upon by the AER, in particular the labour cost forecasts for Queensland produced by Access Economics. Finally, this section concludes with PwC's approach to estimating labour and contractor cost escalation rates, and our findings.

1.1 Choice of forecast methodology

In its proposal ENERGEX relied upon analysis undertaken by KPMG. KPMG's analysis recommended the use of a constant escalation rate (3.05 per cent for 2009-10 onwards) for labour costs over the forecast regulatory period. This rate was considered a reasonable point estimate, based on forecast escalation rates for each year of the forecast period using SMA and STS regression modelling.

Whilst the AER acknowledged that KPMG's general approach was rigorous, KPMG's forecasts were rejected for the following two reasons:[8]

- the AER considers that a constant rate does not accurately represent the volatility and uncertainty present in the current economic climate, and
- the AER considers that the economic circumstances have changed since KPMG's forecasts were developed and that the forecasts do not therefore consider the most up-to-date information.

PwC used the following methodology in development of labour and contractor escalations rates:

Box 1: Description of STS modelling

PwC forecast escalation rates used STS regression modelling based on historical data.

The approach in our analysis is to use the structural time series framework promulgated by Harvey (1989). According to Harvey (1989), these models can be described as regressions on functions of time in which the parameters are time-varying. Amongst other things, this makes them a useful platform for analysing varying cyclicality and seasonality (and other components) of a complex form.

Following Harvey (1989), the seasonal and cyclical component in

[8] AER Draft Decision – Appendix H (page 608).

this analysis is extracted by a state space smoothing algorithm. The structural time series model employed in this analysis is formulated in terms of a trend, seasonal, cyclical and irregular components. In the most general form of the model, all components are assumed to be stochastic and driven by serially independent Gaussian disturbances that are mutually independent. The model may be formally expressed as follows:

$$y_t = \mu_t + \psi_t + \gamma_t + \varepsilon_t, \quad \varepsilon_t \sim NID\left(0, \sigma_\varepsilon^2\right) \tag{1}$$

where the trend, cycle, seasonal, and irregular are denoted by μ_t, ψ_t, γ_t and ε_t respectively. The trend in Equation (2) is specified as follows:

$$\mu_t = \mu_{t-1} + \beta_{t-1} + \eta_t, \quad \eta_t \sim NID\left(0, \sigma_\eta^2\right) \tag{2}$$

$$\beta_t = \beta_{t-1} + \varsigma, \quad \varsigma_t \sim NID\left(0, \sigma_\varsigma^2\right)$$

where μ_t is the level and β_t is the slope. The disturbances η_t and ς_t are assumed to be mutually independent.

The seasonal component is normally constructed in terms of stochastic trigonometric functions as per Harvey (1989), although dummy-variable formulations are also possible. Estimation, and signal extraction are carried out by means of the Kalman filter and associated algorithms. [9]

In this analysis we employ the trigonometric form of stochastic seasonality, where s seasons in the year is

$$\gamma_t = \sum_{j=1}^{[s/2]} \gamma_{j,t}, \quad t = 1, \ldots, T \tag{3}$$

and each $\gamma_{j,t}$ is generated by

$$\begin{bmatrix} \gamma_{j,t} \\ \gamma_{j,t}^* \end{bmatrix} = \begin{bmatrix} \cos\lambda_j & \sin\lambda_j \\ -\sin\lambda_j & \cos\lambda_j \end{bmatrix} \begin{bmatrix} \gamma_{j,t-1} \\ \gamma_{j,t-1}^* \end{bmatrix} + \begin{bmatrix} \omega_{j,t} \\ \omega_{j,t}^* \end{bmatrix} \tag{4}$$

where $\lambda_j = 2\pi j / s$ is frequency, in radians, for $j = 1, \ldots, [s/2]$ and ω_t and ω_t^* are two mutually uncorrelated white-noise disturbances with zero means and common variance σ_ω^2.

In the structural model represented by Equation (2), μ_t is the local linear trend defined by Equation (3), the irregular component, ε_t, is assumed to be random, and the disturbances in all three components are taken to be mutually uncorrelated. The signal-noise ratio associated with the seasonal, that is $q_\omega = \sigma_\omega^2 / \sigma_\varepsilon^2$, determines

[9] Consider Harvey (1989) and Durbin and Koopman (2000).

how rapidly the seasonal changes relative to the irregular.

In all cases, the statistical specification of the cycle is described as follows:

$$\begin{bmatrix} \psi_t \\ \psi_t^* \end{bmatrix} = \rho \begin{bmatrix} \cos\lambda_c & \sin\lambda_c \\ -\sin\lambda_c & \cos\lambda_c \end{bmatrix} \begin{bmatrix} \psi_{t-1} \\ \psi_{t-1}^* \end{bmatrix} + \begin{bmatrix} \kappa_t \\ \kappa_t^* \end{bmatrix}, \quad t = 1,\ldots,T \qquad (5)$$

where (following the STAMP 8.2 manual) λ_c is the frequency, in radians, in the rage $0 < \lambda_c < \pi$, κ_t and κ_t^* are two mutually uncorrelated white noise disturbances with zero means and common variance σ_ψ^2, and ρ is a damping factor. Note, the stochastic cycle becomes a first-order autoregressive process (i.e., AR(1)) if λ_c is 0 or π.

PwC has based specialist labour cost escalation forecasts on published data from the Australian Bureau of Statistics (ABS) on the compensation of employees in Queensland's electricity, gas and water (EGW), mining and construction industries. These industries compete for a similar pool of specialist labour resources and, as such, wage rates in each sector strongly influence each other. General labour cost forecasts are based on ABS data on compensation of employees in Queensland in all industries.

1.2 Forecasting uncertainty

The use of a constant escalation rate in the context of extreme uncertainty and volatility is discussed below. Broadly, PwC considers that:

- where possible and supported by the data, a non-linear forecast for future wage levels would be preferable, i.e. different escalation rates for each year
- notwithstanding the above, a default constant rate is appropriate when there is no evidentiary basis for forecasting non-linear growth in wages in the future, and
- in the presence of a volatile and uncertain market, a model is not necessarily reliable, accurate or robust merely because its forecasts demonstrate volatility – that is, forecasting models must be evaluated on their characteristics (such as the validity of the model assumptions, the explanatory power, etc.) rather than simply their outputs.

KPMG's analysis recommended the use of a constant escalation rate over the forecast period. This rate was considered a reasonable point estimate, based on forecast escalation rates for each year of the forecast period using Simple Moving Average (SMA) and Structured Time Series (STS) regression modelling (STS modelling

is described in detail in Box 1).[10] The AER considers that a constant rate does not accurately represent the volatility and uncertainty present of the current economic climate.[11]

PwC accepts the AER's general position that a constant escalation rate over the forecast period is not equivalent to a series of differing escalation rates whose average is equal to the constant rate. PwC notes that, if cost escalation rates are expected to differ from year-to-year, applying an average rate to all years will not accurately represent price movements over the period.

However, PwC emphasises that, in the presence of a volatile and uncertain market, a model is not necessarily reliable, accurate or robust merely because its forecasts demonstrate volatility. Forecasting models must be evaluated on their characteristics (such as the validity of the model assumptions, the explanatory power, etc.) rather than simply their outputs. In particular, the volatile and uncertain environment will mean the level of confidence in any forecast is likely to be reduced. For 'volatile' forecasts to be produced, a reason for predicting the 'volatility' is required.

PwC's approach provides individual escalation rates for each year of the forecast period and, as such, is not subject to the averaging problem outlined above.

PwC's approach is based on the methodology employed by KPMG. Individual escalation rates have been determined for each year of the forecast period. The model diagnostics have been provided in order that the AER can verify the robustness of the forecast modelling.

With respect to the AER's comments that KPMG's forecasts did not reflect the most up-to-date information, PwC notes that KPMG's forecasts were based on the most up-to-date information available to them at the time of the report. The time lapsed between the submission by ENERGEX and consideration by the AER means that the AER will always have the benefit of more recent information, which of itself is not a reason for rejecting a forecasting method.

1.3 Access Economics' labour forecasts for Queensland

This section considers the Access Economics' analysis of labour costs and makes two critical observations.

1) The Access Economics' model does not seem to appropriately account for the surge in employment in the Electricity, Gas, Water and Waste (EGW) sector over the period 2008-2009 (in the midst of the global financial crisis).

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[10] KMPG (2009) 'Development of Cost Escalation Rates – Final report' (page 26).

[11] AER Draft Decision – Appendix H (page 585).

2) The Access Economics model is driven by a business cycle that according to PwC's own analysis does not appear to be significant in explaining the variability in labour costs relating to the EGW sector.

Each point is discussed in turn below.

Accounting for the most recent movements in labour costs

The forecasts of labour cost growth relied upon by the AER appear unreasonable in the context of the economic conditions currently faced by ENERGEX; in particular, the continuing skills shortage in South-East Queensland driven by strong demand in the utilities sector and other sectors that compete for labour resources (for example, the mining and construction sectors). The high degree of competition between industry sectors for specialist labour in the South East Queensland region has been well documented.

In its April 2009 report entitled *The Queensland Labour Market and Training Review – The Three Months to March 2009*, the Queensland Government states that "the largest increases in employment over the four quarters ending February 2009 were in … Technician and trades workers (up by 13,800 jobs where growth was almost all full-time) and Professionals (up by 10,900 jobs, 10,100 of which were full-time)". These two categories comprise the bulk of those workers employed in the EGW sector. According to the Queensland Government in its April 2009 Labour Market Review, employment, the EGW sector increased by 28.6 per cent (up from 21,000 to 27,000) from the four quarters ending February 2009. This represents the sharpest increase in employment over the 19 key industry sectors for which information is collected by the ABS.

The biggest falls in labour market participation over the same period were recorded by the Arts and Recreation Services (down by 8.1 per cent), Retail Trade (down by 6.9 per cent) and Information Media and Telecommunications (down by 5.8 per cent). These sectors do not compete for labour with the EGW sector.

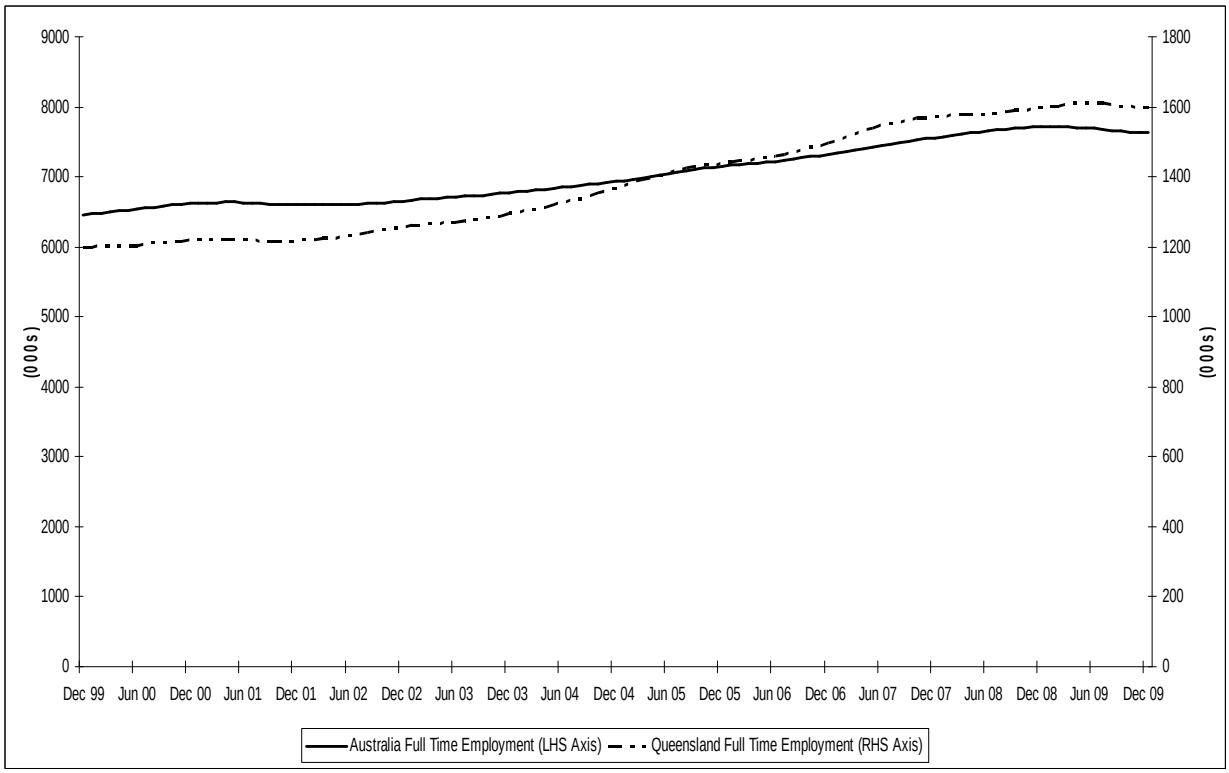
The tightening of the labour market over this period placed pressure on wage growth. According to Access Economics, "… the utilities sector found itself in keen competition for many types of labour, and hence wage growth in utilities outpaced overall wage growth nationally".[12] In fact the tightening of the labour market has been more pronounced in Queensland, and the South East Queensland in particular, compared to Australia as a whole.

The following graphs compare the labour force in Queensland and Australia and South East Queensland and Australia. Over the period December 1999 to December 2009, the level of full time employment in Queensland has remained relatively constant compared to Australia. Furthermore, the dip in full time employment experienced

[12] Access Economics, *Forecast growth in labour costs*, 16 September 2009, p. vi.

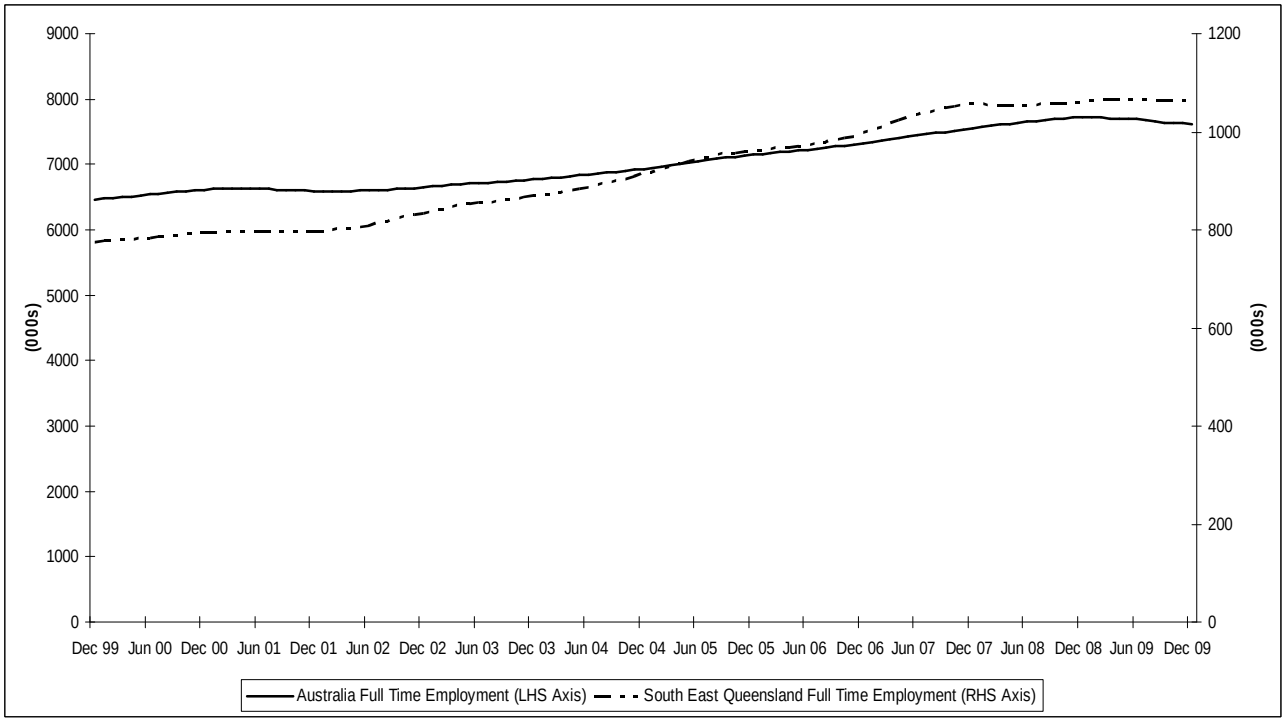
at the Australian (national) level over the period December 2008 to December 2009, arguably a result of the global financial crisis, was not experienced in Queensland. Similarly, when we compare full time employment levels in Australia with those in South East Queensland, a similar conclusion is reached.

Figure 1.1 – A comparison of Full Time Employment Levels in Australia and Queensland (1999 – 2009)[13]



[13] The data was obtained from the Australian Government's website: www.skillsinfo.gov.au/skills/Regions/QLD/QueenslandLabourForceStatistics.htm

Figure 1.2 – A comparison of Full Time Employment Levels in Australia and South East Queensland (1999 – 2009)[14][15]



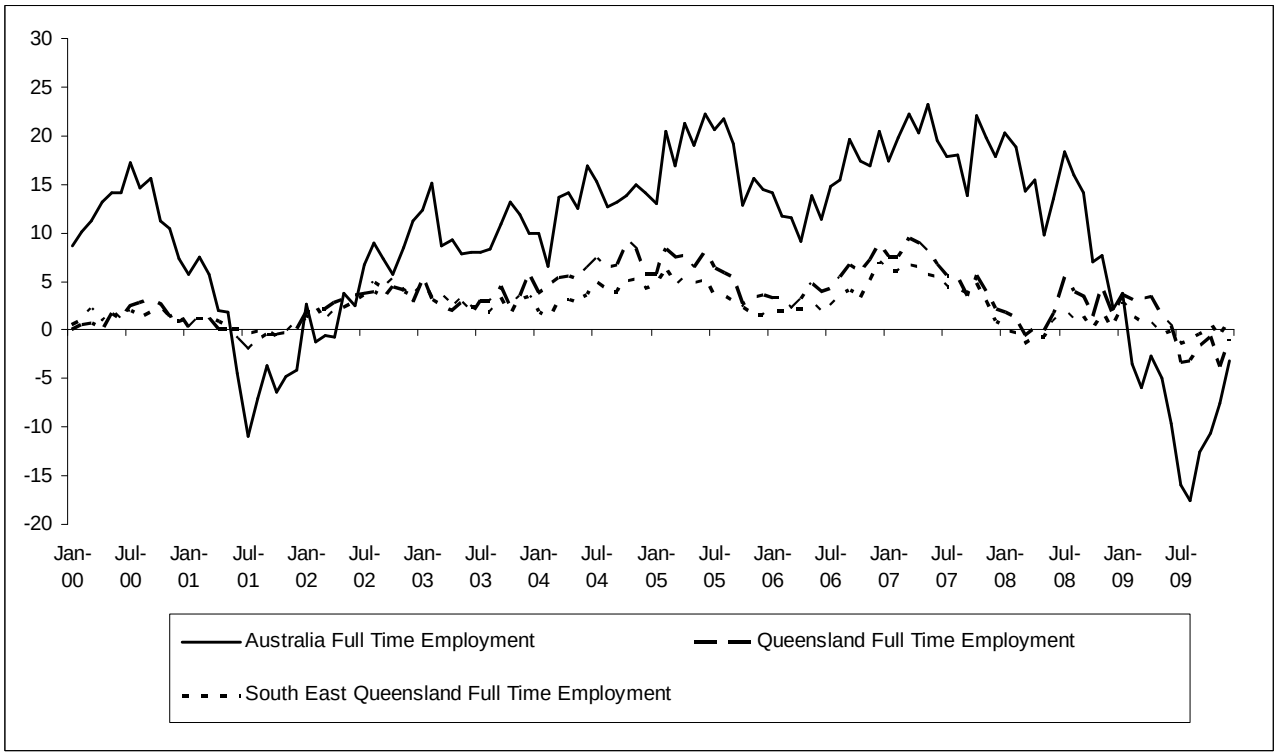
In fact, according to the figure above, growth in the level of full time employment in South East Queensland increased over the period June 2008 to December 2009 – moving in the opposite direction to the Australian trend over the same period.

Review of the above figures also highlights the relative constancy of labour market movements in the Queensland and South East Queensland regions compared to Australia. One way of comparing the degree of volatility (or lack there of) in the data is to transform the data into logarithms and calculate the first-differences. The following figure compares the first-differences of the three series under examination.

[14] Ibid.

[15] The South East Queensland Region includes the following statistical regions: Brisbane City Inner Ring, Brisbane City Outer Ring, South and East BSD Balance, North BSD Balance, Ipswich City, Sunshine South Coast, West Moreton and Gold Coast.

Figure 1.3 – A comparison of the Labour Market volatility in Australia, Queensland and South East Queensland (1999 – 2009)[16]



Close review of the figure above shows that volatility in the level of *full time employees* in the South East Queensland region is relatively minor when compared to the volatility displayed at the aggregate Australian level. As such, one would not expect to see the level of wage volatility in the South East Queensland region that is predicted in the Access Economics report.

Does the business cycle explain labour costs in the EGW sector?

The analysis of labour costs in the Queensland utilities sector undertaken by Access Economics on behalf of the AER is driven primarily by macroeconomic forecasts generated by the Access Economics Macroeconomic model (AEM). According to the AER, the model is based on a "formal econometric modelling approach".[17] In its draft determination (25 November 2009), the AER provides a brief description of the key factors that drive the model and, in particular the Labour Price Index (LPI). These drivers include the following:

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[16] We note the criticisms of the use of first differences to examine labour market volatility outlined by, for example, Dixon and Shepherd (2006) in their article *The cyclical dynamics and volatility of Australian Output and Employment.* However, in this case the authors use alternative methods to investigate the level of volatility in the labour market and reach the same conclusions.

[17] Australian Energy Regulator, *Queensland – Draft distribution determination 2010-11 to 2014-15, 25 November 2009*, p.605.

- *business cycle factors – the model considers how fast the industry/State is growing relative to the national and historical averages*

- *productivity factors – the model uses an average of productivity trends across the past two years*, and

- *competition (relative wage) factors – the modelling approach sees wages in competitor industries moving closer together.*[18]

According to the Access Economics report, *Forecast growth in labour costs*, the cyclical component outlined above, is "the main driver of the difference between the two series [i.e., the utilities labour price index and the national labour price index], and reflects the movement in labour prices in the industry due to economic performance".[19] Unfortunately, the Access Economics report does not outline how the cyclical component was actually modelled, nor provide any evidence that the cycles are statistically robust. This is an important point because, while cycles are often appropriate for economic data, for very short term forecasts (i.e. 2-5 years) transitory fluctuations maybe more efficiently captured by a local linear trend[20]. If formal econometric approaches are to be employed then it is important to ensure that the correct method has been used and that the results have been correctly interpreted.

Application of an unobserved component STS model of the type used to generate forecasts in this report is more useful in capturing trend and cyclical components and understanding their influence on the variable of interest, in this case labour costs. As a means of testing the Access Economics assumption that labour costs in the EGW sector in Queensland are fundamentally driven by the business cycles, we estimate the following model:

$y_t = \mu_t + \psi_t + GDP_t + u_t$	6

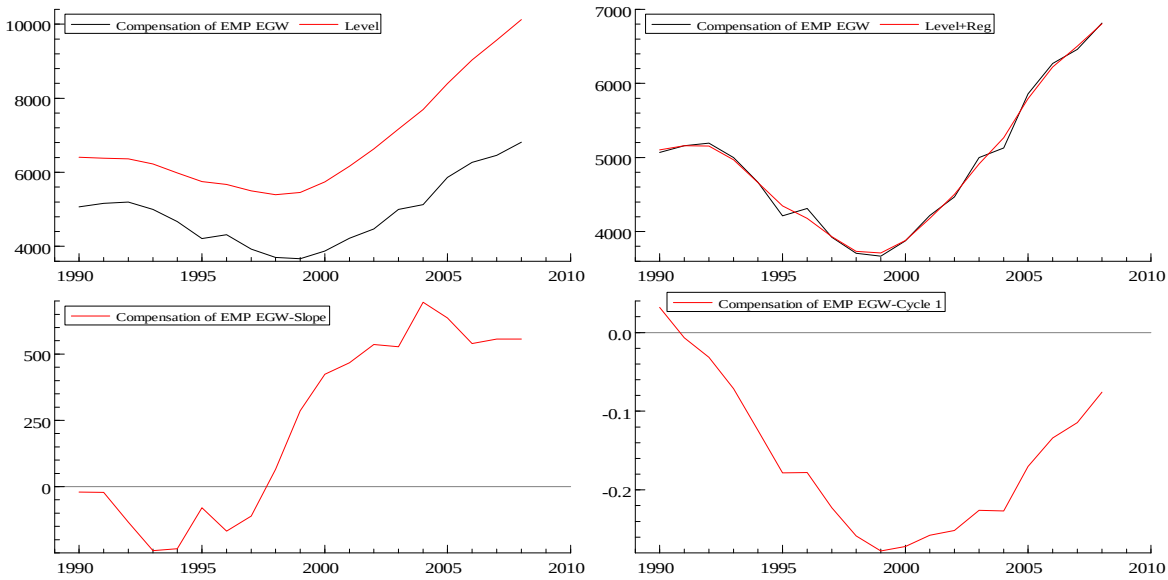
where GDP_t (Gross Domestic Product) is assumed to represent the business cycle, y_t represents compensation to employees in the EGW Sector in Queensland over the period June-1990 to June-2008, μ_t is the trend of y_t and ψ_t is the cyclical component of y_t. The following figure gives us some insight into the influence of μ_t and ψ_t.

[18] Ibid, p. 606.

[19] Access Economics, *Forecast growth in labour costs*, 16 September 2009, p. 39.

[20] Forecasting with Unobserved Components Time Series Model, published in The *Handbook of Economic Forecasting Volume 1* Ed. By G. Elliot, C. Granger and A. Timmermman, North-Holland (2009)

Figure 1.4 – The influence of business cycles on compensation paid to employees in the EGW sector in Queensland (1990 – 2008)



The following observations can be made from Figure 1.4.

- The trend in labour compensation plays a more significant role than the cycle. The trend (top right hand panel) is statistically significant indicating that it plays a significant role in the model used to generate forecasts for this series.
- The trend is composed of the level (top-left hand panel) and the slope (bottom left hand panel). Both the level and the slope are statistically significant.
- The cycle (bottom right-hand corner) is statistically insignificant, meaning that it does not play an influential role in explaining the variability in dependent variable (i.e. compensation paid to employees in Queensland).

In conclusions we see that compensation paid to employees is driven mostly by the stochastic trend (upper right hand panel) rather than the cyclical component (bottom left-hand panel). Both the level and slope are positive, highlighting the influence of the recent high demand for labour in the sector. In regards to the influence of the business cycle as proxied by GDP, we find that its impact is not statistically significant. Consider the following results:

Table 1.1: STS Model of Labour including the Business Cycle – Results and Diagnostics

State Variable/Test Statistic	EGW (y_t)
μ_t	10,126.05 (2.15)
β_t	556.17 (1.98)

State Variable/Test Statistic	EGW (y_t)
ψ_t	0.23 (0.011)
GDP	-0.003 (-0.43)
SE (Std. Error)	41.98
R_d^2 (Coefficient of Determination)	0.48
Q (Box-Ljung test for residual serial correlation)	1.03
N (test for normality)	3.39
H (test for heteroscedasticity)	0.72

Note, β_t denotes the slope and, when added to the level (μ_t), it creates the trend; *t*-statistics are in parentheses.

The model passes the diagnostic tests indicating that it is well-specified. More importantly we find that the influence of the business cycle as proxied by GDP is irrelevant as indicated by the low *t*-static in parentheses. The report undertaken by Access Economics and offered to the AER as an example of a formal econometric approach does not provide the level of detail outlined in the above table.

1.4 Division of labour

The AER considers it appropriate to distinguish between the different types of labour resources employed by ENERGEX for the purpose of estimate labour costs escalation. The AER requested ENERGEX to provide information on the proportion of labour and contractor forecasts attributable to specialist electrical industry employees undertaking direct project work. In response to this question ENERGEX distinguished between:

- general labour and specialist electrical industry employees – specialist being employees with skills specific to electricity industry, such as qualified electricians or electrical engineers, and
- internal and external labour – internal labour being ENERGEX employees, while external labour being contractors.

The nature and merits of these distinctions are discussed in turn.

General and specialist labour

PwC agrees with the AER's general position that, where possible, breaking labour costs into their constituent occupations or roles and forecasting each separately may provide a more rigorous estimate of future labour costs escalation. It is likely that wage movements will differ between industries. This is particularly relevant in Queensland's current macroeconomic climate, with particularly strong growth in the mining industry and related sectors.

Based on an analysis of labour information, ENERGEX estimated that 5 per cent and 95 per cent of total internal labour costs, and 21 per cent and 79 per cent of total contract labour costs, are attributable to these two types of labour respectively. These proportions were used by the AER to weight respective general and specialist labour escalation rates.

PwC's approach therefore provides separate cost escalation forecasts for general and specialist electricity labour, using the same weightings applied by the AER.

Internal and external labour

The AER also considered it appropriate to distinguish between internal labour costs (i.e. the wages of ENERGEX employees) and external labour costs (i.e. payments to contractors providing labour). The AER's rationale is that contractors are not entitled to directly benefit from the provisions of ENERGEX's EUCA, in particular the agreed wage increases.

PwC considers that the AER's position does not accurately reflect the competitive dynamics of the labour market from which ENERGEX sources its employees and contractors and the nature of the EUCA as the product of market dynamics, which we elaborate upon below.

Substitutability of employees and contractors

ENERGEX's contract labour resources have largely the same qualifications and skills as its internal employees. In particular, ENERGEX's contract labour resources include qualified electricians and electrical engineers, as well as generic labour (project managers, clerical workers, etc.); occupations and roles that are substantially the same as internal labour resources. This point is reflected in the AER using the same labour cost escalation forecasts for internal and external labour costs (with the exception of internal employees during the period that the AER has agreed to apply the current EUCA).

Given this, the employee and contract labour resources are close substitutes for each other; from the point-of-view of both ENERGEX and the contractor's employer. In planning and managing the labour required to deliver its capital and operating programs of work, ENERGEX can choose whether to engage labour resources as

employees or as contractors. Factors influencing ENERGEX's decision include: assessment of the duration of the project, level of specialisation required, and, most importantly, the relative longer term costs and benefits of engaging employees or contractors.

In the same way, workers with the requisite skills can also choose whether to be engaged as an employee or contractor. In their case, this decision is also influenced by the relative wages of employees compared to contractors. Other factors include the level of flexibility required and the desirability of additional benefits and security to which employees are entitled. Past barriers to worker mobility have been reduced through superannuation and long service leave reforms which give workers more freedom in their choice of employment.

The lack of available skilled labour in Queensland and the mobility with which specialists and non-specialist labour can migrate between employers and industry sectors (in particular, mining, construction and utilities) means that over time market forces (supply and demand for labour) will push contractor and internal labour rates closer to an equilibrium. According to the Queensland Government

> *The buoyant state economy has resulted in significant skills shortages which need to be addressed in order to facilitate current and continued economic growth and prosperity.*[21]

The skill shortage referred to by the Queensland Government provides an incentive for labour to continually seek out higher wages and compensation. To maintain their required pools of specialist and non-specialist labour, firms (including regulated entities) adjust their labour compensation packages accordingly, which can involve equating internal and external labour rates.

The Queensland Treasury's forecasts of the wage price index remain fairly buoyant for the period 2008-09 to 2010-11 reflecting the continuation of skills shortages in the market. The forecasts are outlined in the table below.

Table 1.2: Queensland Treasury wage forecasts[22]

Percentage change (%)	2008-09	2009-10	2010-11
Wage price index - nominal	4.2	3.5	3.5
Inflation	3.7	2.5	2.5

21 Queensland Government Submission, *House of representatives Standing Committee on Employment and Workplace Relations – Inquiry into Pay and Equity and Associated Issues Related to Increasing Female Participation in the Workforce*, page 4.

22 Queensland Government State Budget 2009-10, Mid year fiscal and economic review (page 4).

Wage price index (real)	0.5	1.0	1.0

Considering the above, movements in the wages of employees and contractors must have a strong bearing on each other. For example, an increase in employee wages will make employment with ENERGEX more attractive to workers. Unless contractors are going to lose their staff in this situation, benefits granted to ENERGEX employees must be matched. Moreover, ENERGEX will require continued support from the contractor market to supplement its internal workforce to deliver record capital and operating expenditure programs through the 2010-2015 regulatory period. In view of the current economic climate and continued skills shortage in the industry, there will continue to be upward pressure on contractor wages.

For these reasons, it is likely that movements in internal (employee) labour costs and external (contract) labour costs will closely mirror each other. In an aggregate sense, contract labour costs should be expected to escalate at the same rate as internal labour costs. Therefore, for the purposes of labour costs escalation forecasting, PwC does not consider the separation of internal (employee) labour costs and external (contract) labour costs to be appropriate.

Nature of ENERGEX's EUCA

ENERGEX's EUCA reflects the underlying labour market conditions and should be considered a manifestation of the economic conditions ENERGEX faces, rather than an extraneous cost increase. As such, the wage increases in the EUCA should be considered a strong indicator of the market conditions ENERGEX faces in procuring all labour resources (employee and contract).

The EUCA is the result of substantial negotiations between ENERGEX and several workers' unions representing ENERGEX's employees. The agreement is the result of a negotiation process that spanned a number of months and included considerable 'hard' bargaining activities (including worker protests and other measures). As such, the agreement should be seen as direct evidence of the genuine market price for electricity sector labour in South East Queensland.

By contrast, other indicators of labour prices (including PwC's and Access Economics' wage forecasts) rely on broad aggregate data and other information. Therefore, they represent merely broad indications of the likely labour market conditions that ENERGEX faces. As such, PwC considers that the price increases agreed to in the ENERGEX EUCA provide a more direct, and hence more reliable, indication of the labour market conditions affecting ENERGEX than forecasts based on broad macroeconomic information. As these labour costs drive movements in both internal and external labour costs, PwC considers it appropriate to apply the cost increases in the EUCA to both internal and external labour costs.

The influence of institutional factors

In section 1.3 of this report, statistical analysis was undertaken to show the labour market in the South East Queensland region does not respond to the business cycles (as proxied by GDP) as assumed by Access Economics. Several reasons may account for the disconnect between the evolution of the business cycle (at the national level) and the South East Queensland labour market. An import consideration is the influence of institutional factors such as, the market power enjoyed by unions and their ability to influence the demand for and supply of labour. According to the Labour Market Research Unit (Department of Employment and Training Queensland Government) (2005):

> *From a purely economic perspective, shortages occur as a result of short-run imbalances as the economy adjusts to a new equilibrium position due to changes in the demand for or supply of specific products.* ***What frequently occurs in any specific market however, is that some resources, in the current situation skilled labour, may become increasingly scarce. In the market for these particular skills this increased scarcity will be signaled by an increase in the price of this resource, i.e. the wages offered for this type of skill****. Only in cases where institutional factors prevent the wage from responding enough to bring supply and demand into equilibrium will shortages occur.*[23]

The Access Economics forecasts are derived from a macro model and therefore do not explicitly account for the institution factors that prevail in the South East Queensland region, a point that Access acknowledges (p.113). To apply the results of what appears to be a purely theoretical model of the economy without consideration to real influences, such as institutional factors, appears to be arbitrary and lacking in transparency particularly when the model is not available for public scrutiny.

Conclusion

As the AER rightly notes, contractors are not directly entitled to benefit from the agreed wage increases in the ENERGEX EUCA. However, in accordance with the market mechanism described above, it is likely that contractors will, via wage negotiations, achieve substantially the same wage increases as employees. In addition, the price increases in the EUCA provide the best evidence of the labour market conditions ENERGEX faces in procuring all labour resources (both employees and contractors).

As such, PwC does not consider it appropriate to distinguish between internal and external labour costs for cost escalation forecasting purposes.

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[23] *Perspective on Skills Shortages* (Trendle, 2005, p.3) Labour Market Research Unit Department of Employment and Training Queensland Government.

1.5 Treatment of the EUCA

This section of the report outlines two critical issues in relation to the method employed by the AER to forecast labour cost escalation rates for ENERGEX. In particular it reviews:

1) the extent to which the AER has properly accounted for the last year of the EUCA; and

2) the average wage rate employed as the base year.

We address these issues in turn.

Treatment of the last year of the EUCA

Under the terms of ENERGEX's EUCA, all ENERGEX employees are entitled to a guaranteed nominal wage increase of 4.5 per cent for the 2009, 2010 and 2011 financial years.[24] Given this agreement is binding on ENERGEX, the increase represents an actual cost increase that ENERGEX will incur. As such, it is the best indication of labour cost escalation for these years.

The AER has, however, declined to factor the last year of the EUCA into ENERGEX's cost forecasts. PwC does not consider that the AER's treatment of this cost increase in its forecasting model accurately reflects the impact of these guaranteed price increases on ENERGEX's labour costs.

The AER's reason for ignoring the last year of the EUCA is to avoid incentive problems – the year in question is within the new regulatory period and if the AER allowed a recovery of the actual wage rise then it may reduce ENERGEX's incentives to argue hard next time (or at least to argue hard for any years that span a regulatory period).

In our view, the AER has overemphasised the incentive issues and has ignored the central purpose of the forecasts, which is to come up with an unbiased forecast of future input price movements.

We note that the last year of this EUCA has the same terms as the preceding years, during which time the rates were borne by ENERGEX. In addition, even if the AER used ENERGEX's actual wage rates when forecasting input prices this time, ENERGEX would have no guarantees that any future rises would be passed through in future price reviews. Assuming all future EUCA's are for 3 year terms, over the 2010-2015 regulatory period ENERGEX labour costs will be subject to conditions of three different EUCA's, two of which will be negotiated during the incumbency of the 2010-2015 regulatory period.

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[24] ENERGEX Union Collective Agreement 2008 (page 24).

Assumed base year wage rate

Where the AER applied the EUCA to determine the labour cost increase, it merely substituted the labour cost increase that Access Economics had forecast with the labour cost increase that was specified in the EUCA (as discussed above, it declined to apply the last year of the EUCA, which is not addressed further). The Access forecasts were quarterly, and the AER calculated the rate of increase in labour costs by comparing the average of the four quarters within a year with those in the preceding year. In the years where the EUCA was assumed to apply, wages were assumed to be fixed in real terms during the year.[25]

Critically for the discussion below, the AER assumed that ENERGEX's labour costs in the base year (2007/08) moved with the quarterly changes in the ABS EGW series, and as such assumed that there was a material *fall* in wages in nominal terms in the base year. As such, even though the new EUCA implied a 4.5 per cent rise in wages in 2008/09 compared with those in the previous year, the AER's assumption that wages had fallen during the previous year implied that the step-up in wages under the new EUCA still implied a *reduction* in real labour costs between the two years.

PwC considers, however, that the AER's assumption that wages during the base year (2007/08) moved with the ABS EGW series is not consistent with the terms of the EUCA that applied during that year and indeed not consistent with how the AER applied the new EUCA going forward. The most appropriate assumption for 2007/08 is that wages were fixed in nominal terms over the course of that year.

The outcome of the AER's approach is that, by virtue of the assumption about labour cost movements in the base year (2007/08) and ignoring the EUCA rate for 2010/11 (as discussed in the section above) the labour costs escalation rates for the 2009 and 2011 financial years are less than the real increases implied by the terms of the provisions of the EUCA (as demonstrated in the table below).[26]

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[25] We note that the AER's assumption that wages during the EUCA years were fixed in real terms during each year is also an error – they are fixed in nominal terms. Our forecasts fix this error as well as the one identified in the text.

[26] Please note, the EUCA real escalation rates have been determined using the KPMG Econtech inflation forecasts relied upon by the AER, notwithstanding PwC's position that the RBA's inflation forecasts are more appropriate.

Table 1.3 – Comparison of internal labour cost escalation rates

Internal labour real escalation rates (%)	2008-09	2009-10	2010-11
Real escalation rates implicit in EUCA	1.3	2.6	1.5
Real escalation rates calculated using the AER's model	-0.1	2.6	0.7

PwC considers that the AER's approach does not accurately represent the true impact of the terms of the EUCA on ENERGEX's labour costs.

Under the existing relationship between ENERGEX and its employees, the terms of the EUCA primarily drive and determine wage rates, including wage adjustments. It is therefore appropriate to assume that an agreed nominal increase in the EUCA is likely to result in an increase in ENERGEX's wage costs by that amount. The quarterly fluctuations considered by the AER to determine its escalation rates do not accurately reflect the actual cost change ENERGEX is likely to incur in the presence of an agreed formal EUCA.

As such, PwC's position is that forecast labour cost escalation rates for the 2009, 2010 and 2011 financial year should be ignored, in favour of the real wage increases implied by the 4.5 per cent nominal increase guaranteed by the terms of the EUCA. That is, the real cost escalation rate should be equal to that guaranteed by the terms of the EUCA. Moreover, the change within the 2007/08 year similarly should be treated consistently in a similar manner – that is, with labour costs during that year assumed to be fixed in nominal terms. As such, PwC's approach is to substitute its labour cost forecasts for the cost increases specified in the EUCA adjusted for inflation forecasts from the RBA.

1.6 Conclusion and recommendations

As discussed in the preceding section, notwithstanding that contractors are not directly entitled to the benefits of ENERGEX's EUCA, PwC does not consider it appropriate to separate 'internal' labour (employees) from contractors in forecasting cost escalation rates. However, PwC accepts that different weightings between specialist and general labour, according to the relative proportion of the workforce these labour types represent, are appropriate.

PwC made some modifications to the models employed by KPMG to develop the labour costs escalators used in ENERGEX's regulatory proposal. These modifications were:

- updating the model to reflect most recent available data
- determining alternative cost escalators for specialist and general labour, and

- applying differing weights for internal labour as compared to contractors.

1.6.1 Specialist labour

Cost escalation rates for ENERGEX's specialist labour were developed using STS regression modelling.

ABS historical data relating to the compensation of employees in Queensland's EGW, mining and construction industries was obtained from two publications:

- Labour force, Australia (6291.0), namely the total number of employees in the relevant industries,[27] and
- Australian National Accounts (5220.0), namely the total compensation of employees in these industries.[28]

From this information, a historical time series of average compensation of employees was developed. PwC has based specialist labour cost escalation forecasts on published data on the compensation of employees in Queensland's electricity, gas and water, mining and construction industries. These industries compete for a similar pool of specialist labour resources and, as such, wage rates in each sector strongly influence each other. We consider that aggregating the results across these sectors is likely to improve the reliability of the resulting labour cost forecasts.

Average compensation per employee in these sectors was forecast using STS modelling. STS modelling is described in more detail in the foregoing section. The model diagnostics are provided in Appendix B. From these forecasts, a composite index of the three sectors was developed, with equal weightings applied to each sector.

In the absence of more information concerning the exact relationship between wages across the relevant industries, an equal weighting was considered appropriate.

These forecasts and the index were adjusted for inflation in line with the RBA's inflation forecasts to determine real escalation rates for labour costs in each industry. These rates are reproduced in the table below.

[27] ABS (2009) 'Labour force, Australia (6291.0)'.

[28] ABS (2009) 'Australian National Accounts (5220.0)'.

Table 1.4 – PwC's proposed specialist labour escalation rates

Escalation rates (%)	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
EGW – real	7.6	0.0	0.7	0.1	0.0	0.0	0.1
Mining – real	-0.2	-1.7	-1.0	-1.5	-1.5	-1.5	-1.6
Construction – real	6.9	3.6	4.0	3.1	2.8	2.6	2.3
Composite specialist labour – real	**3.8**	**0.8**	**1.4**	**0.8**	**0.7**	**0.6**	**0.5**
Inflation	1.5	2.5	2.25	2.5	2.5	2.5	2.5

1.6.2 General labour

Cost escalation rates for ENERGEX's general labour were developed using STS regression modelling, in the same way as above. Historical data was obtained from the same sources, however in relation to all industries.

Average compensation per employee in all sectors was forecast using STS modelling. The model diagnostics are provided in Appendix B.

These forecasts were adjusted for inflation in line with the RBA's inflation forecasts to determine real escalation rates for general labour costs in South East Queensland. These rates are provided in the table below.

Table 1.5 – PwC's proposed general labour cost escalation rates

Escalation rates (%)	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
General labour - real	2.3	2.8	2.1	1.9	1.7	1.5	1.4
Inflation	1.5	2.5	2.25	2.5	2.5	2.5	2.5

1.6.3 Composite index

A composite labour index has been calculated as a weighted average of the specialist and general labour costs escalation rates. The relative weightings are based on estimates of the proportion of ENERGEX's workforce that can be classified as specialist or general labour. Different weightings were determined for internal labour and contractors.

PwC has applied the same weightings as those used by the AER, outlined in the table below.

Weightings (%)	Specialist	General
Internal labour	95	5
Contractors	71	29

1.6.4 Union collective agreement

In October 2008, ENERGEX entered into an union collective agreement (EUCA) with its workers' union. In addition to addressing a number of workplace issues, the EUCA provided for automatic nominal wage increases according to the following schedule:

Table 1.6 – ENERGEX EUCA guaranteed wage increases

Financial year	Nominal pay increase (%)[29]
Year ending June 2009	4.5
Year ending June 2010	4.5
Year ending June 2011	4.5

These cost escalations are binding on ENERGEX and apply to both the specialist and general labour force. As such, this price index is certain and supersedes any estimate of likely labour cost changes based on forecast models.

As such, notwithstanding the results of our modelling above, PwC considers it appropriate to substitute the agreed EUCA escalation rates for model estimates.

These escalation rates have been adjusted for forecast inflation (sourced from the RBA), giving real labour cost escalators of 3.4 per cent, 1.7 per cent and 2.5 per cent for 2008-09, 2009-10 and 2010-11 respectively.

Contractors and the EUCA

The AER did not consider it appropriate to apply the same cost escalation rates to contractors as to internal labour, on the basis that contractors are not directly entitled to benefit from the EUCA. PwC however considers that, given that internal labour and contract labour are close substitutes, their wages are likely to closely mirror each other. As such, EUCA increases should be interpreted as direct evidence of the genuine market price for contract labour in the South East Queensland electricity sector.

[29] ENERGEX Union Collective Agreement 2008 (page 24).

1.6.5 Forecast escalation rates

Based on the methodology outlined above, the following escalation rates were established.

Table 1.7 – PwC's proposed labour costs escalation rates

Escalation rates (%)	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
Internal labour – real	**3.4**	**1.7**	**2.5**	**0.9**	**0.8**	**0.7**	**0.6**
Contractors - real	**3.4**	**1.7**	**2.5**	**1.1**	**1.0**	**0.8**	**0.7**
Inflation	1.5	2.5	2.25	2.5	2.5	2.5	2.5

2 Land & easements

In its analysis KPMG employed Structural Time Series modelling to generate escalation rates for land and easements. Its final recommendation was to identify a point estimate (i.e. 2 per cent for the period 2010-15 and 3 per cent for the period 2015-2025) after having considered the results of an alternative methodology, namely simple moving average (SMA).

The AER accepted the land and easements costs escalation rates proposed by ENERGEX, being satisfied the estimates reasonably reflect expected cost increases.[30] As such, PwC does not propose to modify KPMG's approach to determining these escalators.

For completeness however, we have addressed the AER's concerns with respect to this forecasting approach in Appendix B; namely that, the AER, not being privy to KPMG's model diagnostics, could not verify the statistical significance of the model or its robustness.

[30] AER Draft Decision – Appendix H (page 582).

Appendices

Appendix A Summary of AER's approach

The AER's approach to determine cost escalation rates for ENERGEX's labour (internal and contract), land and easements, is summarised in this appendix.

Labour

The AER's recommended labour cost escalation rates are based on wage growth forecasts, provided by Access Economics, for specialist and general labour respectively in Queensland. The AER treated employees and contractors separately, on the basis that, as contractors are not covered by ENERGEX's union collective agreement (EUCA), it is not reasonable to apply EUCA rates to contractors.

Labour

The AER rejected KPMG's escalation rates for two reasons. Firstly, the AER considers that the economic environment has changed considerably since KPMG's forecasts were derived and, as such, use of more recent data was appropriate.[31] The AER also considered, as per previous comments, that a constant escalation rate is not appropriate in the context of a volatile and uncertain economic environment.

Instead, the AER relied on Access Economics' labour cost growth forecasts. While these forecasts are publically available, the formulas, calculations and models employed to derive them are not. As such, PwC cannot verify the robustness or reliability of these forecasts or reproduce their results.

Access Economics' forecasts were adjusted in order to allow for wage increases mandated in EUCA. This included a 1.3 per cent real wage (4.5% less project inflation) increase in September 2008, a 2.6 per cent increase in September 2009 and a 1.5 per cent increase in September 2010.

The AER drew a distinction between specialist and general labour resources in determining the labour cost escalators. ENERGEX considered specialist labour to include qualified electricians, electrical engineers or specialist non-qualified workers. General labour included project managers, others engineers and other ancillary staff (e.g. data entry, community liaison). On this basis the AER accepted ENERGEX's submission that 95 per cent of labour costs relate to specialist labour, while 5 per cent relate to general labour.

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[31] AER Draft Decision – Appendix H (page 608).

These weightings were applied to Access Economics' wage forecasts, for specialist and general labour respectively, to determine composite labour cost escalation rates. These rates are reproduced below.

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
ENERGEX's proposed labour cost escalation rates – real	2.03	3.05	3.05	3.05	3.05	3.05	3.05
AER labour cost escalation rates – real	-0.03	2.51	0.69	0.57	1.20	1.56	1.54

Contractors

In accordance with the foregoing, the AER relied upon Access Economics' wage forecasts to determine the cost escalation rates for contract labour. These forecasts were weighted according to the estimated proportion of contract labour being specialist or general labour. The weightings, 79 and 21 per cent respectively, were provided by ENERGEX.

The AER did not adjust the wage forecasts in accordance with the terms of the EUCA on the basis that, given the EUCA does not apply to contractors, such adjustments were not considered appropriate.

The AER's contract labour escalation rates are reproduced below.

	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
ENERGEX's proposed contract labour cost escalation rates – real	2.03	3.05	3.05	3.05	3.05	3.05	3.05
AER's contract labour cost escalation rates - real	0.77	1.38	0.14	0.58	1.17	1.54	1.53

Land and easements

The AER tested the reasonableness of ENERGEX's land and easements escalation rates with reference to a historical annual growth rate. The historical growth rate was based on Queensland land value data published by the ABS.[32]

The AER considered ENERGEX's escalation rates to be conservative considering the historical trend. The AER also acknowledged that the STS modelling approach adopted by

[32] AER Draft Decision – Appendix H (page 582).

ENERGEX was a more rigorous approach to land forecasting than the AER's historical averaging. ENERGEX's approach however was not adopted by the AER on the basis that, given model diagnostics were not provided, the AER could not verify the robustness of the modelling.

Considering the above, the AER adopted ENERGEX's proposed escalation rates which are reproduced in the table below.

AER land & easement escalation rates	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
ENERGEX's proposed land & easements escalation rates – real	2.0	2.0	2.0	2.0	2.0	2.0	2.0
AER's land & easement escalation rates - real	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Inflation	1.5	2.5	2.25	2.5	2.5	2.5	2.5

Appendix B Model diagnostics

This appendix provides the model diagnostics for all forecasting models used by PwC in establishing our proposed cost escalation rates.

Labour

The diagnostics for the forecast model used to establish PwC's specialist labour costs escalation rates are provided in the table below.

Specialist labour cost forecast model diagnostics

State Variable/Test Statistic	
μ_t	325.21 (12.3)
β_t	63.20 (3.25)
ψ_t	1.24 (0.32)
Model Diagnostics and Goodness-of-fit Measures:	
SE (Std. Error)	32.25
R_d^2 (Coefficient of Determination)	0.87
DW (Durbin-Watson test for Serial Correlation)	1.99
Q (Box-Ljung test for residual serial correlation)	0.25
N (test for normality)	6.25
H (test for heteroscedasticity)	0.14

The diagnostics for the forecast model used to establish PwC's general labour costs escalation rates are provided in the table below.

General labour cost forecast model diagnostics

State Variable/Test Statistic	
μ_t	525.21 (6.30)
β_t	21.20 (4.25)
ψ_t	0.99 (0.02)

Model Diagnostics and Goodness-of-fit Measures:	
SE (Std. Error)	12.35
R_d^2 (Coefficient of Determination)	0.56
DW (Durbin-Watson test for Serial Correlation)	1.98
Q (Box-Ljung test for residual serial correlation)	0.23
N (test for normality)	0.65
H (test for heteroscedasticity)	0.38

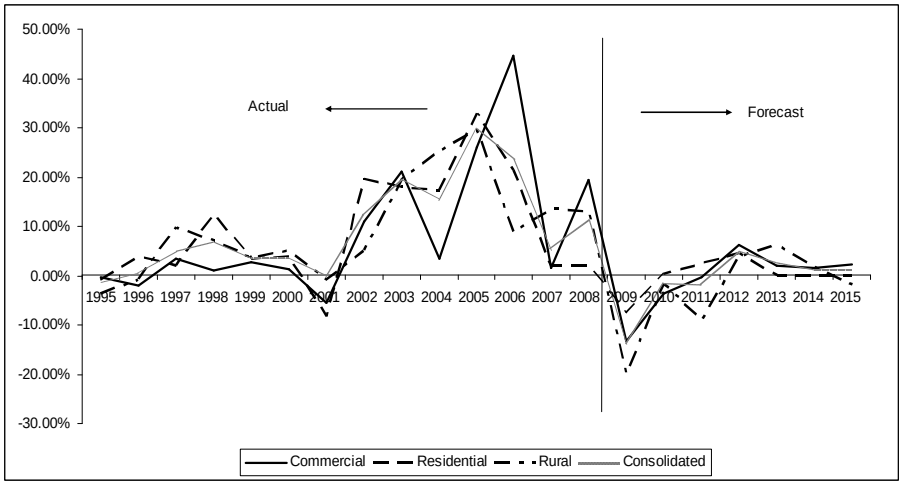
The test statistics relating to the diagnostics relating to the diagnostics for the general labour costs model all pass indicating that the model is robust and well specified.

Land & easements

As noted above, STS analysis informed the final recommendation put forward by KPMG, although it was not the sole source of information used by KPMG. Notwithstanding, the purpose of this section is to attempt to replicate KPMG's forecasts using the STS method, and having done so, to report the associated model diagnostics and goodness-of-fit tests.

The forecasts reported by KPMG in its report to ENERGEX are summarised in the table below.

Figure 2.1 Land and Easement Forecasts Developed by KPMG



Using the historical data summarised in the above figure a STS model of the form outlined below was used to generate forecasts:

$\text{Land Prices}_t = \mu_t + \psi_t + u_t$	1

where y_t denotes the dependent variable (land prices by category – commercial residential and rural) μ_t denotes the stochastic trend, and ψ_t the cyclical components of the dependent variable. The model was able to replicate the KPMG forecasts with a reasonable degree of accuracy. The results show that the models are well-specified as they pass the critical test for serial correlation (*Q*), normality (*N*) and heteroscedasticity (*H*). These tests represent the critical diagnostic tests and provide guidance on whether on or not a model can be judged as statistically robust.

February 2010

Appendix 3.0

Response to aspects of the Draft Determination Strategic Finance Group – February 2010

Response to aspects of the Draft Determination

Report prepared for ENERGEX and Ergon Energy

2 February 2010

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Contents

Overview

1. The Strategic Finance Group: SFG Consulting (SFG) has been engaged by ENERGEX Ltd and Ergon Energy Corporation Ltd to provide expert opinions on several matters in relation to the AER's determination for the Queensland DNSPs. Specifically, we have provided two reports to the AER on this matter:

    a. Strategic Finance Group, 2009, "The reasonableness of regulatory estimates of the cost of equity capital," 28 May 2009; and

    b. Strategic Finance Group, 2009, "Consistency of regulatory assumptions in relation to debt hedging costs," 28 August 2009.

2. The AER's recent Draft Determination discusses some of the points raised in the SFG submissions. This short report responds to the Draft Determination insofar as it relates to the SFG submissions.

1. Debt hedging costs

Overview

3. The Draft Determination notes that:

> The Qld DNSPs regulatory proposals included statements concerning hedging costs. The Qld DNSPs submitted that it would be prudent for a benchmark efficient network service provider to manage interest rate risk by hedging a portion of that risk on future borrowings.[1]

4. The Draft Determination also notes that:

> The Qld DNSPs submitted that hedging against interest rate movements is important; that not doing so is likely to expose them to significant costs; and these costs could have other repercussions upon the DNSPs (particularly their ability to maintain credit ratings).[2]

5. Specifically, the Queensland DNSPs submitted that it would not be possible for a benchmark distribution business to:

   a. maintain the assumed BBB+ credit rating; while

   b. gearing up to the assumed 60% debt finance; while also

   c. failing to hedge the possibly substantial interest rate risk to which they are exposed.

6. The Queensland DNSPs provided estimates of the likely costs of hedging interest rate risk and proposed that the businesses and the AER jointly develop a methodology for incorporating them into the operating cost allowance within the regulatory framework.

7. The Draft Determination rejects the DNSPs proposal to include an allowance for debt hedging costs in their operating expense allowance for the following reasons:

   a. **Legal technicalities**: The Draft Determination concludes that a proposed operating cost must have a specific proposed value for the AER to assess. In the case at hand, the DNSPs had not included a specific amount in their operating cost proposals, but rather had proposed that they jointly (with the AER) develop an approach for incorporating this expense. The AER has rejected this approach and assessed the proposed operating costs as though debt hedging costs were set to zero. The Draft Determination also notes that any estimate of operating costs must apply to the regulatory control period – which technically begins subsequent to the averaging period used to estimate the risk-free rate and debt risk premium.

   b. **Means of allowing for debt hedging costs**: The Draft Determination concludes that debt hedging costs should be included as an adjustment to the estimated WACC rather than as an operating cost.

[1] Draft Determination, p. 177.
[2] Draft Determination, p. 177.

c. **Need for hedging not proven by the DNSPs**: The Draft Determination concludes that the DNSPs have not proven that there is a need to hedge interest rate risk.

8. The SFG Report does not consider legal technicalities, so we do not address that here. In the remainder of this section, we address the two economic reasons set out in the Draft Determination.

Means of allowing for debt hedging costs: operating costs vs. adjustment to WACC

9. The Draft Determination concludes that:

> Any allowance for the risk of higher interest rates on future borrowings must either be a risk premium allowance for risk currently borne by equity providers and/or an allowance for higher expected costs (required return) on debt in future. As such, the claims for hedging costs are actually a risk premium related to an investment in either equity capital and/or debt capital.[3]

10. The Queensland DNSPs have submitted that:

a. They do hedge interest rate risk;

b. That their stakeholders expect or require them to hedge this risk;

c. That their credit rating agencies expect or require them to hedge this risk;

d. That other DNSPs hedge this risk; and consequently that

e. The benchmark DNSP would hedge this risk.

11. That is, the interest rate risk should be hedged and has been hedged – so the providers of capital are not exposed to it. They require no return as compensation for this risk, because it has been hedged as part of prudent business operations. In this respect, the cash cost of hedging interest rate risk is similar to any other form of insurance – it is prudent for a firm to eliminate exposure to certain risks by paying an insurance premium in relation to it. This removes the exposure to that risk for the firm and its debt and equity holders, who consequently require no return as compensation for it.

12. Since:

a. The cash flow required to hedge interest rate risk can be estimated;

b. Hedging this risk is common and prudent business practice; and

c. Once the risk is hedged, providers of capital require no additional expected return in relation to it,

the only logical way of incorporating these costs is as an operating expense and not as an adjustment to the WACC.

[3] Draft Determination, p. 180.

Proof of the need to hedge interest rate risk

13. The Draft Determination concludes that:

> The AER considers that insufficient evidence has been provided by the Qld DNSPs to support their argument that a benchmark firm could not remain unhedged and maintain a BBB+ cost of debt at a 60 per cent debt to 40 per cent equity ratio.[4]

14. The submission on this point from the DNSPs considered a scenario in which interest rates increased by 2% after one year of the regulatory control period and then decreased by 0.5% per year for the remaining years of the regulatory control period. The DNSP submission examined the key financial ratio benchmarks that have been published by Standard and Poor's, including interest coverage, leverage, and profitability ratios. The submission showed that in this scenario, the key financial ratios would deteriorate to the extent that they would fall short of the benchmarks required to maintain a BBB+ credit rating. That is, interest rate hedging would be required to maintain the BBB+ credit rating in this scenario.

15. The Draft Determination states that the AER considers this to be insufficient evidence in support of the proposition that interest rate hedging must be in place for the benchmark DNSP to maintain a BBB+ credit rating with 60% gearing. The Draft Determination proposes a number of reasons in support of this conclusion, each of which is considered below.

Rating agencies would maintain BBB+ credit rating even without hedging

16. The first basis for the AER's conclusion that the DNSPs have provided insufficient evidence is that:

> The AER notes that the relatively stable cash flows of regulated businesses (business profile) means that they might be able to maintain a given credit rating with lower cash flow coverage and higher capital structure than most other businesses in the economy.[5]

17. Even to the extent that regulated businesses can maintain a high credit rating with high leverage due to their business profile, this does not imply that every regulated business will maintain a constant credit rating regardless of how much its key financial ratios deteriorate. That is, the AER cannot mean that its assumed BBB+ credit rating will be maintained irrespective of *any* deterioration in the key financial ratios that are the basis of Standard and Poor's ratings. There must be some point at which the key financial ratios deteriorate to the extent that the BBB+ credit rating would be lost. Indeed some comparable firms have reached that point already and have been rated BBB. The central question is whether an unhedged change in interest rates would cause the key financial ratios to deteriorate sufficiently to put the BBB+ rating in jeopardy.

18. The Draft Determination simply asserts that the assumed credit rating would be maintained, even if interest rates were not hedged and increased.

19. By contrast, the submission from the Queensland DNSPs calculates the key financial ratios in the event of an unhedged interest rate rise, and compares these values against the utilities benchmarks for a BBB+ credit rating published by Standard and Poor's.

[4] Draft Determination, p. 181.
[5] Draft Determination, p. 181.

20. It is not clear from the Draft Determination why this evidence is not sufficient to overturn the AER's assertion that the BBB+ credit rating would be maintained even in the event of an unhedged increase in interest rates, or what evidence, if any, could be presented to overturn this assertion.

DNSPs would hedge even if not compensated

21. The second basis for the AER's conclusion that the DNSPs have provided insufficient evidence is that:

> The AER considers that not providing explicit compensation for hedging will not create disincentives for firms to hedge against interest rates.[6]

22. That is, the AER considers that it need not compensate the businesses for debt hedging costs because the businesses may choose to hedge even if not compensated for the costs of doing so. In our view, it is highly likely that the businesses would hedge against interest rate movements even if not compensated, as this is prudent business practice. However, the same can be said of *all* insurances. For example, the businesses would insure against property damage even if the regulator did not allow them to be compensated for it.

23. The question is not whether the businesses would pay an insurance premium even if the regulator did not allow them to be compensated for it, but rather whether the particular insurance premium is a reasonable and prudent expense for the benchmark DNSP.

DNSPs would not hedge even if compensated

24. The third basis for the AER's conclusion that the DNSPs have provided insufficient evidence is that:

> The DNSPs may choose not to hedge regardless of any allowance.[7]

25. Of course, this can be said about any allowance. Again, the relevant question is whether debt hedging costs are a legitimate expense of a prudent benchmark DNSP – not whether a particular DNSP may elect not to incur the expense even if it is included in the operating expenses.

26. Moreover, this reasoning is quite inconsistent with the previous reasoning. That is, the Draft Determination seeks to disallow debt hedging costs on the basis that:

    a. The DNSPs are likely to hedge even if no allowance is made; but that

    b. Even if an allowance is made, the DNSPs may elect to not hedge.

Equity investors already compensated for risk

27. The fourth basis for the AER's conclusion that the DNSPs have provided insufficient evidence is that interest rate risk is a risk:

[6] Draft Determination, p. 181.
[7] Draft Determination, p. 182

> …that equity investors in these firms appear to be already compensated for.[8]

28. The suggestion here is that the estimated equity beta includes an allowance for the risk that interest rates may increase, thereby deteriorating the firm's key financial ratios and threatening its credit rating. This argument is based on the supposition that the comparable firms on which the equity beta estimate is based do not hedge and are exposed to the same interest rate risk that would apply to the benchmark DNSP if it also did not hedge. However, it is standard for these businesses to hedge this type of risk so that they do not remain exposed to changes in interest rates. Consequently, the beta estimates for these comparable firms are not affected by unhedged interest rate risks.

[8] Draft Determination, p. 182

2. Reasonableness of the allowed return on equity

Overview

29. The Draft Determination notes that the Queensland DNSPs submitted a report from SFG on the reasonableness and plausibility of the relative allowed returns on debt and equity in the AER's Statement of Regulatory Intent. The Draft Determination notes that the SFG report makes three key points:[9]

    a. The parameter estimates in the SORI imply that the allowed return on unlevered equity in the benchmark DNSP is lower than the allowed return on debt;

    b. The parameter estimates in the SORI imply that the allowed return on levered equity in the benchmark DNSP that is available to non-resident investors is lower than the allowed return on debt to those same investors; and

    c. The parameter estimates in the SORI imply that the allowed return on equity in the benchmark DNSP is lower than in any pervious regulatory determination, even though the market circumstances at the time imply a relatively high required return on equity.

30. The Draft Determination generally agrees with the SFG Report in terms of the relativities set out above, but concludes that it is not unreasonable or economically implausible that:

    a. The return to unlevered equity is lower than the return to fixed rate investment grade debt in the same firm;

    b. That the return to shareholders in a firm is lower than the return to debtholders in the same firm; or

    c. That the estimated required return on equity is lower than for any previous determination under the Australian regulatory framework.

31. The remainder of this section considers each of these points in turn.

Relative return on debt and unlevered equity

32. The SFG Report shows that the parameter estimates in the SORI imply that the return to unlevered equity is lower than the return available to debt holders in the benchmark firm. The SFG Report concludes that:

> The proposed parameters imply that an unlevered benchmark firm could fund itself entirely with equity with a required return that is dramatically lower than the fixed rates that are currently available on very highly rated debt.[10]

33. The SFG calculations use the AER's unlevering approach set out in the SORI and the conclusions hold whether one uses CBA Spectrum or Bloomberg data to estimate the required return on debt.

[9] Draft Determination, p. 237-238.
[10] SFG Report, p.18.

34. The SFG Report concludes that:

> …the required return on unlevered equity must be higher than the required return on fixed-rate contractual debt in the same firm. If this were not true, it would be cheaper for the firm to have 100% equity finance than to employ any debt finance at all.[11]

35. Moreover, if it is the case that the required return on unlevered equity is lower than the cost of debt finance, it follows that the AER's assumed capital structure of 60% debt cannot be optimal or efficient – because the cost of capital could be reduced by increasing the proportion of equity finance.

36. The Draft Determination[12] accepts that the parameters in the SORI imply that the required return on unlevered equity in the benchmark DNSP is lower than the required return on debt in the benchmark DNSP. However, the Draft Determination argues that no adjustments are required in relation to this. Each of the AER's reasons for this conclusion is discussed below.

Unable to observe unlevered electricity business

37. The Draft Decision states that:

> Although SFG's manipulation of the CAPM formula may be correct it is merely a theoretical return and cannot be tested against the market as there is no electricity business which currently trades in the Australian stock market.[13]

38. We note that the SFG Report takes the parameter estimates from the SORI and applies the AER's unlevering formula from the SORI to obtain the required return on unlevered equity. This is a mechanical procedure and requires no judgment or subjectivity. There is a unique unlevered equity return implied by, and consistent with, the parameter estimates of the SORI. That is, the SORI effectively sets out what the unlevered return on equity is assumed to be. The SFG Report simply compares this with the assumed return on debt and comments on the reasonableness of that relativity.

39. The Draft Determination then suggests that this is "inappropriate" because there is "no electricity business which currently trades in the Australian stock market." However, the AER has based its beta estimate on a set of comparable firms that *do* currently trade in the Australian stock market, so its claim that there are no such businesses is curious.

40. But in any event the existence or not of such firms is irrelevant. There is a single unique unlevered return on equity that is implied by and consistent with the parameter estimates set out in the SORI. The reasonableness and plausibility of this unique estimate can be compared against the estimated return on debt without reference to any particular listed firm.

Required return on unlevered equity should be lower than required return on debt

41. The Draft Decision actually contends that the required return on unlevered equity *should* be lower than the required return on (BBB+) debt in the same firm – even though this is clearly

[11] SFG Report, p.2.
[12] Draft Determination, pp. 243-244.
[13] Draft Determination, p. 243.

impossible as a matter of the most basic notions of finance, and as a matter of common sense. We quote the Draft Determination so there can be no mistake about this:

> …it is unsurprising that a debt investor in a BBB+ business is likely to require a higher equity return than an equity investor in an unlevered business.[14]

42. Debt holders in the benchmark firm receive a fixed return with a schedule of guaranteed payments. The only risk to a debt holder who holds the debt to its maturity is that the business may default. In this case the debt holders are entitled to receive all of the assets of the firm before there is any payment to the residual equity holders.

43. Now consider the same firm financed by 100% equity. The shareholders in this firm have no guaranteed or promised return at all. There is no maturity date for their investment and there is no promise to ever repay that investment.

44. Under any view of the matter, the risk to debt holders is substantially lower than the risk to unlevered equity in the same firm. Indeed, the debt holders face no risk whatsoever, other than that the firm may default on its promised payments. Consequently, we examine that scenario in more detail. Consider first a levered firm in which the debt holders have provided $60 of capital and the equity holders have provided $40 of capital.

45. Now suppose that the value of the firm's assets falls to $50. In this case, the debt holders are paid $50, in which case their return is -17%. Now suppose the same firm was unlevered so that equity holders had supplied the entire $100 of capital. In the case where the value of the firm's assets falls to $50, the shareholders have an investment worth $50, which represents a return to them of -50%.

46. It simply must be the case that the risk to unlevered equity is greater than the risk to fixed rate investment grade debt in the same firm. In our view, the Draft Determination is wrong to suggest that the opposite is, or can ever possibly be, true.

Investors may prefer CGS or AAA-rated bonds

47. The Draft Decision states that:

> The AER considers that SFG has not explained why an investor willing to invest in an unlevered business would invest in BBB+ bonds. It could be argued that such an investor would instead prefer to invest in lower risk debt instruments such as CGS or AAA rated bonds.[15]

48. The SFG Report shows that:

    a. the parameter estimates set out in the SORI produce a unique unlevered return on equity;

    b. that unlevered return on equity is lower than the estimated return on debt; and that

[14] Draft Determination, p. 245.
[15] Draft Determination, p. 246.

c. such a relativity is impossible because unlevered equity must be riskier than fixed rate investment grade debt.

49. That is, the unique required returns on debt and unlevered equity are drawn from the SORI, and their relative values are implausible. There is no need to consider any particular investor or whether they may prefer to buy AAA rather than BBB+ bonds. Such considerations are clearly irrelevant. This issue is not complex, it is not complicated, and it is not subjective. The SORI implies that the return on unlevered equity is lower than that on investment grade debt, which is impossible.

AER's cost of equity is correct and market estimates of the cost of debt are wrong

50. The Draft Decision contends that the AER's estimate of the unlevered return on equity is correct and it is actually the debt yield estimates published by CBA Spectrum and Bloomberg that are unreasonable and implausible since they report yields above the AER's estimate of the unlevered return on equity.[16]

51. This is extraordinary.

Relative return on debt and levered equity for non-residents

52. The SFG Report shows that the parameter estimates set out in the SORI imply that non-resident investors could obtain a substantially higher return on investment grade debt in the benchmark firm than on residual levered equity in the same benchmark firm. The Draft Decision agrees with SFG's calculations (and repeats those calculations using different inputs[17]) and appears to accept that the required return on levered equity must be greater than the required return on debt in the same firm. However, the Draft Determination concludes that the parameter estimates can stand unchanged and provides a series of reasons in support of that conclusion. Those reasons are addressed in turn below.

Franking credits can be of value to non-resident investors: Withholding tax

53. The Draft Determination proposes that some non-residents may actually receive some benefit from franking credits:

> …not all non-residents would receive the lower return on equity due to inter-regional arrangements as considered by Handley and Maheswaran.[18]

54. Handley and Maheswaran (2008) show that franking credits are of no value to tax exempt institutions such as US pension funds (their Type I non-residents), of no value to any non-residents from countries that have double tax agreements with Australia (their Type II non-residents), and of some benefit to non-residents from countries that have no double tax agreements with Australia (their Type III non-residents). Consequently, consideration of this point hinges on the extent to which Australia has entered double tax agreements with the major suppliers of investment capital.

[16] Draft Determination, p. 244.
[17] Draft Determination, p. 242.
[18] Draft Determination, p. 242.

55. A quick search of Australia's double tax agreements indicates that Australia does have agreements with countries such as the US, UK, Japan, China, India, Russia, Canada, Germany, France, and so on. Australia does not have double tax agreements with North Korea, Iran, or Iraq.[19]

56. There can be no suggestion that the effect of countries with which Australia does not have double tax agreements has a material effect. In any event, the illogicality of having parameter estimates that imply that investors require higher returns from first-ranking investment grade debt than they require from residual equity in the same firm still applies. The only change is that instead of applying to "non-residents," it would apply to "non-residents from countries such as the US, UK, Japan, China, India, Russia, Canada, Germany, France, and so on."

Franking credits can be of value to non-resident investors: Sale to resident investors

57. The Draft Determination contends that:

> …non-residents may be able to capitalize the benefits of future imputation credits if the stocks owned are sold to resident investors. Therefore, the average non-resident investor's return on equity is likely to be higher when the average benefit from the imputation credit is included.[20]

58. If gamma is assumed to be greater than zero, this implies that the value of all future franking credits is capitalized into the stock price. That is, as Officer (1994) shows, the stock price can be written as:

$$Stock\ \ Price = PV\left(Future\ \ dividends\right) + PV\left(Future\ \ franking\ \ credits\right)$$

59. When any investor, including non-resident investors, buys a share they must pay the capitalized value of all future franking credits. When they subsequently sell the share they will receive the capitalized value of all future franking credits at that time. The net effect of this is that the investor has paid for the franking credits that were distributed during their tenure as a shareholder. If the investor is a non-resident and obtains no value from franking credits, that investor will have paid for franking credits that are of no value to them. Consequently, whatever their tenure as a shareholder, non-resident investors will not receive the full return as they have paid for the franking credits that are distributed while they hold the stock yet they receive no benefit from them.

60. Officer (1994) shows that the effect of this is to reduce the return received by non-residents relative to the return received by residents by a factor of $\frac{1-T}{1-T(1-\gamma)}$. This applies whether the shareholder holds the stock for one year or 100 years. The derivation of it is independent of the time the investor holds the stock. It simply recognizes that during their tenure as shareholders, however long that may be, non-residents receive a proportionally lower return than do resident investors. To the extent that gamma is assumed to be greater than zero, both have paid for the franking credits received during their tenure as shareholders, but non-resident investors receive no value from them.

[19] A full list of Australia's tax treaties can be found at http://www.treasury.gov.au/documents/625/XLS/Australian_Tax_Treaty_Table_November_2009.xls

[20] Draft Determination, p. 242

61. The proportionality factor from Officer (1994) set out above is independent of the time the investor holds the stock. It also accounts for the fact that whatever assumption is made about the capitalized value of franking credits when buying the stock, the same applies when selling the stock. The Draft Determination is in error when it contends the opposite. Moreover, these are matters of mathematical derivation and logic, not opinion.

62. Finally, we note that, in any event, the Draft Determination concludes that this effect is likely to be so small that the complexity of estimating it would "more than likely outweigh the benefits of accounting" for it.[21] In our view it is the *error* of making an adjustment for something that has already been factored into the mathematical derivation that is the primary consideration.

Diversification benefits

63. The Draft Determination contends that:

> …the investor assumed in SFG's analysis may be willing to accept a lower return on equity for the purposes of portfolio diversification. That is, the volatility of returns from equity in an electricity DNSP may be lower relative to the market and therefore the investor is willing to accept a lower return on this equity. This is reflected by the equity beta of 0.8…[22]

64. This passage displays a very serious lack of understanding of the most basic principles of finance and is demonstrably inconsistent with the AER's own use of the CAPM to estimate required returns. It is simply wrong.

65. Portfolio diversification has nothing whatsoever to do with volatility. Portfolio diversification and beta are concepts of correlation (the relationship between the returns on a particular stock and returns on a portfolio) and not volatility. Stocks with very high volatility, but low correlation, can have low betas and provide high diversification benefits. Stocks with very low volatility, but high correlation, can have high betas and provide low diversification benefits. The contention that diversification benefits and beta are based on volatility is an error of fact.

66. But even if the Draft Determination was not wrong about this, the point is irrelevant anyway. Whether the assumed beta is high or low, and regardless of the reasons for that, the CAPM simply determines the total required return on equity. The point here is that non-resident investors will receive only a portion of that total required return. That is, the question is not about whether the required return from the CAPM is high or low – rather, the question is about how much of that required return will be received by non-resident investors.

Historical comparisons

67. The SFG Report concluded that:

> The AER's proposed estimate of the required return on equity [set out in the SORI] is lower than any estimate over recent decades. Our view is that this reduction in the estimated required return on equity is not reasonable or plausible. The reasons for this conclusion are:

[21] Draft Determination, p.242.
[22] Draft Determination, p. 242

> Dividend yields are at historically high levels, and the finance literature has established a relationship between dividend yield and required return on equity;
>
> Debt spreads are at historically high levels, and the finance literature has established a relationship between debt spreads and required return on equity;
>
> Option implied volatilities are at historically high levels, and the finance literature has established a relationship between implied volatility and required return on equity; and
>
> Discounted cash flow models imply high (not historically low) required returns on equity.[23]

68. The Draft Determination notes that the proposed estimate of the required return on equity (based on the parameters set out in the SORI) is lower than at any point in recent decades, but concludes that it is not unreasonable or implausible that investors' required returns on equity capital were extremely low in the first half of 2009. The Draft Determination criticizes the SFG Report for suggesting that it is "self-evidently economically unreasonable and implausible" that the cost of equity capital was at a minimum during a period of financial crisis.[24] The reasons put forward in the Draft Determination are discussed in turn below.

Decline in risk-free rate

69. The Draft Determination discusses the reasons why the AER has set the required return on equity at the lowest level in decades as follows:

> SFG's analysis implied that the SORI is the major cause of the dramatic reduction in the return on equity in approximately 2009…However the main driver behind SFG's figure is the change in the risk-free rate.[25]

70. The SFG Report did not disaggregate the reduction in the allowed return on equity into that which is attributable to each parameter. Rather, the SFG Report simply:

a. noted that the collection of parameter estimates set out in the SORI provides for an allowed return on equity that is lower than at any time in decades; and

b. questioned whether this is reasonable or plausible given that conventional view was that at this time the required return on equity was very *high*.

71. That is, the collection of parameter estimates adopted by the AER in the SORI implies an allowed return on equity that is lower than at any time in decades, and this is economically unreasonable and implausible in the circumstances. The only question then is whether it *matters* that the allowed return on equity has been set at a level that is implausibly low in the circumstances. If it does matter, the allowed return on equity should be increased. If it does not matter, no change is required.

[23] SFG Report, p. 2.
[24] Draft Determination, p. 244.
[25] Draft Determination, p. 244.

72. The Draft Determination's discussion about changes in the risk free rate is a side issue. But in relation to that, we note that all of the parameter estimates in the SORI were selected by the AER, including the estimate of the risk free rate. We also note that the JIA submission to the Review of WACC Parameters proposed that the 10-year CGS yield is a downwardly-biased estimate of the CAPM risk-free rate in the circumstances, but that this submission was rejected by the AER. That is, the SORI contains the AER's parameter estimates, and these parameter estimates produce an allowed return on equity that is implausibly low in the circumstances.

Increase in estimate of market risk premium

73. In the Draft Determination, the AER sets out its view that the obvious increase in the required return on equity has already been accounted for via an increase in the MRP parameter from 6% to 6.5%. In our view, the AER was correct to increase the estimate of MRP in the circumstances. However, the 0.5% increase is arbitrary – it is not based on any calculations, estimations or analysis. There is nothing to suggest or explain why the appropriate increase is not 1% or 2%. The Draft Determination now suggests that the 6.5% MRP may be generous, given that option implied volatilities have decreased in recent months. Again, this presupposes that the MRP was exactly 6.5% at the height of the financial crisis, but the AER has not provided any basis for, or explanation of, how the 0.5% increase in the MRP estimate was determined.

74. Moreover, the point being made in the SFG Report is a different, and simpler, one. SFG are simply making the point that whenever the required return on equity is being estimated, one consideration is whether the final estimate is economically reasonable and plausible in the circumstances – does the final estimate make sense?

References

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Strategic Finance Group, 2009, "The reasonableness of regulatory estimates of the cost of equity capital," 28 May 2009.

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Appendix 4.0

Issues Relating to Cost of Capital
Synergies Economic Consulting – February 2010

Issues Relating to Cost of Capital

Response to AER's Draft Decision

February 2010

Synergies Economic Consulting Pty Ltd
www.synergies.com.au

Disclaimer

Synergies Economic Consulting (Synergies) has prepared this advice exclusively for the use of the party or parties specified in the report (the client) and for the purposes specified in the report. The report is supplied in good faith and reflects the knowledge, expertise and experience of the consultants involved. Synergies accepts no responsibility whatsoever for any loss suffered by any person taking action or refraining from taking action as a result of reliance on the report, other than the client.

In conducting the analysis in the report Synergies has used information available at the date of publication, noting that the intention of this work is to provide material relevant to the development of policy rather than definitive guidance as to the appropriate level of pricing to be specified for particular circumstance.

Contents

1 Introduction

ENERGEX engaged Synergies Economic Consulting (Synergies) to provide advice on three specific issues in relation to the Draft Decision by the Australian Energy Regulator (AER).[1]

The first of these issues relates to the use of taxation statistics to estimate gamma. ENERGEX and Synergies remain firmly of the belief that it is inappropriate to use taxation statistics to estimate gamma. The AER estimated gamma by relying upon two studies, one of which was a dated taxation statistics study by Handley and Maheswaran.[2] In an attempt to further understand Handley and Maheswaran's results, ENERGEX requested Synergies to update the study. The robust study undertaken by Synergies produced plausible results that were consistent with generally accepted finance principles, although the results were materially different from those of Handley and Maheswaran.

The second issue addressed in this report concerns the estimation of inflation over a ten year time horizon. Expected inflation can be estimated from market data when the market is deep and liquid, producing credible price signals. When this is not the case then forecasts must be used. There is a concern that the AER may use market data when illiquid trading results in estimates that are not robust.

The last issue addressed in this report is the estimation of the debt margin for a BBB+ rated business. ENERGEX is of the view that the most appropriate approach is to use the average of the debt margin quoted by the two main independent data providers in Australia. The AER has sought to develop a model to determine the preferred data source and additionally they are considering a model to estimate the BBB+ ten year yield. There are some issues we have identified with the AER's approach that are discussed here.

Each of these issues will be addressed in turn.

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1 Australian Energy Regulator (2009), Draft Decision, Queensland Draft Distribution Determination 2010–11 to 2014–15, 25 November 2009

2 J. Handley and K. Maheswaran (2008), A measure of the efficacy of the Australian imputation tax system, The Economic Record, vol.84, no.264, March 2008.

2 Tax Statistics

ENERGEX engaged Synergies Economic Consulting (Synergies) to undertake a taxation statistics study similar to that by Handley and Maheswaran[3]. As the period of analysis in their study ended in 2004, this study is now dated. Hence, Synergies sought to update this analysis.

Synergies did not undertake the study as a means of estimating theta as Synergies believes that a tax statistics analysis cannot be used to estimate the value of theta. A tax statistics approach estimates a ratio that can only be theta if contemporary finance theory is ignored.

In its Draft Decision[4], the AER provided a number of comments regarding the Synergies study based on analysis undertaken by its consultant, Handley. Responses to these comments are provided below.

2.1 Payout ratio

Synergies estimated a payout ratio using the taxation statistics similar to that obtained by Hathaway and Officer[5]. The payout ratio estimated by Hathaway and Officer, who also used taxation statistics, was 71%. In his advice provided to the AER, Handley accepts that firms do not in fact distribute 100% of their free cash flow:

> It is again repeated that the practice that firms usually do not distribute 100% of the free cash flow and imputation credits generated each period is not in dispute.[6]

Even though he accepts payout ratios of less than 100%, he does query the payout estimate of approximately 70%. In doing this he is disregarding the last twenty years of evidence, regarding payout ratios by Australian firms, in estimating a payout ratio to be used by ENERGEX for the coming regulatory period.

He incorrectly asserts the assumption that the credits are never distributed and then disputes this claim. The fact is that the credits will be distributed but not in the near

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[3] J. Handley and K. Maheswaran (2008), A measure of the efficacy of the Australian imputation tax system, The Economic Record, vol.84, no.264, March 2008.

[4] Australian Energy Regulator (2009).

[5] N. Hathaway and R. R. Officer (2004) The value of imputation tax credits, Report, Capital Research Pty Ltd, November 2004.

[6] J. Handley (2009), Advice on Gamma in Relation to the 2010-2015 QLD/SA Electricity Distribution Determinations, Memorandum to the AER, 20 October 2009, p. 10.

future given the twenty years of corporate behaviour. Since the introduction of dividend imputation in 1987, the payout ratio has been consistently below 100%. The effects of the time value of money and discounting results in the retained credits having a negligible value today and therefore can be safely ignored.

Handley contends that the retained cash flow can be reinvested and it will earn the firm's cost of capital. This statement is correct but irrelevant to the value of the imputation credits. Imputation credits cannot be reinvested. They are only of value to resident shareholders once the dividends are distributed. Confusing imputation credits with free cash flows, results in the erroneous conclusion by Handley that a 100% payout ratio is appropriate.

2.2 Payout ratios inferred by tax statistics

The AER and Handley agree that the actual payout ratio is less than 100%. Additionally Synergies agrees that payout ratios derived from accounting distributions of dividends will be different to the payout ratios derived from taxation statistics. Consistent with the Monkhouse definition (discussed below), the payout ratios must be estimated from taxation statistics as it is the payment of corporate taxation based upon taxable income that gives rise to the imputation credits.

The AER is under the misconception that there is double counting based upon the advice received by their consultant:

> The most critical issue with Synergies' tax study, as pointed out by Handley, is that figures obtained using company tax statistics are subject to double counting due to complex corporate structures where dividends are paid through multiple entities which consequently exaggerates the number of imputation credits distributed.[7]

If dividends were to be paid to an interposing entity and not distributed in that year then the undistributed credits would become proportionally larger through time. What happens in any one year is that some dividends are paid to an interposing entity while in the same year interposing entities distribute dividends that have not been created by them. Through time the results are broadly consistent due to the two effects countervailing one another. This provides the necessary safeguard to ensure that there has been no double counting and that the imputation credits have not been overstated.

Hence, by examining the data through time, in any one year payments may be made to an interposing entity but also credits are being claimed from an interposing entity.

[7] Australian Energy Regulator (2009), p. 210.

Without knowing who the payments are made to and who the credits are received from, adjustments to the data are not possible.

Importantly, if the data provides reasonably consistent, relative results through time, adjustments are not required as credits to interposing entities must equate to credits received from interposing entities. It is therefore extremely unlikely that double counting has occurred, and if it has, the effect would be negligible. Synergies examined the tax statistics through time and found that the results were reasonably consistent (measured on a relative basis) each year.

As a consequence, the conclusion reached by the AER regarding the payout ratio overstates the actual payout ratio. A payout ratio of 70% is certainly reasonable and consistent with the data.

2.3 Utilisation rates

Handley states:

> Synergies' estimate is clearly implausibly low, particularly considering that imputation credits have been refundable to resident individuals, super funds and certain other entities since 1 July 2000 (reflecting changes to Australian tax laws).[8]

The estimate by Synergies is consistent with expectations. The expectations are that the market places little value upon the imputation credits. This is consistent with the empirical evidence provided by SFG Consulting[9], who undertook a dividend drop-off study using market data, updating the work by Beggs and Skeels[10].

The theta 'value' derived using a tax statistics approach was greater than the value derived using market data. This is consistent with expectations and given the consistency with SFG's estimate, Synergies fails to see how the estimate is 'implausibly low'.

As a result of the advice provided by Handley, the AER stated:

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8 Australian Energy Regulator (2009), p. 208.

9 SFG Consulting (2009), Gamma: Further Evidence to Support Departure from the AER's Statement of Regulatory Intent, Report Prepared for ENERGEX and Ergon Energy, December.

10 D. Beggs and C. Skeels (2006), Market Arbitrage of Cash Dividends and Franking Credits, The Economic Record, vol.82, no.258.

> Overall, the AER considers that while Synergies has presented new information, it suffers from methodological flaws, as identified by Handley, and therefore does not constitute persuasive evidence under clause 6.5.4(g).[11]

For the reasons outlined above, Synergies does not consider that its analysis suffers from any methodological flaws. Synergies has been open and transparent and has provided all calculations, estimates, data sets and data sources to the AER. Synergies has been able to replicate some of Handley and Maheswaran's published results where its data periods overlap with Handley and Maheswaran.

ENERGEX requested access to Handley and Maheswaran's data via the AER. It is understood that this request was declined by Handley. Synergies and ENERGEX have therefore not had the opportunity to review Handley and Maheswaran's analysis, including whether they sought to make any adjustments for what Handley perceives to be 'double counting' by Synergies.

2.4 Theta inferred by tax statistics

The AER states:

> The AER notes that the same imputation credit being double counted may only be used by one investor, which would therefore potentially reduce the estimated theta.[12]

The Synergies result is consistent with that of Officer and as outlined above, Synergies believes that double counting, if any, is negligible. The AER's claim that double counting has affected the ratio of claimed credits to total credits is therefore false.

Synergies relied on the taxation statistics released by the Australian Taxation Office to estimate the credits for individuals and for funds. Synergies did not believe it appropriate to make any further assumptions than it has.

In contrast, with regard to non-residents, Handley makes numerous assumptions regarding who are the recipients, their taxation status, taxation rates, etc. Many assumptions are made with a conclusion that the utilisation rate is 7%. Synergies did not make any of these assumptions and concluded that a utilisation rate of 0% is appropriate. There is an immaterial difference between 7% based on many assumptions and 0% based upon transparent data.

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11 Australian Energy Regulator (2009), p. 209.

12 Australian Energy Regulator (2009), p. 211.

2.5 Consistency with Monkhouse definition

The AER has stated that:

> The generally accepted regulatory approach to date in Australia has been to define the value of imputation credits in accordance with the Monkhouse definition.[13]

Under the Monkhouse definition for gamma:

- the imputation payout ratio is the face value of imputation credits distributed by the firm as a proportion of the face value of imputation credits generated by the firm in the period; and
- the utilisation rate (theta) is defined as the value of distributed imputation credits to investors as a proportion of their face value.[14]

What is important with the definition is the distinction between face value and value. Value (with reference to the calculation of theta) in itself would normally be interpreted as market value while face value is not market value. This distinction is important to the claim made by the AER in stating that:

> ...the methodologies used in both studies were attempting to estimate the same value.[15]

The studies that the AER is referring to are the studies by Beggs and Skeels and Handley and Maheswaran. The Beggs and Skeels study:

> .. considers the impact of cash dividends and franking credits on ex-dividend share price adjustments.[16]

This study is an attempt to use market data to estimate the effect on value when dividends that have franking credits are paid.

The second study referred to by the AER is the tax statistics study by Handley and Maheswaran. This study in no way attempts to estimate value and is therefore inconsistent with the Monkhouse definition. This study measures the extent to which imputation credits have reduced personal taxation liabilities. This is very different to the Beggs and Skeels study. Beggs and Skeels attempt to measure the market value of

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13 Australian Energy Regulator (2009), p. 198.

14 P. Monkhouse (1997), 'Adapting the APV Valuation Methodology and the Beta Gearing Formula to the Dividend Imputation Tax System', Accounting and Finance, 37, vol. 1, 1997, pp. 69-88

15 Australian Energy Regulator (2009), p. 204.

16 D. Beggs and C. Skeels (2006), p. 1.

the ability to offset credits while the Handley and Maheswaran study measures the proportional offset of personal taxation liabilities given the credit.

ENERGEX (and others) has previously argued that the Handley and Maheswaran study is inappropriate to rely upon to measure value as it completely ignores market value. In no way can this method be used to measure market value or to even proxy market value. It ignores the fact that risk adverse investors are placed 'at risk' to earn dividends. There is not a one-for-one relationship between the cost of acquiring shares and the probability of earning a return on those shares. Ignoring the risk-return relationship that underpins much of modern finance theory overstates the value of theta.

2.6 Deficiencies in using tax statistics

The AER states:

> The AER acknowledges that tax statistics are based upon book values which may not reflect the market. That said, consistent with the AER's approach to gearing in the WACC review, the AER considers that book values can be used as a proxy for market values.[17]

As stated earlier, the tax statistics approach is not a value-based approach. It is a ratio of the claimed imputation credit to the created and distributed imputation credit. It is not a proxy for market value as it does not attempt to be a measure of or reflective of this value.

The AER uses book values as a proxy for market values where either:

- market values are not obtainable (which they are in the case of theta); or
- the book value is a reasonable proxy for market value, as in say, the case of gearing.

The ratio based upon taxation statistics is not even a book value measure of theta.

The AER goes on to state:

> That said, Energex and Synergies were silent on the fact that the payout ratio of 71 per cent for imputation credits has been derived from tax statistics rather than from a market-based estimate.[18]

[17] Australian Energy Regulator (2009), p. 209.

[18] Australian Energy Regulator (2009), p. 209.

ENERGEX and Synergies are not silent about the payout ratio. Referring to the definition of payout ratio by Monkhouse, face values are used for this element of gamma. This is exactly what Synergies has done to estimate the payout ratio. It is not a matter of being silent but rather following the definition for payout ratio used by the AER.

The AER also states:

> The AER considers this inconsistency calls into question their concerns about non-market based estimates.[19]

ENERGEX and Synergies believe that their approach of estimating the payout ratio using face values while rejecting the use of taxation statistics to value theta is perfectly consistent with the Monkhouse definition, which requires the payout ratio to be derived using face values and for theta to be estimated using market values.

2.7 Conclusion

Synergies undertook a taxation statistics study in which it made clear that use of this data was not the appropriate methodology to estimate gamma. The study was undertaken as the AER relied upon this approach in reaching their estimate of 0.65. Importantly the taxation statistics result places an unattainable, unrealistic limit to what value theta could take.

The results obtained by Synergies were consistent with expectations, previous published studies and also consistent with the results of the study relied upon by the AER where the data periods overlapped. The assumptions made by Synergies were not the same as the assumptions made by Handley and Maheswaran. Synergies has been unable to replicate all of the results produced by Handley and Maheswaran as access was denied to their data.

Synergies believes that its transparent taxation study:

- is robust;
- does not suffer from methodological issues claimed by Handley;
- has demonstrated that double counting is not a valid criticism; and
- seriously calls into question the persuasiveness of evidence relied upon by the AER to raise the value for gamma based on the Handley and Maheswaran study.

[19] Australian Energy Regulator (2009), p. 209.

3 Inflation

In its draft determination in relation to ENERGEX, the AER has flagged that consideration may be given to changing its method used to estimate expected inflation prior to the final determination. This in turn has been prompted by the re-commencement of the Commonwealth Government's issuance of indexed bonds. Synergies has been asked to consider any issues for ENERGEX arising from this potential change.

3.1 Background

Expected inflation is not a parameter relevant to the determination of WACC. It is, however, used in the post–tax revenue model (PTRM). Clause 6.4.2(b)(1) of the National Electricity Rules (NER) states that the PTRM must specify:

> …a method that the AER determines is likely to result in the best estimates of expected inflation.

The AER has specified the method to estimate inflation over a ten year period by applying the RBA's short-term inflation forecasts (which currently extend out to two years) and combining this with the mid-point of the target inflation band (2.5 per cent) for the remaining eight years. A geometric average inflation rate is calculated from this data.

Historically, expected inflation had been calculated by applying the Fisher equation to the yield on nominal ten year Commonwealth Government Securities (CGS) and indexed ten year CGS yields. This method was appropriate while the market for both types of securities was extremely liquid.

The Commonwealth Government ceased issuing indexed CGS in 2003. Hence, the supply of indexed CGS has been limited with trades in the market having decreased, which increases the likelihood that the market for these securities is a poorly functioning market due to the effect upon the price discovery process (discussed below). If this is the case, any analysis which uses the Fisher equation technique applied to market data to derive forecast inflation would be unreliable. The AER has stated that while credible market-based data is not available, it will estimate forecast inflation from RBA forecasts and targets.

In 2009, the Commonwealth Government announced that it will recommence issuing indexed CGS. In the draft determination, the AER has therefore flagged that it will review the use of this method prior to the final determination:

> *The AER considers that, while the yields from indexed CGS are likely to be unreliable for the purposes of this draft decision due to the limited supply of these securities, it will re-examine this issue for the final decision*[20].

While the AER recognises the potential liquidity issues that could prevent the application of this method, this still creates some uncertainty for ENERGEX.

3.2 Issues in relying on indexed CGS data

The problem is that currently there is some trading of indexed CGS but it is unknown if the data available is credible. Importantly, if it is not credible then the forecast inflation estimate will not be 'the best estimate of expected inflation'. The data will not be credible if the price discovery process has been affected by the lack of trading of the indexed CGS. It is not clear if and how the AER will seek to assess this.

3.2.1 Price Discovery Process

Price discovery is the general process used in determining market prices. It is the result of the interactions of buyers and sellers operating in an open and free marketplace. The result of an efficient price discovery process is that the resulting price is one that would be negotiated in an open and unrestricted market between a knowledgeable and willing but not anxious buyer and a knowledgeable and willing but not anxious seller acting at arm's length within a reasonable time frame.[21]

If interference occurs then the price discovery process breaks down. A common interference is low trading volume or thin markets. Where markets are thin, observed prices can be quite different to 'true' prices. Little confidence can be placed in the observed price as it is a result of an inefficient process. The observed price will not reflect one that would be negotiated in an open and unrestricted market between a knowledgeable and willing but not anxious buyer and a knowledgeable and willing but not anxious seller acting at arm's length. Additionally, prices will not reflect available information or current market conditions. Inefficient prices cannot be validly analysed to examine factors affecting either supply or demand. The result is that any estimate of forecast inflation will be a poor estimate.

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[20] Australian Energy Regulator (2009), pp..279-280.

[21] A commonly accepted concept for market value when used in independent valuations of shares and businesses.

3.2.2 Credible data

It is important, when using market data, to be able to identify when the data is not credible and therefore when it can and cannot be used to reliably estimate forecast inflation.

There is no generally accepted measure of thin markets where prices do not reflect 'true' prices. A review of the empirical work of Robert Engle[22] reveals that there are three predictors of situations where thin markets affect the price discovery process and these are set out below.

1. There is a delay between when the information affecting price becomes public and the subsequent trading. There is a plethora of empirical evidence investigating and reporting the effects of thin trading in stock markets.[23]

2. It is expected that a high volume of liquidity would facilitate price discovery and similarly a low volume of liquidity or thin trading generates inefficient price discovery.[24] Empirical research has established that a high volume of liquidity facilitates price discovery. Similarly, a low volume of liquidity or thin trading generates inefficient price discovery. The thinner the market the greater the chance of an inefficient price as the price discovery process breaks down so that the resultant price does not correctly reflect supply and demand conditions. In other words, the observed price in a thinly traded market is far more likely to diverge from the 'true' price that would be expected to emerge from a deep market.

3. There is an extremely strong relationship between frequency of trading or depth of the market and bid-ask spreads. The efficiency of the price discovery process for a thin market compared to a normal market has been estimated to be between 10% and 50%[25]. This means that the observed price could be as little as 10% of a price that would be observed in an efficient market.

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22 Professor of Finance at the Stern School of Business New York University and 2003 Nobel Laureate in Economics.

23 See Banz, R. (1981), 'The Relationship between Return and Market Value of Common Stock', Journal of Financial Economics, 19, pp. 41-44; Beedles, W., Dodd, P. and Officer, R. (1988), 'Regularities in Australian Share Returns', Australian Journal of Management, pp. 1-29; Reinganum, M. (1981a), 'Misspecification of Capital Asset Pricing: Empirical Anomalies Based on Earnings' Yields and Market Values', Journal of Financial Economics, 9, pp. 19-46.

24 Barclay, M. and Hendershott, T. (2003), 'Price Discovery and Trading After Hours', The Review of Financial Studies, Winter 2003, pp. 1041-1073.

25 Biais, B., Hillion, P. and Spatt, C, 1999, 'Price Discovery and Learning During the Preopening Period in the Paris Bourse', Journal of Political Economy, 107, pp.1218-1248.

Unfortunately there is no one measure that can be used to determine if market data is credible due to thin trading problems. If the price discovery process has been affected then prices do not reflect 'true' prices and the resulting expected inflation parameter has been poorly estimated.

3.2.3 Concerns

We consider that if the AER was to consider changing the approach that it currently uses, it should do so after careful consideration of alternatives and an assessment of which of these alternatives provides the best estimate of inflation at the current time. If the AER is to revert to estimating implied inflation using yields on indexed CGS, it must establish that the market for both of these securities is not subject to thin trading. As at December 2009 there were three indexed bonds on issue (with a term to maturity exceeding one year) being:

1. $1.7 billion that matures 20/8/2015
2. $2.5 billion that matures 20/8/2020
3. $4 billion that matures 20/9/2025.

For the AER to change its methodology in estimating expected inflation based on market data, the AER must be certain that the market data is credible. While there is no one measure or statistic that determines the credibility of data due to thin trading, the AER should establish the following:

1. *transaction time* – the market is efficient, that is, there is little time delay, if any, between the release of price sensitive information and the incorporation of that information into price;
2. *volume* – there is a sufficient volume of trades to facilitate efficient and effective price discovery; and
3. *spreads* – bid-ask spreads are what would occur in an efficient market ensuring that observed prices would not diverge from the 'true' price.

In addition to these tests, ENERGEX must be given the opportunity to respond to any intended change by the AER.

3.3 Conclusions

The AER has signalled that it may change the approach that it has adopted in the draft determination in estimating expected inflation. The revised approach would most likely be one where market data is used to estimate expected inflation. The problem is that the credibility of the data is questionable given the Commonwealth Government has only recently re-commenced issuing indexed bonds and the resulting forecast inflation estimate is not likely to be the 'best estimate' as required under Clause 6.4.2(b)(1) of the NER.

There is no one universally accepted test to determine if the market data is credible. There are three predictors of credible data where the credibility is questioned as a consequence of thin trading. The three predictors are related to transaction time, volume and spreads. Examination of these factors provides an insight into the credibility of the data and hence whether the data can be used to provide the 'best estimate of forecast inflation.'

If the AER determines that it will change its method prior to the final determination, ENERGEX and other stakeholders should have the opportunity to review and respond to this prior to implementation.

4 Debt Margin

The issue of estimating the cost of debt in the difficult market conditions following the global financial crisis has been considered by the AER in its decision. It is also understood that the AER may be considering the development of its own method to estimate the cost of debt with limited market data, although it has indicated that this should not impact on ENERGEX's final determination. The focus of our response is on:

- estimating a 10 year BBB+ Bloomberg yield, which has not yet been addressed by the AER; and
- potential issues with the method that it currently uses to test the alternative data sources available.

4.1 Background

4.1.1 Requirements under the NER

The debt risk premium is the margin above the nominal risk free rate that a debt holder would most likely demand reflecting the default risk of the business. The debt margin for the regulatory control period is determined in accordance with clause 6.5.2(e) of the NER, which states that the debt margin is:

> *…the margin between the annualised nominal risk free rate and the observed annualised Australian benchmark corporate bond rate for corporate bonds which have a maturity equal to that used to derive the nominal risk free rate and a credit rating from a recognised credit rating agency.*

The AER's *Statement of Regulatory Intent* (SoRI) states that a maturity of ten years is applicable in relation to the nominal risk free rate and this period is also applicable for the debt margin. Additionally, a credit rating of BBB+ is assumed. The debt margin is therefore the margin for ten year BBB+ rated Australian corporate bonds.

4.1.2 Estimating the debt margin following the global financial crisis

The two recognised, independent data providers that have most commonly been referenced by regulators are Bloomberg and CBA Spectrum, noting that the AER had historically relied upon the former. When the debt market was deep and liquid, the difference between the yields quoted by the two data providers was small and inconsequential. Since the global financial crisis, the difference in yields between the

two providers has increased although more recent evidence shows signs of convergence. The AER has since commenced referencing both Bloomberg and CBA Spectrum and has established a method that it uses to assess which provider (or both) is seen as being the best 'predictor' of observed market yields over the relevant time period (referred to here as 'the AER's testing method').

It is noted that the AER is considering developing its own method for estimating a ten year BBB+ yield, although the AER has indicated that this will not be applied to ENERGEX for its final determination. We observe that this assumption has been noted by ENERGEX in its Revised Regulatory Proposal and it is considered important that ENERGEX has an opportunity to respond to any change in method if the AER determined that it did want to implement such a change in time for the final determination.

In its Regulatory Proposal, ENERGEX proposed the application of an average of Bloomberg and CBA Spectrum given the issues faced by both data providers in estimating a long-term BBB+ debt margin in such an illiquid market. For the purpose of the draft determination, the AER determined that it would apply CBA Spectrum. ENERGEX used CBA Spectrum in its Revised Regulatory Proposal but continues to hold the view that an average of both data providers is a more robust approach.

4.2 Options for estimating a Bloomberg ten year yield

Indicative yields previously relied upon by the AER are no longer published, being the Bloomberg eight year BBB yield and the eight and ten year A yields (which were used to extrapolate the eight year BBB yield to a ten year rate). Consideration therefore needs to be given as to how a ten year BBB Bloomberg yield will now be estimated.

There are two methods that could be applied. The first is to apply a method that is consistent with the approach that has been applied historically, which is to extrapolate based on the next lowest credit rating category for which Bloomberg continues to publish a ten year rate.

The longest available Bloomberg BBB rate is currently seven years. The only credit rating category for which ten year yields are published is AAA. The seven year BBB rate could therefore be extrapolated based on the difference between the ten year and seven year AAA yields.

There are some difficulties in assuming that the term structure of the AAA yield curve can be used to estimate the term structure of the BBB yield curve. This is for two reasons. First, the sample will include issuers other than Australian corporates. The

majority of the sample consists of banks, reflecting the Commonwealth Government's guarantee.[26]

Second, the risk facing a lender in advancing funds to a AAA borrower for a ten year term will be seen as considerably less than a loan to a BBB for the same term. If anything, referencing AAA data is more likely to understate the term structure of a BBB rather than overstate it, and hence should be considered conservative. In saying this, the A curve, that has been utilised for some time in extrapolating the BBB curve, has been extremely flat and we expect that this is driven by the lack of bond issues at this end of the curve. The main advantage of referencing Bloomberg's longer term AAA yields is that they are more likely to be based on actual bond issues and hence reflect actual market data.

An alternative method is simple linear interpolation. This assumes that the slope of the yield curve is constant from five years to ten years. For example, based on the BBB data published by Bloomberg, its indicative seven year rate could be extrapolated to a ten year rate based on the difference between the five and seven year rate.

Each of these methods has its advantages and disadvantages. We consider that a reasonable approach would be to take an average of the two methods.

4.3 AER's approach to testing alternative data sources

The observed yields of a common sample of BBB+ rated bonds was compared with the fair value estimates based on Bloomberg, CBA Spectrum and an average of both. The difference between the observed yields and the fair value estimates were then compared using the weighted sum of squared errors. The model used by the AER has been requested and provided to ENERGEX allowing replication of the results.

As noted above, the AER determined that CBA Spectrum was the most appropriate data source for the purpose of the draft determination. It is presumed (but not stated by the AER) that this will be re-tested prior to the final determination, which creates uncertainty for ENERGEX. We also have some concerns with the testing method applied by the AER, which are set out below.

4.3.1 Outliers

Dealing with outliers requires the exercise of subjective choices. As subjectivity is involved, model outcomes are not right or wrong but rather an outcome estimated

[26] Additionally it has recently been announced that the guarantee is to be removed effective 31 March 2010.

based upon the subjective choice. Consistent results are unlikely amongst different users applying the same model.

The subjectivity is present with regard to:

- the inclusion or exclusion of outliers; and
- the choice of technique that is generally accepted to identify an outlier, noting that there are three common different approaches[27] that are used.

It may very well be that under one of these tests, a bond may be an outlier while under another test the bond is not an outlier. Given the uncertain nature of the approach due to some subjective assessments, the results of the test may be inconclusive. We recommend that the AER makes a clear statement as to what constitutes an outlier to remove the subjectivity with the current approach.

4.3.2 Yields versus spreads

When examining outliers, the focus should be upon debt margins or spreads over CGS and not the yield. The yield is the sum of the Commonwealth Government bond yield plus a debt margin. For example, a change in yield may be as a consequence of a change in Commonwealth Government bond yields rather than a change in the corporate bond yield it is being compared to.

Further, the sample of corporate bonds is so small and the bonds so infrequently traded that on some days during the averaging period, only one of the bonds may have traded. It is possible that an event occurs which may result in that bond being determined to be an outlier if only yields are examined.

We would recommend that the AER changes its approach and considers spreads as opposed to yields to increase the credibility of the results of the model.

4.3.3 Weighting

The model employed by the AER weights the bonds as opposed to using a simple average. The weighting reflects trading frequency so that an infrequently traded bond does not have the same weighting as a more frequently traded bond. Importantly, the model uses observations of bond prices to determine the 'best' ten year BBB yield when all of the bonds have a maturity less than ten years. The extent to which one

[27] These include: Chauvenet's test – a test to assess if one piece of experimental data is an outlier; the standard test of two standard deviations from the mean; and more than 1.5 times the inter-quartile range from the 25th and 75th percentile.

method is seen to be the better predictor of ten year rates, which cannot currently be directly observed, remains questionable.

The weighting could also be considered with regard to maturities. As the ten year debt margin is required, longer dated bonds could have a greater weighting than shorter dated bonds in the hope that one data provider is preferred to the other for the ten year yield. The actual weighting may still require some subjective assessment. This should be the practice until the sample includes bonds with maturities of at least ten years.

4.4 Conclusion

The AER has chosen a model to determine which data provider is preferred. Based on what is an inherently subjective assessment, CBA Spectrum was determined to be preferred to Bloomberg over the relevant period. It is questionable whether if different subjective assessments were made the results would be the same. The AER should remove where possible any subjective assessments.

It is also noted that ENERGEX has some concerns with the AER's suggestion that a custom built model may be investigated to estimate debt margins. However, it is assumed that such a method will not be developed and applied for the purpose of the final determination. Rather, it is assumed that ENERGEX will have the opportunity to review this model prior to its implementation, along with other Distribution Network Service Providers and stakeholders.

ENERGEX has recommended the use of the average of Bloomberg and CBA Spectrum data. We concur that this is a reasonable approach given the issues that have been identified with both methods (including the potential for the preferred method to vary through time based on the AER's testing methodology). Given that Bloomberg no longer provides ten year BBB yields, the Bloomberg BBB yield needs to be estimated by extrapolating a shorter term BBB yield.

If the AER is not going to use this recommended approach and its weighted least squares model then we recommend that further adjustments may be required regarding outliers, the weighting process and the use of spreads instead of yields. Overall, subjectivity should be removed as much as possible. The model then needs to be tested to ensure a credible result.

February 2010

Appendix 5.0

Gamma: Further evidence to support departure from the AER's Statement of Regulatory Intent

Strategic Finance Group – December 2009

Gamma: Further Evidence to Support Departure from the AER's Statement of Regulatory Intent

Report prepared for ENERGEX and Ergon Energy

7 December 2009

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Executive summary and conclusions

Instructions

1. The Strategic Finance Group: SFG Consulting (SFG) has been engaged by ENERGEX Ltd and Ergon Energy Corporation Ltd to provide new information in support of their departure from the AER's *Statement of Regulatory Intent* in relation to the gamma parameter.

2. Specifically, we have been engaged to provide new information in relation to the gamma parameter, including a review of the relevant material in the following documents:

   a. The Australian Energy Regulator's (AER's) Final Decision: Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, 1 May 2009 (WACC Review Final Decision); and

   b. The supporting paper commissioned by the AER and prepared by Associate Professor Handley: Further comments on the value of imputation credits, 15 April 2009 (Handley Final Report).

3. We note that we have previously made a number of submissions in relation to the gamma parameter as part of the AER's WACC Review. These submissions are as follows:

   a. A report dated 16 September 2008 and titled The effect of franking credits on the cost of capital of Australian firms (SFG Gamma Submission);

   b. A report dated 1 February 2009 and titled The consistency of estimates of the value of cash dividends (SFG Consistency Report);

   c. A report dated 1 February 2009 and titled Market practice in relation to franking credits and WACC: Response to AER proposed revision of WACC parameters (SFG Market Practice Report);

   d. A report dated 1 February 2009 and titled Using redemption rates to estimate theta: Response to AER proposed revision of WACC parameters (SFG Redemption Rate Report).

4. The focus of this report is on a number of key issues that have been identified following the AER's *Final Decision* and the supporting report of Handley (2009). These issues include the following:

   a. Whether valuation experts and professionals make adjustments for gamma when performing corporate valuation exercises, and if not, the reasons why market practice is to set gamma equal to zero;

   b. Whether an assumed payout rate of 100% is reasonable, sensible, or even possible;

   c. Whether Associate Professor Handley's treatment of the range of conceptual issues and assumptions that arise when using redemption rates to estimate theta are consistent with any sort of CAPM or any equilibrium model at all;

   d. The appropriate time period over which to estimate theta, and whether there is any evidence of a structural break in 2000;

e. Whether the Beggs and Skeels (2006) dividend drop-off estimate or the updated SFG estimate using more recent data should be preferred;

f. Whether tax statistics and redemption rates have any relevance when estimating theta; and

g. Where a particular parameter is used in two places in the WACC estimation exercise, whether consistency requires that the same value should be used for that parameter in each of the two places.

Conclusions

Market practice

5. Our main conclusions in relation to market practice are that:

a. There is general agreement that market professionals make no adjustment for franking credits when estimating WACC or when valuing firms;

b. This is entirely equivalent to "setting gamma to zero;"

c. Market practitioners are not using a special alternative approach that allows them to perform valuation calculations in which franking credits have a significant impact, but which does not require them to estimate gamma. Rather, they use the same standard framework with the parameters defined in the same way as the AER;

d. The AER is wrong to conclude that "any assumed value for imputation credits (i.e., between zero and one) should not affect company values provided it is incorporated consistently in the firm's cash flows as well as the discount rate."[1] This proposition is false and all conclusions based on it are unsupported.

Assumed payout rate

6. The basis of the AER's assumed payout ratio of 1.0, and our responses to these proposed reasons, are as follows:

a. "[A payout ratio of 1.0] is consistent with the Officer (1994) WACC framework which assumes a full distribution of free cash flows." [2]

We note that Officer (1994) includes a detailed worked example that clearly does *not* assume a full distribution of free cash flows. When Officer (1994) implements the framework of Officer (1994), he does not assume a payout ratio of 1.0.

b. "[A payout ratio of 1.0] is consistent with the AER's post-tax revenue model (PTRM), which explicitly assumes a full distribution of free cash flows." [3]

We note that the AER itself states that this is the wrong basis by which to estimate the distribution rate. Rather, the AER itself concludes that "the assumed utilisation of imputation credits should not be based on a benchmark efficient NSP. Rather, the AER

[1] Final Decision, p. 409.
[2] Final Decision, p. 420.
[3] Final Decision, p. 420.

considers that a best estimate of gamma should be based on a market-wide estimate for businesses across the Australian economy" [4] and that "a reasonable estimate of the annual payout ratio is the market average of 0.71" [5]

c. "[A payout ratio of 1.0] avoids any further costly debate on the estimation of the additional parameters that would be required to establish the 'true' time value adjustment to retained credits, which the AER has demonstrated to be immaterial under a set of reasonable assumptions." [6]

We show that the basis for this conclusion is flawed. Moreover, the alternative does not require any additional parameters to be estimated. In our view, the appropriate approach is to simply adopt the empirical estimate of the payout ratio, which is 71%.

7. In any event, the same estimate of dividend payout should be used throughout the WACC estimation. The *Final Decision* uses the actual observed empirical estimate of dividend payout when estimating market risk premium, but uses an assumed payout of 100% when estimating gamma.

Conceptual issues

8. Our main conclusions in relation to conceptual asset pricing issues are as follows:

a. When estimating theta (and consequently gamma) using empirical evidence from observed prices of traded securities, conceptual issues relating to the derivation of asset pricing models do not arise.

b. However, when estimating theta using the weighted-average redemption rate approach, these conceptual issues do arise. This is because the weights that must be applied under this approach are the outcome of the precise version of the model that is assumed.

c. The weights that are used cannot be arbitrarily selected – they must be the outcome of a proper asset pricing model such as the CAPM.

d. Any form of the CAPM requires that:

i. The m investors must, between them, hold 100% of the n assets in the economy; and

ii. The m investors own nothing other than the n assets.

e. The "model" envisaged by Associate Professor Handley violates both of these basic requirements. The Handley model does not satisfy the basic market clearing condition so any proposed equilibrium does not exist, cannot exist and cannot be derived. Consequently it cannot be used to develop a set of weights to be applied when constructing a weighted-average redemption rate estimate of theta.

[4] Final Decision, p. 394.
[5] Final Decision, p. 420.
[6] Final Decision, p. 420.

Appropriate time period for estimating theta

9. Our main conclusions in relation to the time period that should be used to estimate theta are as follows:

   a. In the absence of evidence of a structural break, a long sample of data should be used to estimate theta. This is consistent with the recommendations of Boyd and Jagannathan (1994) and with the most basic statistical principles that, other things equal, more data leads to more reliable estimates;

   b. Rather than *assume* a structural break in July 2000, one should examine the empirical data to determine if a break did occur; and

   c. The only evidence of a structural break comes from Beggs and Skeels (2006). However, this conclusion is conditional on results from the short period before 2000 during which the estimated value of a one dollar dividend is $1.18 and the estimated value of franking credits fell sharply. But for these curious results (which can occur when dividend drop-off analysis is applied to short sub-periods of data), the Beggs and Skeels estimates from post-2000 are not significantly different from those pre-2000.

Inferring theta from market prices

10. Our conclusions in relation to the post-2000 dividend drop-off estimates of theta are as follows:

   a. If the Beggs and Skeels variation of the methodology is the most appropriate and if only post-2000 data should be used, an estimate using an updated data set should be preferred to that reported by Beggs and Skeels (2006);

   b. Professor Skeels states that the best such estimate of theta is currently 0.23; and

   c. All dividend drop-off estimates of theta are conditional on the particular value of cash dividends that is adopted.

Use of tax statistics

11. The AER concludes that average redemption rates can be used to provide an estimate of the upper bound for theta. Under this approach we must assume a conceptual asset pricing model, from which we seek to infer what the price of franking credits would be if we did observe trading in them. This conceptual model then determines the weights that are to be applied to franking credits distributed to various parties. The alternative approach is to observe the market-clearing price of traded securities – an equilibrium price that incorporates the complex interactions between all market participants. The main advantage of using observed market prices of traded securities is that we don't have to assume – we can *observe* instead. For this reason, using market prices of traded securities (as we do for all other WACC parameters) should be preferred to the use of redemption rates weighted according to a conceptual model.

12. The AER has based its support of weighted-average redemption rates on a number of propositions:

   a. Gamma does not affect the cost of capital;

b. The forcible removal of foreign investment would (in reality) not affect the cost of capital of Australian firms; and

c. The forcible removal of foreign investment would increase the estimate of theta under *all* methodologies.

13. The first two of these propositions is false and the third is an assumption. Consequently, we conclude that there is no basis for the continued use of weighted-average redemption rates – even as an estimate of the upper bound value of theta.

Consistency issues

14. We note that the AER assumes a payout rate of 100% when estimating gamma, but adopts the lower actual payout rate of Australian firms when estimating market risk premium.

15. Inconsistent estimates of the value of cash dividends are used in two places in the AER's reasoning:

a. The AER's empirical estimates of theta (and consequently gamma) are conditional on an estimated value of cash dividends of 75-80 cents per dollar; and

b. The AER's estimate of the required return on equity using the CAPM is conditional on cash dividends being valued at 100 cents per dollar.

16. In our view, the estimate of 100 cents per dollar should be used consistently throughout the WACC estimation process. This is because:

a. Dividend yield studies are consistent with an estimate of 100 cents;

b. The relevant and important dividend drop-off studies are consistent with an estimate of 100 cents;

c. An estimate of 100 cents (and the corresponding estimate of the value of franking credits) fits the Australian data just as well as the 80 cent estimate (and its corresponding estimate of the value of franking credits) reported by Beggs and Skeels (1996).

Final observations

17. In its *Final Decision*, the AER relies on three key inputs when estimating gamma:

a. The AER assumes a distribution rate of 100%. Section 2 of this report shows that this is at odds with empirical observation and is impossible as a practical matter;

b. The AER uses a lower bound for theta of 0.57 based on the dividend drop-off work of Beggs and Skeels (2006). Professor Skeels is of the view "that the SFG estimate of theta of 0.23 represents the most accurate estimate currently available;" [7] and

c. The AER uses an upper bound of 0.74 based on the redemption rate analysis of Handley and Maheswaran (2008). Section 6 of this report shows that this approach is at odds with the approach of using empirical observations of market prices, which is used to estimate all

[7] Skeels (2009), p. 5.

other WACC parameters. Moreover, we also show that the basis for using this approach is flawed in several respects. Finally, we note that even if this approach is to be used, Synergies (2009) questions the results reported by Handley and Maheswaran (2008).

18. We conclude this report with three final observations:

a. The AER's final estimate of 0.65 is obtained by applying 50% weight to its "lower bound estimate" of 0.57 and its "upper bound estimate" of 0.74. Associate Professor Handley considers the AER's 0.74 estimate to be outside the range that can be considered reasonable.

b. The weighted-average redemption rate estimate of 0.74 has never been proposed as anything other than as "an upper bound estimate" of theta. By contrast the dividend drop-off estimate is a point estimate. The AER then selects its final estimate of theta as the mid-point between an upper bound and a point estimate. Clearly this must result in an upward bias.

c. To the extent that gamma is greater than zero, shareholders are assumed to receive some benefit from franking credits and they are assumed to pay the present value of that benefit in the form of a higher share price. Foreign investors obtain no benefit from franking credits. Yet, to the extent that gamma is greater than zero they are assumed to pay for franking credits. In our view, it is incumbent upon anyone proposing to assume that gamma is greater than zero to explain why foreign investors would willingly pay for franking credits that they cannot use.

1. Market Practice

Overview and context

19. In this section, we consider the evidence about commercial and market practice in relation to franking credits. We begin by noting that the issue is *not* about whether some investors might value or benefit from franking credits. Unquestionably, some investors do value the franking credits they receive and some do not. Rather, the key issue is whether dividend imputation affects the equilibrium cost of capital of Australian companies, and consequently the revenue requirement of the benchmark firm.

20. One (but not the only) consideration that is relevant when estimating gamma is whether market professionals in practice actually adjust their cost of capital estimates for an assumed equilibrium value of franking credits in the way that the AER proposes. Our recent *SFG Market Practice Report* suggests that they do not. Specifically, that report shows that the great majority of market professionals make no adjustment at all to either the cash flows or the discount rate to reflect any assumed value of franking credits. In that report, we summarise the relevant evidence about market practice as follows:

    a. The great majority of independent expert valuation reports make no adjustment at all to either cash flows or discount rates to reflect any assumed value of franking credits (Lonergan, 2001; KPMG, 2005);

    b. The great majority of CFOs of major Australian companies (who between them account for more than 85% of the equity capital of listed Australian firms) make no adjustment at all to either cash flows or discount rates to reflect any assumed value of franking credits (Truong, Partington and Peat, 2008); and

    c. Published Queensland Government Treasury valuation principles require government entities to make no adjustment at all to either cash flows or discount rates to reflect any assumed value of franking credits (OGOC, 2006).

21. We also note that credit rating agencies such as Moody's and Standard and Poor's also make no adjustments in relation to franking credits to any quantitative metric that they compute when developing credit ratings for Australian firms.

Reasons for making no adjustment

22. In its Final Decision, the AER concludes that:

> The AER agrees that the clear evidence is that the majority of market practitioners do not make any adjustment for the value of imputation credits.[8]

23. The AER then goes on to quote a conclusion from our recent *SFG Market Practice Report*:

> SFG states that the dominant market practice in Australia is to set gamma to zero when estimating the cost of capital and when conducting valuation exercises.[9]

[8] Final Decision, p. 407.

24. The AER then concludes (*Final Decision*, p. 408) that "the evidence does not support this assertion." However, our conclusion is identical to that of the AER. Market practice is to estimate the other WACC parameters in the standard way, aggregate them together into a WACC estimate, and to make no adjustment for franking credits to either the WACC or the cash flows. This is entirely equivalent to "setting gamma to zero." If gamma takes a positive value, there is an adjustment to the WACC or the cash flows. If gamma is set to zero there is no adjustment. The AER agrees that practitioners make no adjustment – this is equivalent to saying that they set gamma to zero. Put another way, how is it possible that practitioners set gamma to something other than zero, but that this requires no adjustment?

25. When the standard CAPM is used to estimate the required return on equity we have:

$$r_e = r_f + \beta_e \times MRP .$$

26. If an adjustment is to be made to the discount rate, that adjustment takes the following form:

$$r_e\left[\frac{1-T}{1-T(1-\gamma)}\right].$$

27. If "no adjustment is made for franking credits" the adjustment term (in square brackets above) is ignored and the WACC is based simply on r_e. If "gamma is set to zero," we have:

$$r_e\left[\frac{1-T}{1-T(1-0)}\right] = r_e\left[\frac{1-T}{1-T}\right] = r_e$$

and again the WACC is based simply on r_e. Consequently, "making no adjustment for franking credits" and "setting gamma to zero" are exactly equivalent and simply different ways of expressing the same concept.

28. The AER reiterates in its *Final Decision* that:

> The AER considered it possible that for practical reasons market practitioners elect to exclude the value of imputation credits from both the cash flow and discount rate.[10]

29. It is not clear how this differs from practitioners "setting gamma to zero" when estimating cash flows and "setting gamma to zero" when estimating the discount rate. It is also not clear how (or why) practitioners could adopt a value for gamma other than zero, and then make no adjustment to either the cash flow or the discount rate when performing any sort of valuation analysis.

30. It is our view that the AER has misunderstood what it means to "set gamma to zero" and the role than gamma plays in the WACC estimation and corporate valuation process.

[9] Final Decision, p. 407.
[10] Final Decision, p. 404.

Value of credits vs. adjustment to WACC

31. The AER concludes that its decision to set gamma to 0.65 is not inconsistent with the observed market practice of making no adjustment in relation to gamma at all, to either cash flows or discount rates, when performing valuation exercises. Part of the justification for this conclusion is the recognition by some practitioners that franking credits have value to some investors. For example, the AER quotes a report from KPMG which suggests that:

> Imputation credits are valuable to investors,[11]

and notes that Associate Professor Handley concludes that:

> whilst some experts no doubt assume/believe that imputation credits have zero value, the evidence does not support the assertion that standard practice is the blanket assumption that credits have no value.[12]

32. The AER itself concludes that it:

> …does not consider the evidence supports the notion that market practitioners believe imputation credits have zero value…[13]

33. We agree entirely with this. Indeed it is our view that it is quite obvious that franking credits are valued by some investors and not by others. But this is not the relevant question. The key issue here is whether (and to what extent) franking credits affect the equilibrium cost of capital of Australian firms, and consequently the revenue requirement of the benchmark firm. This is an entirely different question.

34. However, the AER states that it is seeking to:

> …arrive at a reasonable estimate of the value of imputation credits…[14]

In our view, this is the wrong question. The goal is not to determine the value of franking credits to a particular type of investor. Rather, the goal is to determine the effect that franking credits have on the equilibrium cost of capital – on the forward-looking rate of return that is commensurate with prevailing conditions in the market for funds. This is quite different from the question of how valuable franking credits might be to a particular investor.

35. The AER/Handley view appears to be that "setting gamma to zero" is equivalent to suggesting that they "have no value" to investors. This is not the case. We noted above that the key issue here is *not* about whether some investors might value or benefit from franking credits. Unquestionably, some investors do value the franking credits they receive and some do not. Rather, the key issue is whether dividend imputation affects the equilibrium cost of capital of Australian companies. These are quite different issues. It is entirely possible that some (or many) investors do value franking credits, yet this does not affect the equilibrium cost of capital of Australian companies.

[11] Final Decision, p. 408.
[12] Final Decision, p. 408.
[13] Final Decision, p. 408.
[14] Final Decision, p. 408.

36. In our view, all market professionals clearly know that franking credits are of benefit to some investors and not to others. Given this knowledge, they make no adjustment in relation to gamma to cash flows or discount rates. That is, market professionals distinguish between:

    a. Whether franking credits are of value to some investors; and

    b. Whether dividend imputation affects the equilibrium cost of capital of Australian firms.

37. Indeed this is precisely the point that is being made in the KPMG quote that is highlighted by the AER. Handley (2009) cites KPMG's conclusion that even though franking credits are valuable to some investors, this does not necessarily imply that an adjustment should be made to the equilibrium cost of capital:

> …whilst imputation credits are valuable to investors, including such value in company valuations or the cost of capital involves more complex considerations.[15]

38. The recognition by some market professionals that franking credits have value to some investors does not suggest that setting gamma to 0.65 is somehow consistent with market practice. What is relevant is that given this knowledge, market professionals make no adjustment in relation to gamma to cash flows or discount rates when performing corporate valuations.

39. There are many other things that are of benefit to some investors, but which do not affect the rate of return available to investors. The effect of dividend imputation is to reduce the amount of personal tax that resident investors pay on their dividend income from the firm. A reduction in capital gains tax rates is also of value to resident investors, but there is no suggestion that this benefit affects the equilibrium corporate cost of capital. A general reduction in personal tax rates is also of value to resident investors, but again there is no suggestion that this benefit affects the equilibrium corporate cost of capital. Finally, the issuing of shareholder discount cards is of benefit to some investors, but again there is no suggestion that this benefit affects the equilibrium corporate cost of capital. That is, there are many government and corporate policies that provide some benefit to a group of investors, but which are not considered to have any impact on the equilibrium cost of capital of the firm. The actions of market professionals are consistent with them including franking credits in this class.

Do Australian firms use a framework that does not require an estimate of gamma?

40. In the *Explanatory Statement* to its Draft Decision, the AER expressed the view that market practitioners may be using an approach that allows them to directly estimate a discount rate that reflects the impact of franking credits, without having to separately quantify the impact of franking credits or to estimate gamma. Under this view, all of the market professionals set out above are assumed to use an approach that is substantially different from that adopted by Australian regulatory bodies – whereby all of the calculations required of the regulator can be performed without ever having to estimate gamma. The AER has strengthened its view on this issue in the *Final Decision*, concluding that:

> It is clear that there is a valid valuation framework…that would avoid the need to directly estimate gamma.[16]

[15] Final Decision, p. 408.
[16] Final Decision, p. 409.

41. Our recent *SFG Market Practice Report* further explains the issue. Handley (2009, p.39) correctly notes that in the Officer (1994) framework the value of the firm can be written as:

$$V = \frac{X_0(1-T)}{r_i}$$

where

$$r_i = k_E\left[\frac{1-T}{1-T(1-\gamma)}\right]\frac{E}{V} + k_D(1-T)\frac{D}{V}$$

and

$$k_E = r_f + \beta_E \times MRP\,.$$

42. In this setting, the definitions of r_f, β_E, and MRP are the same as what the AER has used in its determination. That is, these three parameters are estimated using the yield on government bonds, regression analysis of stock returns on market returns, and historical excess market returns, respectively.

43. Handley (2009, p.39) then suggests that the value of the firm can be written as:

$$V = \frac{X_0(1-T)}{r_i^*}$$

where

$$r_i^* = k_E^*\frac{E}{V} + k_D(1-T)\frac{D}{V}.$$

44. In this case, of course:

$$k_E^* = k_E\frac{1-T}{1-T(1-\gamma)}.$$

45. In theory, there are two ways to estimate k_E^*. The most obvious way is to estimate k_E using the standard CAPM with the parameters defined in the standard way (as performed by the AER):

$$k_E = r_f + \beta_E \times MRP$$

and then make whatever adjustment to k_E is required to reflect the assumed value of gamma:

$$k_E^* = k_E\frac{1-T}{1-T(1-\gamma)}.$$

46. The alternative is to attempt to estimate k_E^* directly by re-defining all of the CAPM parameters in terms of what they would be if there was no dividend imputation. That is, we need an estimate of each CAPM parameter – not as it *is* – but as it *would be* if there was no dividend imputation. Under this approach, we would have:

$$k_E^* = r_f^* + \beta_E^* \times MRP^* .$$

47. This can only be implemented by re-defining all of the CAPM parameters in terms of what they would be if there was no dividend imputation and by estimating them as they would be if there was no dividend imputation. We are not aware of any way of doing this. We are also unaware of any piece of evidence to suggest that this has ever been done or attempted anywhere. Yet the AER concludes that:

> It is quite possible and plausible that market practitioners are consciously choosing to adopt this simpler approach to estimating the cost of equity.[17]

48. The direct estimation of k_E^* is not "simpler" to implement, it is impossible to implement and has never been implemented. Rather, it is our view that market professionals use the same CAPM with the same parameters defined in the same way as the AER has done. They then make no adjustment to this traditionally defined definition and estimate of k_E, which is equivalent to setting gamma to zero.

49. But even if it were possible to implement the "alternative" approach in practice, we would need to be able to remove the effect of franking credits from each of the CAPM parameters. That is, they would all have to be estimated as they would be if there were no franking credits. This could not be done without first having an estimate of the value of those franking credits. That is, even this alternative approach would still require an estimate of gamma.

Consistency between cash flows and discount rate

50. The AER concludes that:

> Intuitively, any assumed value for imputation credits (i.e. between zero and one) should not affect company values provided it is incorporated consistently in the firm's cash flows as well as the discount rate.[18]

51. There is universal agreement that there must be a consistency between the definition of the cash flows and the definition of the discount rate. Officer (1994) sets out various consistent definitions of cash flows and discount rates. He also shows that for a given value of gamma the different consistent combinations of cash flow and discount rate produce the same estimates of the value of the firm. There is no debate about any of this.

52. However, this does *not* imply that one can now select a *different* value of gamma and obtain the *same* firm value. This point was made in our recent *SFG Market Practice Report* and also in the *FIG submission*. However, the view of the AER is that different values of gamma do not affect company values so long as cash flows and discount rates are defined consistently.

[17] Final Decision, p. 409.
[18] Final Decision, p. 409.

53. The example from Officer (1994) can be used to illustrate the point. Officer shows that the cash flows and discount rate can be consistently defined as:

	Definition	Officer (1994) $\gamma = 0$	Officer (1994) $\gamma = 0.5$
Cash flow	$X_0(1-T)$	24.376	24.376
Discount rate	$r_i = k_E\left[\frac{1-T}{1-T(1-\gamma)}\right]\frac{E}{V} + k_D(1-T)\frac{D}{V}$	15.635	12.548%
Firm value	$V = \frac{X_0(1-T)}{r_i}$	**155.904**	**194.265**

or as:

	Definition	Officer (1994) $\gamma = 0$	Officer (1994) $\gamma = 0.5$
Cash flow	$(X_0 - X_D)(1-T(1-\gamma)) + X_D$	26.380	33.170
Discount rate	$r_i = k_E\frac{E}{V} + k_D\frac{D}{V}$	16.921	17.075%
Firm value	$V = \frac{(X_0 - X_D)(1-T(1-\gamma)) + X_D}{r_i}$	**155.904**	**194.265**

54. In summary, for a given value of gamma, the estimated firm value is the same so long as cash flows and discount rates are defined in a consistent manner. However, a change in the value of gamma obviously must result in a different estimate of the value of the firm. The AER is wrong to continue to conclude the reverse.

55. Moreover, it is on the basis of this flawed reasoning that the AER finally concludes that the "arguments from Handley make logical sense." [19]

Summary

56. Our conclusions are that:

a. There is general agreement that market professionals make no adjustment for franking credits when estimating WACC or when valuing firms;

b. This is entirely equivalent to "setting gamma to zero;"

c. Market practitioners are not using a special alternative approach that allows them to perform valuation calculations in which franking credits have a significant impact, but which somehow does not require them to estimate gamma. Rather, they use the same standard framework with the parameters defined in the same way as the AER;

[19] Final Decision, p. 409.

d. The AER is wrong to conclude that "any assumed value for imputation credits (i.e. between zero and one) should not affect company values provided it is incorporated consistently in the firm's cash flows as well as the discount rate." This proposition is false and all conclusions based on it are unsupported.

2. Assumed payout rate

Context and AER view

57. In its *Final Decision*, the AER concludes that:

> …a best estimate of gamma should be based on a market-wide estimate for businesses across the Australian economy.[20]

58. The AER also notes[21] that gamma is defined as the product of the payout ratio and the value of distributed credits (theta).

59. Under the Australian dividend imputation framework, franking credits are created when a firm pays tax on Australian profits and franking credits are distributed when firms distribute those profits as dividends.

60. The AER notes[22] that, on average, 71% of the franking credits that are created by Australian firms in a given year are distributed to shareholders and the remaining credits are not distributed. This occurs because firms do not distribute all of their earnings as dividends.

61. The AER recognises that, on average, the distribution rate of franking credits is 71% but then estimates gamma *as though* the distribution rate were 100%:

> …the adoption of a payout ratio of 1.0 does not imply an expectation that all credits will be paid out in each period. Rather as Handley advised, the full distribution of free cash flows is the standard assumption for valuation purposes, therefore for consistency, a 100 per cent payout of imputation credits is appropriate.[23]

62. This approach has also been adopted in the Draft Determination, where the AER notes that it recognises that, on average, the distribution rate of franking credits is 71% but that gamma should be estimated *as though* the distribution rate were 100%, or alternatively as though franking credits that are not distributed are just as valuable as those that are.[24]

Use of available estimates

63. In our view, an estimate of the distribution rate of franking credits is available, it appears to be uncontroversial, and it should be used. If we know that the distribution rate is 71%, we should use a distribution rate of 71%.

Consistency with Officer framework

64. In his seminal paper on this issue, Officer (1994) includes a worked example in an appendix to the paper. In that worked example, the firm creates 13.58 franking credits and distributes 10.38 of them – a distribution rate of 76%. It is clear that Officer, in developing this framework, is of

[20] Final Decision, p. 394.
[21] Final Decision, p. 410.
[22] Final Decision, p. 415.
[23] Final Decision, p. 410.
[24] Draft Determination, pp. 204-205.

the view that the distribution rate will be substantially less than 100%. This runs counter to the AER's conclusion that adopting an assumed payout ratio of 1.0:

> …is consistent with the Officer (1994) WACC framework which assumes a full distribution of free cash flows.[25]

Basis for estimating value of retained credits

65. In its *Final Decision*, the AER concludes that:

> …a reasonable estimate of the payout ratio using the analysis suggested by NERA is between 0.91 and 0.98.[26]

66. This is not true. It is clear that the payout ratio is nothing like either 91% or 98%. The empirical evidence shows that Australian firms do not pay out anything like this proportion of the franking credits that are created. Hathaway and Officer (2004), for example, show that the ratio of credits distributed to credits created each year averages 71%.

67. What the AER apparently means to say here is that it considers that franking credits that are not distributed to shareholders are 91% to 98% as valuable as those that are. The AER then goes on to conclude[27] that this is immaterially different from 100%, so that franking credits are equally valued by investors and have the same effect on the cost of capital of Australian firms whether they are distributed to shareholders or not.

68. The basis for this claim is in Table 10.6 in the *Final Decision*,[28] in which the AER performs a series of calculations on the basis that franking credits that are not distributed in a certain year are eventually distributed to shareholders either one or five years later and that on the basis of this:

> …the payout ratio increases from 0.71 to around 0.95 depending on the assumptions taken in accounting for time value considerations.[29]

69. The 71% figure that the AER adopts is from Hathaway and Officer (2004). This is the average, each year across all Australian companies, of the ratio of:

    a. the total amount of franking credits distributed to shareholders in a given year, to

    b. the total amount of franking credits created in that year.

70. The AER's calculations above are based on the notion that 71% of franking credits are distributed in the year in which they are created, and the remaining 29% are distributed the following year (or, in the alternative, within five years). This appears to fundamentally misinterpret just what Hathaway and Officer have measured with their 71% figure. Indeed the AER's interpretation of this is physically impossible.

[25] Final Decision, p. 420.
[26] Final Decision, p. 419.
[27] Final Decision, p. 420.
[28] Final Decision, p. 419.
[29] Final Decision, p. 419.

71. To see this, consider the figures set out in Table 1 below. Let Year 1 represent the first year of dividend imputation. Suppose that 100 units of franking credits were created across the economy in that year. In each subsequent year we increase the total amount of franking credits created by 3%, reflecting an assumption that corporate tax payments increase in approximately the same proportion as GDP. Each successive column is then interpreted as follows:

    a. In Year 1, 100 franking credits are created, 71 are distributed and 29 are stored.

    b. In Year 2, 103 franking credits are created, and consistent with Hathaway and Officer (2004), 71% of them (73) are distributed. Of the 73 franking credits that are distributed, 29 have been stored from the previous year and are now being distributed one year later. This means that of the 103 credits created in Year 2, 44 are distributed immediately and 59 are stored – to be distributed in the following year.

72. This process continues, and by Year 4 the stock of stored or undistributed credits is greater than the total amount of credits to be distributed. Specifically, at the end of Year 3 there are 90 stored credits. The total credits to be distributed in Year 4 is only 78. In other words, it is simply impossible that stored credits can be routinely distributed the year after they are created.

Table 1. AER assumption about distribution of franking credits

Year	1	2	3	4	5	6	7
Credits created	100	103	106	109	113	116	119
Credits distributed (71%)	71	73	75	78	80	82	85
Credits from previous year	0	29	59	78	80	82	85
Credits from current year	71	44	16	0	0	0	0
Credits stored	29	59	90	121	154	188	222

73. The same result applies in the case where stored credits are assumed to be distributed five years after they are created. At some stage we reach a point where the stored credits exceeds the credits to be distributed in a given year.

74. In summary, the basis of the AER's conclusion that franking credits are equally valued by investors and have the same effect on the cost of capital of Australian firms whether they are distributed to shareholders or not is that those credits that are not distributed immediately will be distributed so soon afterwards that the loss of time value is negligible. However, the table above shows that this is simply impossible.

Consistency with estimate of market risk premium

75. In its *Final Decision*, the AER's estimate of the market risk premium is based primarily on empirical evidence relating to historical excess market returns as set out in a series of tables prepared by Associate Professor Handley.[30] In that analysis, Associate Professor Handley takes the excess return of a stock market index over and above the yield on government bonds each year. He then "grosses up" these estimates for various assumed values of franking credits. This grossing up procedure is based on the *actual* payout ratio of Australian firms, not on an *assumed* payout ratio of 100%.

[30] Final Decision, p. 209 and Handley (2009), "Further comments on the historical equity risk premium."

76. In our view, consistency demands that the same payout ratio must be used throughout the WACC estimation process. It is inconsistent to use the actual observed payout ratio in one part of the WACC estimation and to use a different assumed value for the same parameter in another part of the same WACC estimation. In our view, the same actual observed empirical estimate should be used throughout the WACC estimation process.

Summary and conclusions

77. The basis of the AER's assumed payout ratio of 1.0, and our responses to these proposed reasons, are as follows:

a. "[A payout ratio of 1.0] is consistent with the Officer (1994) WACC framework which assumes a full distribution of free cash flows." [31]

We note that Officer (1994) includes a detailed worked example in which clearly does *not* assume a full distribution of free cash flows. When Officer (1994) implements the framework of Officer (1994), he does not assume a payout ratio of 1.0.

b. "[A payout ratio of 1.0] is consistent with the AER's post-tax revenue model (PTRM), which explicitly assumes a full distribution of free cash flows." [32]

We note that the AER itself states that this is the wrong basis by which to estimate the distribution rate. Rather, the AER itself concludes that "the assumed utilisation of imputation credits should not be based on a benchmark efficient NSP. Rather, the AER considers that a best estimate of gamma should be based on a market-wide estimate for businesses across the Australian economy" [33] and that "a reasonable estimate of the annual payout ratio is the market average of 0.71." [34]

c. "[A payout ratio of 1.0] avoids any further costly debate on the estimation of the additional parameters that would be required to establish the 'true' time value adjustment to retained credits, which the AER has demonstrated to be immaterial under a set of reasonable assumptions." [35]

We show above that the basis for this conclusion is flawed and impossible. Moreover, the alternative does not require any additional parameters to be estimated. In our view, the appropriate approach is to simply adopt the empirical estimate of the payout ratio, which is 71%.

78. In any event, the same estimate of dividend payout should be used throughout the WACC estimation. The *Final Decision* uses the actual observed empirical estimate of dividend payout when estimating market risk premium, but uses an assumed payout of 100% when estimating gamma.

[31] Final Decision, p. 420.
[32] Final Decision, p. 420.
[33] Final Decision, p. 394.
[34] Final Decision, p. 420.
[35] Final Decision, p. 420.

3. Conceptual issues

Context and AER view

79. In its *Final Decision*, the AER concludes that:

> …foreign investors in the Australian market will be recognised in defining the representative investor, but only to the extent that they invest in the domestic capital market.[36]

80. This is based primarily on advice from Associate Professor Handley, who concludes that:

> …for the purposes of estimating gamma, foreign investors should be recognised only to the extent that they invest in the domestic market.[37]

81. In our view, one should not apply one approach "for the purposes of estimating gamma" and a different, inconsistent approach for the purposes of estimating other WACC parameters. We return to this internal consistency issue in a subsequent section of this report. In this section we address the conceptual issue relating to the definition of the market in relation to the estimation of gamma.

Relevance of the conceptual issue

Empirical estimates from market prices

82. We begin by noting that the conceptual issue relating to the definition of the market and the effect of foreign investors has no bearing whatsoever on the empirical estimates of gamma that are based on the prices of traded securities. For example, analyses of dividend drop-offs and the simultaneous prices of shares and futures contracts are based on traded security prices. To the extent that foreign investors (or any other group) has an influence, this is reflected in the observable traded price.

83. In our *SFG Gamma Submission*, we noted that government bonds trade in a free market, transactions occur, and a market-clearing price is determined. We observe that market clearing price, infer a yield to maturity from it, and use that as an estimate of the risk-free rate. In economic theory, that market-clearing price was determined by the representative investor. But the identity or characteristics of the representative investor does not need to be determined or assumed in order to estimate the risk-free rate. We simply observe traded market prices, use them to obtain the parameter estimate and move on.

84. Exactly the same applies to the estimation of theta. The empirical techniques that are based on market prices are not based on, and do not require, any assumption whatsoever about the identity or characteristics of the representative investor. The dividend drop-off approach, for example, is a procedure that is applied in exactly the same way irrespective of any theoretical debate about how we should think about the concept of a representative investor.

[36] Final Decision, p. 426.
[37] Handley (2009), "Further comments on the valuation of imputation credits," p. 17.

Weighted-average redemption rates

85. The alternative to using empirical estimates based on traded market prices, is to estimate gamma based on weighted-average redemption rates. This approach clearly *does* require an assumption about the appropriate market definition and the weighting that should be applied to foreign investors. In essence, the redemption rate approach requires an assumption about the weight to be applied to resident investors and the weight to be applied to foreign investors. The former is multiplied by one, the latter is multiplied by zero, and Associate Professor Handley considers the resulting weighted average to be an "upper bound" for theta.

86. In summary, the conceptual issues discussed in this section are irrelevant to the empirical estimates based on traded market prices. These issues are only relevant to estimates based on weighted-average redemption rates, where an assumption about the appropriate weights to be applied is required. For the redemption rate approach only, a range of conceptual issues in relation to the underlying asset pricing model must be determined. This then determines the weights to be applied to the different investor groups when constructing the weighted-average redemption rate.

Conceptual asset pricing issues

87. The conceptual issues in relation to the underlying asset pricing model appear to have converged on a setting in which there is a single market consisting of *n* risky assets held collectively by *m* investors. The AER states that:

> …the starting point for the Sharpe CAPM (and all subsequent versions of the CAPM) is to assume a given set of assets (*n* risky assets and a risk-free asset) and a given set of investors (*m*) who collectively determine the prices of those assets.[38]

88. Handley (2009) also sets out part of the derivation of the CAPM where there is a single market consisting of *n* risky assets held collectively by *m* investors.[39]

89. A crucial aspect of these models is that:

    a. The *m* investors must, between them, hold 100% of the *n* assets; and

    b. The *m* investors own nothing other than the *n* assets.

90. That is:

    a. None of the *m* investors can hold any assets outside the model; and

    b. There can be no investors outside of the model who can possibly buy any of the *n* assets inside the model.

91. In other words, the derivation of the CAPM and subsequent models that are based on it, require a closed system. A model in which investors who are inside the system are able to invest in assets outside the system, or where investors outside the system are able to invest in assets inside the system is very different from the CAPM or any subsequent model based on it. None of the

[38] Final Decision, p. 424.

[39] Handley (2009), "Further comments on the valuation of imputation credits," pp. 13-14.

CAPM derivations hold in such a case and the CAPM pricing equation (which is used to estimate the required return on equity) does not hold. In particular, the representative investor is certainly not anything like a simple weighted average.

92. To see this, consider the derivation presented by Brennan (1992) as cited by Handley (2009).[40] Here every investor maximises their end-of-period utility:

$$\underset{z_{ij}}{Max} V_i\left(\overline{W}_i, S_i^2\right)$$

$$\text{subject to:}$$

$$\overline{W}_i = \sum_{j=1}^{n} z_{ij}\overline{P}_{j1} - R\sum_{j=1}^{n}\left(z_{ij} - \overline{z}_{ij}\right)\overline{P}_{j0}$$

$$S_i^2 = \sum_{j=1}^{n}\sum_{k=1}^{n} z_{ij} z_{ik}\omega_{jk}$$

93. The first of these equations says that all investors maximise their end-of-period expected wealth. Utility is increasing in expected returns, $\overline{W}_i$, and decreasing in variance, S_i^2. z_{ij} represents the weight that investor *i* invests in each of the *j* assets. The second equation says that investor *i* must invest all of his wealth inside the system. Expected end-of-period wealth is the expected payoff on risky assets plus the return on the amount invested in the risk-free asset. The last equation is the expression for the variance of the returns of the investor's portfolio.

94. If, however, the *m* investors inside the system are able to invest in n_1 assets inside the system and n_2 assets outside the system, this optimisation becomes:

$$\underset{z_{ij}}{Max} V_i\left(\overline{W}_{i,IN} + \overline{W}_{i,OUT}, S_{i,IN}^2 + S_{i,OUT}^2 + 2\,\mathrm{cov}\left[\overline{W}_{i,IN}, \overline{W}_{i,OUT}\right]\right)$$

$$\text{subject to:}$$

$$\overline{W}_i = \sum_{j=1}^{n_1+n_2} z_{ij}\overline{P}_{j1} - R\sum_{j=1}^{n_1+n_2}\left(z_{ij} - \overline{z}_{ij}\right)\overline{P}_{j0}$$

$$S_i^2 = \sum_{j=1}^{n_1+n_2}\sum_{k=1}^{n_1+n_2} z_{ij} z_{ik}\omega_{jk}$$

95. That is, the end of period utility of each investor depends on the value of his investments inside the system plus the value of his investments outside the system and the relationship (covariance) between those two holdings.

96. Moreover, Brennan (1992, Eq. 8) applies the "market clearing condition" which says that:

a. The *m* investors must, between them, hold 100% of the *n* assets; and

b. The *m* investors own nothing other than the *n* assets.

97. This then leads to what Handley (2009, p.14) calls "the familiar Sharpe CAPM pricing equation."

98. In summary, there is no model in which:

[40] We adopt the full notation, as set out in Brennan (1992).

a. Any of the *m* investors inside the model can hold any assets outside the model; and

b. There are any investors outside of the model who can possibly buy any of the *n* assets inside the model.

99. When these possibilities are introduced, the investor's optimisation problem changes, the market clearing condition changes, and the familiar Sharpe CAPM pricing relation cannot be derived. It is simply not possible to derive any form of CAPM model unless:

a. The *m* investors, between them, hold 100% of the *n* assets; and

b. The *m* investors own nothing other than the *n* assets.

100. By contrast, Handley (2009) states that:

> any assets which may be held by any of the investors in other markets – and the corresponding wealth of those holdings – are not included in the model and therefore play no role in the pricing of the *n* risky assets in the market.[41]

101. As shown above, this is simply untrue and violates the most basic elements of equilibrium and the CAPM. It is impossible to derive any sort of equilibrium relationship when one considers only a sub-set of investors and a sub-set of assets. There is no such thing as an optimisation problem that applies to a sub-set of investments or a sub-set of investors. There is no such thing as a market clearing condition that considers a sub-set of investors and a sub-set of assets. The "model" envisaged by Associate Professor Handley does not exist and cannot exist and the CAPM pricing equation cannot be derived in the framework that he proposes.

102. Under Associate Professor Handley's "model" there are a group of Australian assets. These are the *n* assets referred to above. These assets are held partially by Australian investors and partially by foreign investors. In total there are *m* investors. But the Australian investors and the foreign investors also have assets outside Australia. Consequently, the market clearing condition in Paragraph 99.b is violated and the derivation of the asset pricing model breaks down. One cannot derive the CAPM or any CAPM-like pricing equation in this case. To derive a CAPM-like pricing equation it must be the case that the investors in the model own all of, and nothing but, the assets in the model. This is the market clearing condition referred to above. Without this market clearing condition there can be no CAPM-like pricing equation. In the Handley framework there is no market clearing condition because the investors inside the model are allowed to own assets that are outside the model, so there can be no CAPM-like pricing equation. Nothing resembling the CAPM can be derived in the Handley framework.

103. To obtain the CAPM pricing equation, we must have a properly defined market clearing condition in which the investors inside the model own all of, and nothing but, the assets in the model. There are two ways in which this can be achieved:

a. Assume away foreign investors entirely and assume away the ability of domestic investors to buy assets outside Australia. That is, we could assume that there are only Australian investors who own all of, and nothing but, the Australian assets. This would be an extreme assumption and is equivalent to simply setting gamma equal to one by assumption.

[41] Handley (2009, p. 14).

If this were to be done, consistency demands that one would have to re-estimate all other WACC parameters as they would be in the absence of foreign investment; or

b. Consider foreign investors and foreign assets within the model. To obtain a market clearing condition (which is a pre-condition for obtaining a CAPM-like pricing equation), one must consider *all* foreign investors and *all* foreign assets. Any weighted-average must be taken over all investors who are included in the market clearing condition. In this case, Australian investors make up an insignificant proportion of investors, so their tax position in relation to Australian dividends is effectively irrelevant in equilibrium.

Relevance of conceptual asset pricing issues

104. At this point we reiterate that none of these conceptual issues arise or require any consideration when gamma is estimated with reference to the observed prices of traded securities. These issues only become relevant when determining the weights to be applied when applying the weighted-average redemption rate approach. No such assumptions or considerations are required when using market data to estimate gamma. In that case, the equilibrium *outcomes* of the trading and investment decisions of all market participants can be *observed* in the form of traded prices rather than *assumed* in the context of a conceptual model.

Summary and conclusions

105. When estimating theta (and consequently gamma) using empirical evidence from observed prices of traded securities, conceptual issues relating to the derivation of asset pricing models do not arise.

106. However, when estimating theta using the weighted-average redemption rate approach, these conceptual issues do arise. This is because the weights that must be applied under this approach are the outcome of the precise version of the model that is assumed.

107. The weights that are used cannot be arbitrarily selected – they must be the outcome of a proper asset pricing model such as the CAPM.

108. Any form of the CAPM requires that:

a. The m investors must, between them, hold 100% of the n assets; and

b. The m investors own nothing other than the n assets.

109. The "model" envisaged by Associate Professor Handley violates both of these basic requirements. The Handley model does not exist and cannot exist and cannot be derived. Consequently it cannot be used to develop a set of weights to be applied when constructing a weighted-average redemption rate estimate of theta.

4. Appropriate time period for estimating theta

Context and AER view

110. In its *Final Decision*, the AER concludes that:

> …there is persuasive evidence to reject pre-July 2000 data from consideration in estimating theta.[42]

Weighted-average redemption rates

111. The AER argues that one reason for this conclusion is that:

> …a weighted-average valuation across all investors in the Australian capital market…would…increase as a result of the 2000 tax changes.[43]

112. That is, prior to the 2000 tax change there were three types of investors:

a. Resident taxpayers who could use franking credits;

b. Resident untaxed individuals and entities who could not use franking credits; and

c. Non-resident investors who could not use franking credits.

113. Under the weighted-average utilisation approach, one multiplies the proportion of investors in each group by one if they can utilise franking credits and by zero if they cannot. Consequently, the weighted-average utilisation will increase by the proportion of resident untaxed individuals and entities – because these investors were previously unable to utilise franking credits, but were made able to utilise them as a result of the 2000 tax change.

114. There are two pieces of evidence in relation to redemption rates before and after 2000:

a. Hathaway and Officer (2004) *estimate* redemption rates using aggregate tax statistics. They conclude that the best estimate is "a redemption factor of about 40% for distributed credits" and that no increase occurred in July 2000.[44]

b. Handley and Maheswaran (2007) *assume* a redemption rate for resident investors for the period after 2000.[45]

Dividend drop-off analysis

115. The AER has primarily relied on the results of Beggs and Skeels as the basis for concluding that the 2000 Rebate Provision had the effect of increasing the estimated value of franking credits. This comes from Table 5 of Beggs and Skeels, which is reproduced below.

[42] Final Decision, p. 430.
[43] Final Decision, p. 438.
[44] Hathaway and Officer (2004), p.16.
[45] Handley and Maheswaran (2008), p.86.

Test for change in value of theta – Beggs and Skeels (2006)

TABLE 5
Tests for Structural Breaks in Franking Credit Drop-off Ratios at Tax Regime Changes

Tax regime	Period	Estimated cash drop-off ratio ($\gamma_{1,j}$)	Estimated franking credit drop-off ratio ($\gamma_{2,j}$)	Null hypothesis	*P*-value
1	1986–1988	0.465 (0.040)	0.752 (0.157)	$\gamma_{2,1} = \gamma_{2,2} = \ldots = \gamma_{2,7}$	0.000
2	1989–1990	0.646 (0.064)	0.450 (0.119)	$\gamma_{2,1} = \gamma_{2,2}$	0.126
3	1991	0.765 (0.115)	0.376 (0.206)	$\gamma_{2,2} = \gamma_{2,3}$	0.757
4	1992–1997	0.861 (0.059)	0.201 (0.103)	$\gamma_{2,3} = \gamma_{2,4}$	0.447
5	1998–1999	0.795 (0.099)	0.418 (0.186)	$\gamma_{2,4} = \gamma_{2,5}$	0.305
6	2000	1.168 (0.099) C	0.128 (0.204) A	$\gamma_{2,5} = \gamma_{2,6}$	0.047
7	2001–2004	0.800 (0.052)	0.572 (0.121)	$\gamma_{2,6} = \gamma_{2,7}$ B	0.003

The numbers in parentheses are estimated standard errors and the *P*-values are from conventional *F*-tests of the hypotheses.

Source: Beggs and Skeels (2006), Table 5, p. 61.

116. The key result in this table is that the estimated value of franking credits increased from 12.8 cents in the dollar immediately before the Rebate Provision to 57.2 cents in the dollar afterwards (see Point A). This change is also estimated to be statistically significant (see Point B).

117. Recall, however, that the value of franking credits is estimated by taking the combined value of a $1.00 cash dividend plus the attached franking credit and then subtracting the estimated value of the cash dividend. When the estimated value of the cash dividend is high, the estimated value of the franking credit will be low, and vice versa.

118. Beggs and Skeels estimate the value of a $1.00 cash dividend to have decreased from $1.168 immediately before the Rebate Provision to 80 cents afterwards (see Point C). That is, the result here is not so much one of an increase in the value of franking credits, but a decrease in the estimated value of cash dividends from an implausibly high level. Not only is there no explanation for why a $1.00 dividend might be worth $1.168 prior to the Rebate Provision, but there is also no reason why the Rebate Provision would affect the value of cash dividends.

119. When interpreting empirical results, it is important to consider the results in their entirety. In this case, if it is to be accepted that these results establish that the Rebate Provision has increased the value of franking credits, it must also be accepted that:

a. A $1.00 cash dividend was worth $1.16 prior to the Rebate Provision; and

b. The Rebate Provision caused the value of cash dividends to fall by over 30% (from $1.168 to 0.80) even though it has nothing to do with cash dividends.

120. The alternative explanation is simply that estimation error, of the type that is expected from time to time when market data is used (and applied to a small sample such as the observations from the single year of 2000), has resulted in economically implausible estimates in the period immediately prior to the Rebate Provision.

Reason for preferring more data

121. In its Final Decision, the AER notes that:

> sample size is no doubt a relevant factor[46]

but argues that:

> SFG has not presented evidence that the reliability of theta estimates from dividend drop-off studies actually improves with a longer-term data set.[47]

122. The leading paper in relation to the reliability of dividend drop-off estimates is Boyd and Jagannathan (1994) who state that:

> a significant problem confronting researchers in this area – an extremely high noise-to-signal ratio. Dividend yields vary across stocks and across time, but their variability is miniscule compared to that of daily stock returns…To illustrate these issues we estimate price drop equations annually for each of the 25 years in our sample. Simply put, the results vary enormously from year to year. The implication is that inferences based on one or a few years' data will be extremely imprecise. One solution is to examine a very long time period as is done in this study.[48]

123. That is, the leading paper in the area notes that dividend drop-off results "vary enormously from year to year," that inference based on a few years' data will be unreliable, and hence there is a need to "examine a very long time period." We also note that we submitted this passage in full to the AER.[49]

124. Moreover, we note that there are at least two elements to the reliability of statistical estimates: precision and bias. Precision can be estimated via the standard error of the estimate. Bias reflects the extent to which the point estimate properly reflects the quantity being estimated. The difference can be illustrated with reference to recent stock returns. Since April 2009 the stock market has increased strongly every month. When all observations in a sample are similar, the standard error is low and precision is high. But this estimate from a short period would not be considered to be an unbiased estimate of long-run stock returns – the sample is too short to draw that conclusion. A large sample is required to obtain reliable estimates.

Conclusions

125. Our conclusions in relation to the time period that should be used to estimate theta are as follows:

a. In the absence of evidence of a structural break, a long sample of data should be used to estimate theta. This is consistent with the recommendations of Boyd and Jagannathan (1994) and with the most basic statistical principles;

[46] Final Decision, p. 430.
[47] Final Decision, p. 429-430.
[48] Boyd and Jagannathan (1994, p. 715-716).
[49] SFG Consistency Report, p.10.

b. Rather than assume a structural break in July 2000, one should examine the empirical data to determine if a break did occur; and

c. The only evidence of a structural break comes from Beggs and Skeels (2006). However, this conclusion is conditional on nonsensical results (driven by the sort of estimation error that is expected when applying this sort of empirical estimation techniques to a small sample of data) from the short period before 2000. But for a short sub-period of strange results in early 2000, the Beggs and Skeels estimates from post-2000 are not significantly different from those pre-2000.

5. Inferring theta from market prices

Context and AER view

126. In its *Final Decision*, the AER concludes that:

> Despite the advantage of providing more up-to-date estimates (i.e. to 2006), the AER has concerns regarding the reliability of the SFG study, and considers that correction of identified deficiencies would likely have a material impact on the results. Accordingly while the AER has given full consideration to the SFG study, limited weight has been placed upon theta estimates generated by the SFG study for the purposes of this final decision… Based on the empirical evidence available, the AER considers that the 2006 Beggs and Skeels study provides the most comprehensive, reliable and robust estimate of theta inferred from market prices in the post-2000 period. It is also an independent published study that has been through the academic refereeing process. Accordingly the AER has placed significant weight on the 2001-2004 estimate of theta from this study of 0.57.[50]

Subsequent analysis

127. Subsequent to the AER's *Final Decision*, Professor Chris Skeels (one of the authors of Beggs and Skeels, 2006) has been engaged to perform a thorough peer review of the SFG study and of the AER's concerns with and criticisms of it. Skeels (2009) notes that:

> Many of the criticisms raised by the AER were little more than allusions to potential problems with the SFG analysis. In some cases I found that these allusions were ill-founded and readily dismissed. In other instances the appropriate response was to rework the model and to actually establish whether the concern was valid or not. This latter class of concerns was incorporated into the questions posed to SFG. I found their responses to be convincing in as much as the potential problems were demonstrated to have little or no material impact upon the results.[51]

128. Professor Skeels then concludes that:

> I find that the results presented in Appendix I constitute an empirically valid study of the dividend drop-off problem for Australia and that the SFG estimate of theta of 0.23 represents the most accurate estimate currently available.[52]

Estimates are conditional on the value of cash dividends

129. Dividend drop-off analyses regress the stock price change over the ex-dividend day on cash dividends and franking credits. Some of the change in stock price is ascribed to the cash

[50] Final Decision, p. 447-448.
[51] Skeels (2009), p. 5.
[52] Skeels (2009), p. 5.

dividend and whatever is left over is ascribed to the franking credit. Consequently, the estimated effect of franking credits is *conditional* on the value that is ascribed to cash dividends.

Conclusions

130. Our conclusions in relation to the post-2000 dividend drop-off estimates of theta are as follows:

a. If the Beggs and Skeels variation of the methodology is the most appropriate and if only post-2000 data should be used, an estimate using an updated data set should be preferred to that reported by Beggs and Skeels (2006);

b. Professor Skeels states that the best such estimate of theta is currently 0.23; and

c. All dividend drop-off estimates of theta are conditional on the particular value of cash dividends that is adopted.

6. Use of tax statistics

Context and AER view

131. In its *Final Decision*, the AER notes that the JIA submission proposed that average redemption rates should not be used to estimate theta. The JIA submitted that:

> Based on the evidence provided from experts to date it is clear that the rate at which imputation credits are redeemed has nothing to do with the market value of theta.[53]

132. This view was further articulated in our *SFG Redemption rate Report* in which we advocated the use of empirical estimates based on observed prices of traded securities:

> …methods that seek to estimate the market value of franking credits rather than counting how many of them are used.[54]

133. The AER concludes that:

> Overall, the AER maintains its view from its explanatory statement that the methodology provided by the Handley and Maheswaran (2008) study provides a relevant and reliable estimate of theta in the post-July 2000 period. Based on Handley's advice, the AER considers that the results of this study provide a reasonable upper-bound estimate of theta. [55]

134. In reaching this conclusion, the AER considers two lines of argument raised by the JIA. A report by NERA sets out a number of conceptual issues that largely overlap with the conceptual issues relating to market definition and the derivation of asset pricing models. Since these issues are already addressed in some detail in Section 3, we do not repeat that analysis here.

135. The second line of argument is that set out in our *SFG Gamma Submission* and the *SFG Redemption Rate Report*, and this is the focus of the remainder of this section.

Tax statistics are not really needed

136. Before proceeding, it is important to be clear about what the "tax statistics" or "redemption rate" method actually does. This method assumes that franking credits received by non-residents are worthless to them and that franking credits received by residents are worth 100% of face value to them. Consequently, theta is estimated as the proportion of Australian shares that are owned by resident investors. (That is, a weighted-average is taken by applying the weights from the Handley asset pricing model that was criticised in Section 3.) Tax statistics are only used as an indirect way of estimating the relative amounts of resident and foreign investment in Australian shares.

[53] Final Decision, p.450.
[54] Final Decision, p.450.
[55] Final Decision, p.456.

The SFG counterfactual

137. In our *SFG Gamma Submission* we set out a counterfactual example. In that example, we considered what would happen to the estimate of gamma (and consequently the firm's cost of capital) if a law were passed that forcibly reduced the amount of foreign investment allowed in Australia. We noted that redemption rates must increase in this case (since a greater proportion of franking credits must go to resident investors). If redemption rates were used as the basis for estimation, the estimate of theta would increase, the estimated cost of capital would fall, and the estimated value of the firm would rise. We concluded that such an outcome is illogical – Australian firms would not be made better off by constraining the supply of foreign capital.

138. Consistent with the advice from its consultant, Associate Professor Handley, the AER rejected this argument in its *Explanatory Statement*, setting out a number of reasons for doing so. We responded to each of these arguments in our *SFG Redemption Rate Report*, and concluded that none of them were valid.

139. In its *Final Decision*, the AER reiterates its original reasons and concludes that redemption rates can be used to obtain an upper bound for gamma. In affirming its earlier decision on this point, the AER relies heavily on Handley (2009). The basis for the conclusions of Handley (2009), and consequently of the AER, lies on three keystone propositions. In our view, the first two propositions are wrong and the third is an assumption without basis. Our reasons for this view are set out in the remainder of this section.

Keystone 1: AER suggests that gamma does not affect the cost of capital

140. One of the pillars of the AER's conclusion that redemption rates are relevant to the estimation of theta is the contention that an increase in the assumed value of gamma does not result in a decrease in the allowed cost of capital. This is plainly wrong. If different values of gamma had no impact on the cost of capital, (and consequently on the revenue requirement and the value of the firm) we would not need to estimate gamma – because it would be irrelevant. Yet we see substantial resources devoted to the estimation of gamma – because it clearly *does* matter.

141. In our *SFG Redemption Rate Report*, we set out the relevant part of the example from the Appendix to Officer (1994) to show that gamma *is* relevant. Officer (1994) shows how a higher value of gamma reduces the cost of capital and increases the value of the firm.

142. Handley (2009, pp. 23-25) sets out a complicated discussion of what he calls "after-company-before-personal-tax" returns and "after-company-after-some-personal-tax" returns and so on.[56] In our view, this discussion is irrelevant and serves only to obfuscate the clear relationship between gamma, WACC, and the value of the firm.

143. The only issue that is of any consequence here is whether an increase in gamma increases the value of the firm. Clearly it does. There can be no debate about this point. It therefore follows that if gamma is higher, a given cash flow stream must be discounted at a lower rate to produce a higher firm value. That is, the discount rate that is applied to a given cash flow stream *does* unambiguously decrease with an increase in gamma – notwithstanding Associate Professor Handley's discussion about what he calls "after-company-before-personal-tax" returns and "after-company-after-some-personal-tax" returns.

[56] We note that this discussion fails to recognise the well-known typographical error in Officer, 1994, Eq. 14, which is repeated as Handley, 2009, Eq. 4, whereby gamma should be replaced by theta – theta is related to "tax credits per share distributed" and gamma is not.

144. The AER notes that "Handley has explored in some detail the impact of gamma in the Officer (1994) framework" [57] and is clearly persuaded by his conclusions:

> Handley argues that the reduction in the cost of equity described by SFG merely reflects a reduction in the cost of equity to the *firm*, while the total return to the *shareholder* remains the same irrespective of the value assumed for gamma. The AER considers that Handley's analysis appropriately captures the impact of gamma in the Officer (1994) WACC framework. On this basis the AER considers that the counterfactual analysis put forward by SFG does not necessarily provide for a reduction in the cost of equity, as it merely describes the return to the firm, rather than the total return to shareholders (which is unchanged). [58]

145. This conclusion relates to our discussion of the detailed example in the appendix of Officer (1994) – where we simply explain the role of gamma as set out in Officer's worked example. We agree entirely that there is "a reduction in the cost of equity to the *firm*, while the total return to the *shareholder* remains the same irrespective of the value assumed for gamma." This is the whole point of our discussion, and of the worked example in Officer (1994). It is precisely the "cost of equity to the *firm*" that is used as the discount rate when converting a given set of cash flows into their present value. When one's estimate of gamma increases, one applies a lower "cost of equity to the *firm*" and obtains a higher firm value. If one were to over-estimate gamma, the result would be a lower estimate of "cost of equity to the *firm*" and a higher estimate of firm value.

146. The relevance in the regulatory setting is that the revenue requirement is set according to the "cost of equity to the *firm*." The conclusion that an over-estimate of the gamma "does not necessarily provide for a reduction in the cost of equity" and consequently a reduction in allowed revenues has no basis.

147. In our *SFG Consistency Report*, we commented on the AER's conclusion in its *Explanatory Statement* that:

> Handley demonstrates that the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate.[59]

148. Our response to this claim was as follows:

> This is not true. In my view, this paragraph fundamentally misconstrues a key issue in relation to dividend imputation.

[57] Final Decision, p.455.
[58] Final Decision, p.455.
[59] Explanatory Statement, p. 335.

> Handley (2008) summarises the key results of Officer (2004) in showing that there are several different ways of defining the cash flows and each one has a specific definition of the discount rate that must be applied to it. That is, there must be a consistency between the definitions of the cash flows and the discount rate. Officer shows that the various different definitions produce the same company value so long as (a) the cash flows and discount rate are defined consistently; and (b) the same value of gamma is used in all cases. Handley reiterates this result. I agree with all of this and do not consider any of it to be controversial.
>
> However, it plainly does *not* follow from this that "the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate." If we set gamma to 0, the different approaches all produce the same company value as each other. If we set gamma to 0.65, the different approaches all produce the same company value as each other – but it is a different company value from the case where gamma is set to 0.
>
> In summary, the Explanatory Statement's leading point in responding to the inconsistency identified in the JIA submissions is plainly wrong. Changing the estimate of gamma *does* affect company values. The value of the company is increased by the present value of the expected future franking credits.[60]

149. In response, Handley (2009, p.33) claims that there is still some sense in which the statement:

> the inclusion of imputation credits in the analysis will not affect company values as long as they are consistently recognised in the cash flows as well as the discount rate[61]

is true. But it is *not* true. It is demonstrably false – changing the estimate of gamma *does* affect company values and any suggestion to the contrary is simply wrong. See also Paragraph 53 above for a worked example of this point.

Keystone 2: AER suggests that the forcible removal of foreign investment would (in reality) not affect the cost of capital of Australian firms

150. In our counterfactual example we considered what would happen to the estimate of gamma (and consequently the firm's cost of capital) if a law were passed that forcibly reduced the amount of foreign investment allowed in Australia. We noted that simple average redemption rates must increase in this case (since a greater proportion of franking credits must go to resident investors). If simple average redemption rates were used as the basis for estimation, the estimate of theta would increase, the estimated cost of capital would fall, and the estimated value of the firm would rise. We concluded that such an outcome is illogical – Australian firms would not be made better off by constraining the supply of foreign capital.

151. One of the pillars of the AER's conclusion that redemption rates are relevant to the estimation of theta is the contention that the forcible removal of foreign equity from the Australian market may have no impact on the cost of equity of Australian firms:

[60] SFG Consistency Report (2009, p.5).
[61] Handley (2009, p.33).

> …the AER notes Handley's advice that the case being considered is the partial substitution of foreign investment by domestic investment subject to no change in total supply. Given the assumption of no change in the total supply of funds, it is not clear that the counterfactual example put forward by SFG would actually involve an increase in the domestic cost of equity. [62]

152. Our counter-factual example is designed to show that an artificial reduction in the amount of foreign equity would be detrimental to the firm in reality, but would be measured as a *benefit* to the firm if simple average redemption rates were used to estimate theta. The passage from the AER above contends that such an artificial reduction in foreign equity may not, in reality, be detrimental to the firm – that it may have no impact on the cost of equity or consequently on the value of the firm.

153. To examine this claim from the AER, consider what would happen (in reality) if government proposed to ban or substantially limit the amount of foreign capital available. How would Australian firms react? Would they:

a. Have no comment since the restriction of foreign equity has no impact on their cost of equity or on the value of their firm; or

b. Lobby intensely to have such a "wealth destroying" proposal rejected?

154. In our view, the AER's claim that "it is not clear" that a proposal to ban or significantly limit the amount of foreign equity allowed would (in reality) "actually involve an increase in the cost of equity" is without basis. Of course it would increase the cost of equity for Australian firms, would reduce firm values, and would be roundly criticised by firms, superannuation funds, and shareholders.

Keystone 3: AER suggests that the forcible removal of foreign investment would increase the estimate of theta under *all* methodologies?

155. The AER concludes that:

> …a substitution of foreign for domestic investment in the Australian equity market [presumably the AER means this to be the other way around] should be expected to increase the equilibrium value of imputation credits…This in turn implies that theta would be expected to increase in equilibrium. Importantly, this is true under all methodologies for estimating theta (i.e. including dividend drop off studies). [63]

156. There is general agreement that if the proportion of foreign investment decreases, the simple average redemption rate must mechanically increase in the same proportion. Other things equal, this results in a proportional increase in the value of the firm.

157. But the same does not follow for techniques that use the prices of traded securities. In a traded market, investors with different levels of wealth, different degrees of risk aversion, different tax positions, and different countries of residence all trade with one another. The outcome is a market clearing price that reflects all of these individual differences being traded off against one

[62] *Final Decision*, p.454.
[63] *Final Decision*, p.454.

another. The market-clearing price is the observed equilibrium outcome of all of these interactions.

158. Under the simple average redemption rate approach, we do not use any traded price, nor do we observe any equilibrium outcome. Rather, we must assume a conceptual asset pricing model, from which we seek to infer what the price of franking credits would be if we did observe trading in them. This is discussed in some detail in Section 3 above. The outcome of this approach is that, under the "model" that underlies Associate Professor Handley's work, the forcible removal of foreign investment increases the estimate of theta proportionately.

159. By contrast, under the market evidence approach we can directly observe equilibrium outcomes from trade among all market participants. The AER *assumes* that dividend drop-off estimates of theta will also increase if foreign equity is reduced. But there is no basis for this assumption. The whole point of using observed market prices of traded securities (as we do for all other WACC parameters) is so we don't have to assume – we can *observe* instead. That is, rather than use a conceptual model to apply weights to franking credits distributed to various parties, we can observe a traded market-clearing price.

160. Moreover, in our *Gamma Submission* we noted that the dividend drop-off results have been remarkably stable across different variations of the methodology and across time. The result has consistently been that the package of a dollar dividend and the associated franking credit is valued at close to a dollar. This result has remained consistent over time, even though the degree of foreign investment changes from time to time.

Summary and conclusions

161. The AER concludes that average redemption rates can be used to provide an estimate of the upper bound for theta. Under this approach we must assume a conceptual asset pricing model, from which we seek to infer what the price of franking credits would be if we did observe trading in them. This conceptual model then determines the weights that are to be applied to franking credits distributed to various parties. The alternative approach is to observe the market-clearing price of traded securities – an equilibrium price that incorporates the complex interactions between all market participants. The main advantage of using observed market prices of traded securities is that we don't have to assume – we can *observe* instead. For this reason, using market prices of traded securities (as we do for all other WACC parameters) should be preferred to the use of redemption rates weighted according to a conceptual model.

162. The AER has based its support of weighted-average redemption rates on a number of propositions:

a. Gamma does not affect the cost of capital;

b. The forcible removal of foreign investment would (in reality) not affect the cost of capital of Australian firms; and

c. The forcible removal of foreign investment would increase the estimate of theta under *all* methodologies.

163. The first two of these propositions is false and the third is an assumption. Consequently, we conclude that there is no basis for the continued use of weighted-average redemption rates – even as an estimate of the upper bound value of theta.

7. Consistency issues

Inconsistency with MRP

164. In its *Final Decision*, the AER states that

> Consistency between gamma and the MRP is an important consideration. [64]

165. In its *Final Decision*, the AER's estimate of the market risk premium is based primarily on empirical evidence relating to historical excess market returns as set out in a series of tables prepared by Associate Professor Handley.[65] In that analysis, Associate Professor Handley takes the excess return of a stock market index over and above the yield on government bonds each year. He then "grosses up" these estimates for various assumed values of franking credits. This grossing up procedure is based on the *actual* payout ratio of Australian firms.

166. As discussed in Section 2 above, when estimating gamma the AER uses an *assumed* payout ratio of 100%.

167. In our view, consistency demands that the same payout ratio must be used throughout the WACC estimation process. It is inconsistent to use the actual observed payout ratio in one part of the WACC estimation and to use a different assumed value for the same parameter in another part of the same WACC estimation. In our view, the same actual observed empirical estimate should be used throughout the WACC estimation process.

Inconsistency with estimate of required return on equity

168. In our *SFG Consistency Report* we note that inconsistent estimates of the value of cash dividends are used in two places in the AER's reasoning:

a. The AER's empirical estimates of theta (and consequently gamma) are conditional on an estimated value of cash dividends of 75-80 cents per dollar; and

b. The AER's estimate of the required return on equity using the CAPM is conditional on cash dividends being valued at 100 cents per dollar.

AER accepts that the inconsistency exists

169. It is clear that both Handley (2008) and the AER have accepted that there is such an inconsistency:

> Handley agrees with SFG that the empirical evidence from dividend drop-off studies – that cash dividends are less than fully valued – presents an apparent inconsistency with the standard CAPM.[66]

170. Moreover, Handley (2009, p.29) notes that the AER has:

[64] Final Decision, p.456.
[65] Final Decision, p. 209 and Handley (2009), "Further comments on the historical equity risk premium."
[66] Explanatory Statement, p. 335.

a. Relied upon US dividend yield studies to conclude that dividends are valued at 100 cents per dollar in supporting its use of the standard CAPM in one step of the WACC estimation exercise; and

b. Relied upon drop-off studies to conclude that dividends are less than fully valued (75-80 cents per dollar) when estimating gamma.

171. Handley (2009, p.29) also notes that this "at first appears to be an inconsistency." He then notes that the AER is "not concerned with" this inconsistency because it is using different estimates of the value of dividends in the two different steps of its WACC estimation exercise:

> i.e. US dividend yield studies in relation to the CAPM and drop-off studies in relation to gamma.[67]

Relevance of the inconsistency

172. There is a clear inconsistency: The AER has used a different estimate of the value of cash dividends in two steps of its WACC estimation exercise. This gives rise to two questions:

a. Whether the inconsistency needs to be rectified; and

b. If it does need to be rectified, how this should be done.

173. In our view, it is effectively self-evident that such inconsistencies must be rectified. Otherwise it would be open to a regulator to use inconsistent estimates throughout the WACC estimation exercise. For example, it would be inconsistent and wrong:

a. for a regulator to estimate the risk-free rate using the yield on 5-year government bonds, but to use the yield on 10-year government bonds when estimating market risk premium; or

b. to estimate beta relative to a domestic market index, but to use a world market index when estimating market risk premium; or

c. to assume a payout ratio of 100% when estimating theta but a substantially lower payout rate when estimating market risk premium.

174. In our view, it is similarly inconsistent and wrong to set the value of cash dividends to 100 cents when estimating required return on equity, but to use an estimate of 75-80 cents when estimating gamma.

175. If, however, it *is* considered legitimate for a regulator to have inconsistent estimates of the same parameter in two steps of the same WACC estimation process and that there is nothing to constrain the regulator in this regard, then the remainder of this section is irrelevant.

Restoring consistency

176. The AER has used a different estimate of the value of cash dividends in two steps of its WACC estimation exercise. Logically, consistency is restored by using the same estimate in both steps. Logically again, there are two possibilities:

[67] Handley (2009, p. 29).

a. Use an estimate of the value of cash dividends of 100 cents in both steps of the WACC estimation; or

b. Use an estimate of the value of cash dividends of 75-80 cents in both steps of the WACC estimation.

177. If consistency is to be restored, one of these courses of action must be taken. The only question is which one. We favour the use of an estimate of 100 cents in both steps, consistent with the weight of evidence.

Dividend yield studies

178. There is general agreement that the dividend yield studies support an estimate of 100 cents.

Dividend drop-off studies

Boyd and Jagannathan (1994)

179. There is general agreement that Boyd and Jagannathan (1994) supports an estimate of 100 cents. There is also agreement that this is "an important study." [68] There is disagreement about the weight that should be applied to this study.

180. Based on advice from Associate Professor Handley, the AER places little weight on this study as it is "based primarily on an arbitrage framework." [69] The key result of this paper, for present purposes, is as follows:

> In reviewing all the empirical results, we note that marginal ex-dividend price drop is almost always one-for-one with dividends (in the cross-section). This result is obtained with a variety of different specifications and over a period of approximately 25 years.[70]

181. This conclusion is based primarily on the results in their Table 3 (p. 729) which reports results from a perfectly standard dividend drop-off analysis that has nothing whatsoever to do with any arbitrage framework. This reason for rejecting the "important" Boyd and Jagannathan study is consequently unfounded.

182. Based on further advice from Associate Professor Handley, the AER also places limited weight on this important study:

> Given that the methodology used by the authors does not reflect an equilibrium framework. [71]

183. This is also demonstrably untrue. Section 1 of the paper is called "An equilibrium model of ex-dividend share pricing," Section 1.5 is called "Equilibrium" and Figure 2 is also called "Equilibrium." Boyd and Jagganathan (1994) clearly *does* "reflect an equilibrium framework." This reason for rejecting the "important" Boyd and Jagannathan study is also unfounded.

[68] Final Decision, p. 460, 462.
[69] Final Decision, p. 460, 462.
[70] Boyd and Jagannathan (1994, p. 716).
[71] Final Decision, p.463.

184. Consequently, more weight should be applied to this important study and its conclusion that an appropriate estimate of the value of dividends is 100 cents.

Graham, Michaely, and Roberts (2003)

185. In our *SFG Consistency Report*, we noted that Graham, Michaely and Roberts (2003) present results for various dividend yield classes. We noted that one such class was for dividend events where the yield was greater than 2%. For this class, the estimate of the value of dividends is 100 cents as set out in the table below.

Excerpt from Table V of Graham, Michaely and Roberts (2003)

Dividend Yield	Statistic	Sub-period 1 (eighths)	Sub-period 2 (sixteenths)	Sub-period 3 (decimal)
>2%	Mean	0.9984	1.0016	1.0218
>2%	Median	0.9868	0.9838	0.9565

Source: Graham, Michaely and Roberts (2003) Table V p. 2627.

186. We concluded that this set of results was the most consistent with the Australian market – where the dividend yield is about 5% and firms pay dividends twice per year, so the average yield is about 2.5% per dividend payment.[72]

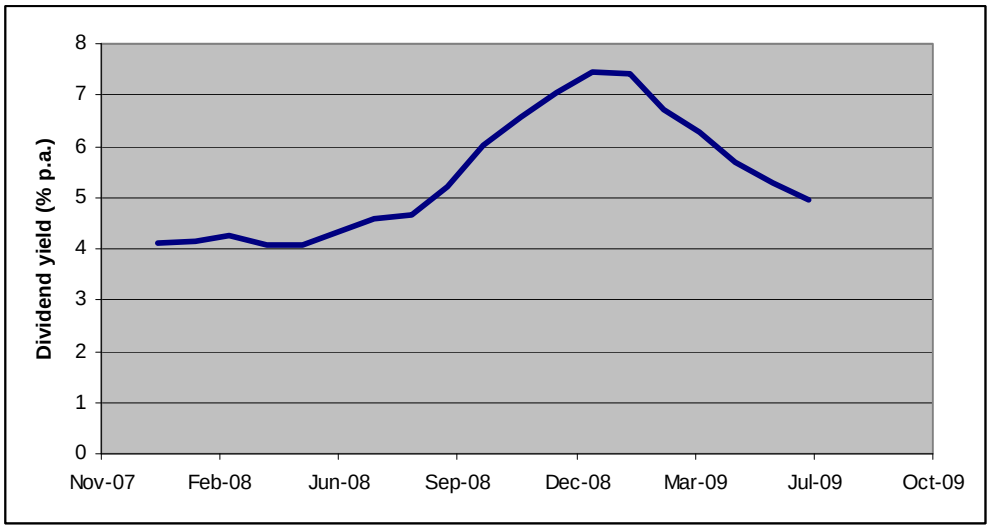
187. The AER rejects this submission for three reasons. First, the AER states that:

> SFG does not present any evidence supporting its claim that the annual dividend yield of Australian firms is 5 per cent as claimed by SFG[73]

188. Rather than reject the submission because it is not sure whether Australian dividend yields are as high as 5%, another approach would have been for the AER to check what the dividend yield on the Australian market actually is. In Figure 1 below, we present a recent time series of dividend yields obtained from the Reserve Bank of Australia. The Reserve Bank reports that as at the end of July 2009, the dividend yield on the ASX 200 index was 4.97%. At the time of writing our *SFG Consistency Report*, the dividend yield was even higher than 5%.

[72] This is somewhat of an under-estimate since some firms pay no dividends at all. That is, of those firms that do pay dividends, the average yield is higher.
[73] Final Decision, p.463.

Figure 1. Dividend yield – ASX 200 Index



Source: Reserve Bank of Australia, www.rba.gov.au.

189. The second basis for the AER dismissing this submission is an alleged inconsistency in *our* work. In this regard, the AER notes that in an earlier paper we used an estimate of 4% in a numerical example. The figure above shows that in earlier times the average dividend yield *was* about 4%. Since that time, dividend yields have increased and we have adopted a correspondingly higher figure.

190. The third basis for the AER dismissing our submission is that Graham, Michaely and Roberts (2003) do not disclose the average yield for stocks in their "greater than 2 per cent" category. We know that the yield for the average Australian firm is above 2%, so it would seem that the above 2% category would be appropriate. Conversely, the AER argues that because we don't know the mean yield of this category, we should instead use the less-than 0.5%, 0.5 to 1.0%, 1.0% to 1.5% and 1.5% to 2.0% categories as the basis for our estimate.

191. In summary, the AER's reasons for rejecting our submission in relation to this paper are curious and unfounded. We know that the yield for the average Australian firm is above 2%, so it would seem that the above 2% category would be appropriate. The results for this category support an estimate of the value of dividends of 100 cents.

A cash estimate of 100 cents

192. In our view, both of the key US dividend drop-off studies support an estimate of the value of dividends of 100 cents. As set out above, our view is that the AER's reasons for rejecting this evidence is unfounded:

a. Boyd and Jagganathan (1994) conclude that the appropriate estimate is 100 cents:

   i. The result comes from standard drop-off analysis that is not at all contaminated by any discussion of arbitrage; and

   ii. The paper is very clearly set within an equilibrium framework.

b. Graham, Michaely and Roberts (2003) conclude that the appropriate estimate is 100 cents for cases where the dividend yield is greater than 2%, which is the case for the average Australian firm:

   i. The annual dividend yield for the average Australian firm *is* around 5%, and this would have been trivial for the AER to confirm if they did not know it;

   ii. The allegation of inconsistency on our part is most odd – we previously used an estimate of about 4% at a time when the average dividend yield *was* about 4%; and

   iii. We know that the yield for the average Australian firm is above 2%, so it would seem that the above 2% category would be appropriate. Conversely, the AER argues that because we don't know the mean yield of this category, we should instead use the less-than 0.5%, 0.5 to 1.0%, 1.0% to 1.5% and 1.5% to 2.0% categories as the basis for our estimate.

193. We also note that an estimate of 100 cents is entirely consistent with the estimate from the dividend yield studies, which is generally accepted and not the subject of debate. If one accepts that the appropriate estimate of the value of cash dividends *is* 100 cents, then that estimate should be used in both steps of the WACC estimation process. This means that:

a. The standard CAPM should be used to estimate the required return on equity since that approach is based on cash dividends being valued at 100 cents; and

b. The estimate of theta (and consequently gamma) should be conditional on cash dividends being valued at 100 cents rather than conditional on them being valued at 75-80 cents. The subsequent section shows how this is easily done.

194. Conversely, if one does *not* accept that the appropriate value of cash dividends is 100 cents, then that alternative estimate should be used consistently across both steps of the WACC estimation process. In our view, it would be inconsistent and wrong to use one estimate in one step of the WACC estimation exercise and a different (inconsistent) estimate of the same parameter in another step on the same WACC estimation exercise.

Consistent implementation of a cash estimate of 100 cents

195. If one accepts that the appropriate estimate of the value of cash dividends *is* 100 cents, then that estimate should be used in both steps of the WACC estimation process. This means that:

a. The standard CAPM should be used to estimate the required return on equity since that approach is based on cash dividends being valued at 100 cents; and

b. The estimate of theta (and consequently gamma) should be conditional on cash dividends being valued at 100 cents rather than conditional on them being valued at 75-80 cents.

196. The Beggs and Skeels (2006) approach for estimating theta (and their 0.57 estimate on which the AER relies) can be summarised as set out below. The left-hand side is the stock price change over the ex-dividend day. Then 80% of the cash dividend amount is set to account for some of the stock price change, and the remainder of it is assumed to be accounted for by franking credits. The current Beggs and Skeels estimate of theta is conditional on cash dividends being valued at 80 cents in the dollar:

$$\Delta P_t = 0.8 \times Dividend_t + \theta \times FC_t .$$

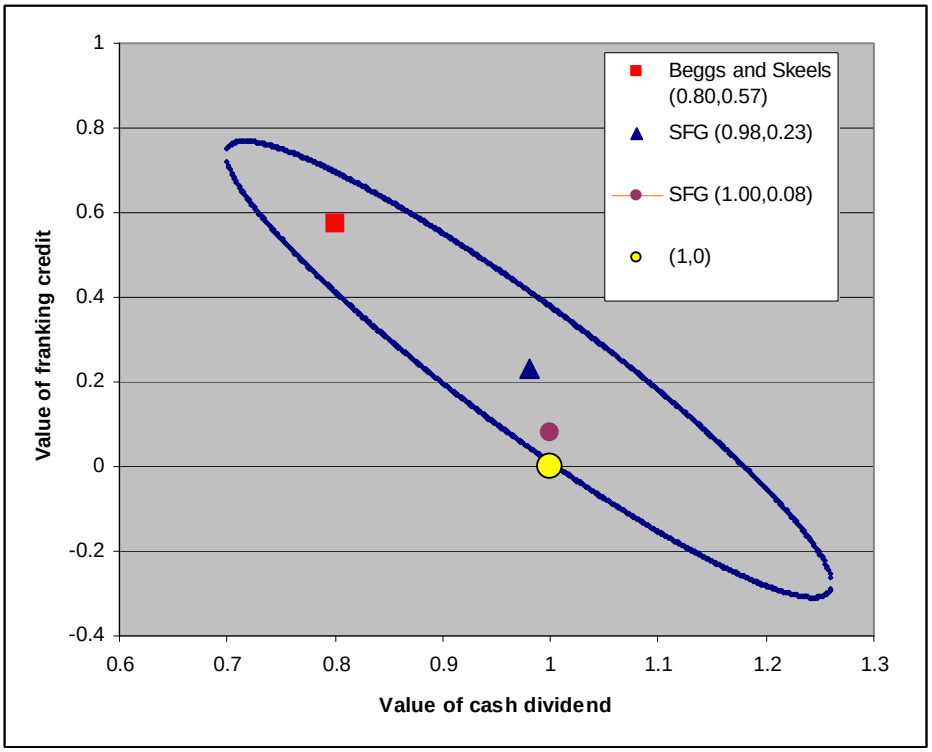
197. Applying an estimate of the value of dividends of 100 cents, consistent with the evidence above and with the other step of the WACC estimation process, is straightforward as set out below. This will, of course, result in a different estimate of theta:

$$\Delta P_t = 1.0 \times Dividend_t + \theta^* \times FC_t .$$

198. We have re-estimated theta conditional on cash dividends being valued at 100 cents in the dollar. This has been done using the same data set, same tax rates, and same methodology that was the subject of the recent review of our work by Professor Skeels. We have simply estimated theta conditional on cash dividends being valued at 100 cents, with the remainder being attributable to franking credits. The resulting estimate of theta is 0.079, with standard error of 0.047. The *t*-statistic is 1.69, indicating that the estimate of theta is not significantly different from zero.

199. Next, we compute a joint confidence region as described in Greene (1993) pp. 190-191.[74] This joint confidence region shows the pairs of parameter estimates (value of cash dividends and value of franking credits) that fit the data equally well. Specifically, any pair of parameter estimates inside the joint confidence region fit the data equally well – there is no statistically significant difference in their ability to fit the data. We plot the joint confidence region in Figure 2 below.

Figure 2. Joint confidence interval



[74] Greene shows that the joint confidence region is that set of values $\beta = (\beta_1, \beta_2)'$ for which $\frac{1}{2}(b-\beta)'\Omega^{-1}(b-\beta)$ is less than the critical value of $F[2, n-K]$, where b represents the parameter estimates, Ω is the estimated covariance matrix of the relevant parameters, n is the number of observations in the sample, and K is the number of parameters being estimated.

200. Figure 2 shows that our estimate of theta that is conditional on cash dividends being valued at 100 cents per dollar fits the data just as well as an "unconstrained" estimate that values cash dividends at less than 100 cents and ascribes positive value to franking credits. Our CAPM-consistent estimate of theta (that is conditional on cash dividends being valued at 100 cents) is 0.079. This estimate has co-ordinates (1.00, 0.08) above.[75] Our "unconstrained" estimate is (0.98, 0.23). The Beggs and Skeels (1996) post-2000 estimate is (0.80, 0.57). All of these points are shown in Figure 2 and all are within the joint confidence region. That is, all of these combinations of (a) the value of cash dividends, and (b) theta fit the data equally well. One can choose any of these combinations and fit the data just as well as any other combination. The usual criterion of statistical significance cannot discriminate between any of these combinations. What can discriminate between them is that some of them are consistent with the standard CAPM and some are not. Those points for which the value of cash dividends is 1.00 are consistent with the CAPM (which is based on this value) and others are not.

201. We also note that an estimate of 100 cents for cash dividends and zero for franking credits fits the data just as well as any of the other combinations in the joint confidence region. That is, the market practice approach adopted by valuation professionals fits the data just as well as the Beggs and Skeels estimate or any other unconstrained estimate. In other words, restricting the value of cash dividends to be 100 cents (to be consistent with the use of the standard CAPM and with the empirical evidence set out above) has an insignificant effect on the ability of the dividend drop-off model to fit the data. This CAPM-consistent estimate fits the data just as well, so nothing is being given up by using it. What is gained by using it is consistency with the use of the standard CAPM.

Summary and conclusions

202. We note that the AER assumes a payout rate of 100% when estimating gamma, but adopts the lower actual payout rate of Australian firms when estimating market risk premium.

203. Inconsistent estimates of the value of cash dividends are used in two places in the AER's reasoning:

a. The AER's empirical estimates of theta (and consequently gamma) are conditional on an estimated value of cash dividends of 75-80 cents per dollar; and

b. The AER's estimate of the required return on equity using the CAPM is conditional on cash dividends being valued at 100 cents per dollar.

204. In our view, the estimate of 100 cents per dollar should be used consistently throughout the WACC estimation process. This is because:

a. Dividend yield studies are consistent with an estimate of 100 cents;

b. The relevant and important dividend drop-off studies are consistent with an estimate of 100 cents; and

c. An estimate of 100 cents (and the corresponding estimate of the value of franking credits) fits the Australian data just as well as the 80 cent estimate (and its corresponding estimate of the value of franking credits) reported by Beggs and Skeels (2006).

[75] We have rounded co-ordinates to two decimal places.

8. Final observations

Reasonableness of AER upper bound

205. Associate Professor Handley concludes that

> A reasonable estimate of gamma is within the range 0.3 to 0.7[76]

206. Logically, then, it follows that Associate Professor Handley considers any estimates from outside this range to be unreasonable.

207. The AER's final estimate of 0.65 is obtained by applying 50% weight to its "lower bound estimate" of 0.57 and its "upper bound estimate" of 0.74. That is, 50% of the AER's final conclusion is based on an estimate (0.74) that Associate Professor Handley considers to be unreasonable.

Logical consistency

208. The weighted-average redemption rate estimate of 0.74 has never been proposed as anything other than as "and upper bound estimate" of theta. By contrast the dividend drop-off estimate is a point estimate.[77] The AER then selects its final estimate of theta as the mid-point between an upper bound and a point estimate. Clearly this must result in an upward bias.

Rationality of foreign investors

209. Gamma does affect share prices and the value of the firm. The calculations set out in Paragraph 53 that a positive value of gamma leads to the share price and the value of the firm being higher than it would otherwise be. The increase in the share price is simply the capitalised value of all future franking credits. That is, to the extent that gamma is greater than zero, shareholders are assumed to receive some benefit from franking credits and they are assumed to pay the present value of that benefit in the form of a higher share price.

210. Of course, foreign investors obtain no benefit from franking credits. Yet, to the extent that gamma is greater than zero they are assumed to pay for franking credits. In our view, it is incumbent upon anyone proposing to assume that gamma is greater than zero to explain why foreign investors would pay for franking credits that they cannot use.

[76] Handley (2009, p.41).

[77] As discussed above, it is of course a point estimate *conditional* upon a particular value of cash dividends and there are a range of consistency issues associated with that. We put them aside here, noting that the resulting estimate is a point estimate and not an upper or lower bound.

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