10 November 2009

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Jemena Gas Networks – Submission on JGN Access Arrangement

Dear Mike

Jemena Gas Networks (NSW) Limited (**JGN**) appreciates this opportunity to make a submission to the AER on the JGN revised access arrangement (**AA**).

The enclosed package includes JGN's submission as well as appendices to the submission.

Confidentiality

JGN has identified Section 4 and Appendix 7 to its submission as being confidential. Accordingly, we request that the AER keep this information confidential.

Should you wish to discuss this submission please contact Sandra Gamble, Group Manager Regulatory, on (02) 9270 4512 or by email at sandra.gamble@jemena.com.au.

We look forward to the AER draft decision in February 2010.

Yours sincerely

Sandra Gamble
Group Manager Regulatory

Attach.

Jemena Gas Networks (NSW) Ltd

Submission to the AER Consultation on JGN's Access Arrangement

10 November 2009

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Contact Person

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Jemena Gas Networks (NSW) Ltd (**JGN**) welcomes this opportunity to participate in the Australian Energy Regulator's (**AER**) public consultation process on JGN's access arrangement submission.

This submission covers reports and information that support JGN's revised access arrangement submission in relation to:

- dividend imputation
- the cost of debt
- hedging costs
- benchmarking of JGNs costs.

JGN provides these additional materials in accordance with the undertaking it made in chapter 9 of its Access Arrangement Information. Specifically, JGN undertook to provide any relevant further information to the AER on cost of capital issues if such information becomes available.

JGN requests that the AER consider this submission in conjunction with material submitted by JGN on 25 August 2009 and in JGN's subsequent responses to the AER's clarification questions.

JGN would welcome any subsequent questions the AER may have.

1 Imputation Credits

In this submission, JGN provides new papers from Skeels, Officer and Fero that support JGN's proposed value for imputation credits of 0.2 that it submitted its revised access arrangement on 25 August 2009.

Gamma is the market value of the imputation credits that are created by a firm and is the product of the assumed proportion of credits that are created that are distributed (the payout ratio F) and the market value of the imputation credits once in the hands of investors (theta).

Since JGN submitted its revised access arrangement additional research into the value of imputation credits has become available. This research is summarised below and provided in the supporting Appendices.

In Appendix 1, Peter Fero a tax partner at Gilbert+Tobin rejects the assumption that all imputation credits are eventually distributed based on his research which shows that the income tax law presents significant impediments to full effective distribution of franking credits.[1] Fero's findings are inconsistent with a 100 per cent distribution rate assumed in the AER's Statement of Regulatory Intent[2] (SORI).

In Appendix 2, Officer also finds that the assumption of a 100 percent distribution is unrealistic. Officer points to empirical evidence which demonstrates the distribution

[1] P. Feros, *Review of WACC parameters: Gamma*, ETSA Price Reset, 22 June 2009

[2] Electricity transmission and distribution network service providers: Review of weighted-average cost of capital (WACC) parameters – Final Decision, 1 May 2009, p410

rate is significantly lower.[3] Officer's finding is consistent with the value of the F factor calculated by Neville Hathaway and Bob Officer of 0.71.[4] JGN indicates in its access arrangement information (**AAI**) that the Hathaway and Officer F factor value supports the more recent Synergies observation of 0.66.[5]

In Appendix 3, Skeels disagrees with the AER's approach in the SORI based on his subsequent analysis. Skeels finds that it is not reasonable to treat the Beggs and Skeels (2006) estimate as a lower bound on gamma. Further, Skeels finds there is no scientific justification for the AER's proposed value of gamma of 0.65 obtained by averaging the Beggs and Skeels (2006) and Handle and Maheswaran (2008) estimates. Skeels also finds the AER's proposed estimator of gamma is upwardly biased by construction.[6]

Appendix 4 provides another paper in which Skeels has reviewed the gamma value observed by SFG using a dividend drop off study. Skeels states that 'the SFG estimate of theta of 0.23 represents the most accurate estimate currently available."[7]

The findings by Skeels, Officer and Fero are all consistent with a 0.2 gamma as proposed by JGN. In particular the findings of Fero and Officer directly support the F factor JGN outlined in its AAI of 0.66.

2 Hedging

JGN anticipates incurring costs related to hedging its debt financing for the next access arrangement period. As those costs relate to market prices that will be observable at the time of WACC parameter measurement, JGN will be specifying the level of those costs to the AER following the draft decision.

Section 24 of the National Gas Law states that a service provider should be provided with a reasonable opportunity to recover at least the efficient costs the service provider incurs in providing reference services.

JGN proposes that the cost of hedging should be included in the allowed costs of the business because it is a cost which an efficient service provider would incur and provides benefits to consumers as the benefits of hedging outweigh the cost.

JGN notes that Synergies have produced a report into the treatment of hedging costs.[8] JGN has provided this report in Appendix 5.

Synergies find that depending on the prevailing market conditions it is efficient for businesses to hedge at least some of the interest rate risk and that allowing such costs will promote economic efficiency.

---

[3] R. R. Officer, *Estimating the Distribution Rate of Imputation Tax Credits: Questions Raised by ETSA's Advisers*, 23 June 2009

[4] N. Hathaway and R. Officer, *The Value of Imputation Credits*, manuscript, University of Me bourne, 1992.

[5] Synergies Economic Consulting, *Gamma: New Analysis Using Tax Statistics*, 28 May 2009

[6] C. Skeels, *Estimation of Gamma*, 18 June 2009

[7] C. Skeels, *A review of the SFG dividend drop-off study: A report prepared for Gilbert and Tobin*, 28 August 2009

[8] Synergies Economic Consulting, *Hedging Interest Rate Risk on Future Borrowings*, August 2009.

Synergies conclude that compensation for hedging costs is appropriate as hedging is a common practice employed by comparable businesses and provides the businesses with an opportunity to reduce their exposure to a risk they can not directly control which frees the business to pursue other initiatives in areas which improve the overall efficiency of the services delivered.

A study by Strategic Finance Group provided in Appendix 6 identifies that there is an inconsistency between the AER's assumptions of 60 per cent gearing, credit rating (BBB+) and hedging policy (no compensation for interest rate hedging costs) made in the AER's SORI.

SFG conclude that:

1. there are sound economic reasons for the benchmark distribution or transmission firm to seek to maintain an investment grade credit rating

2. the financial ratios for the benchmark firm are presently barely able to support an investment grade rating

3. any further unhedged interest rate shock that further deteriorated the key financial ratios for the benchmark firm would put severe pressure on the investment grade rating.

Consequently, there are sound economic reasons for the benchmark firm to seek to hedge against downside risk arising from adverse changes in interest rates.

JGN is currently not compensated for the cost of hedging. The Synergies study also shows that the risk is not compensated through the beta. This is because the comparator firms used by the AER are active hedgers of interest rate risk. The Fama French analysis used to determine the relevant market beta submitted by JGN also relied upon the same comparator firms as the AER's SORI analysis. This means the SFG analysis is equally applicable to JGN's situation.

Synergies also conclude that for future borrowings to be undertaken during the proposed regulatory period that the term structure does not compensate the distributer for hedging costs.

JGN will be including the amount of its forecast hedging cost in response to the AER's draft decision enabling it to make a more accurate determination of the level of those costs.

3 Cost of Debt

In its initial AAI, JGN noted the poor performance of the Bloomberg fair value curves for deriving a reasonable benchmark cost of debt for a regulated firm during the period that preceded the submission. The almost total absence of trade in corporate bonds in the period after the collapse of Lehman's Brothers in September 2008 led to substantial uncertainty amongst financial institutions about the value of corporate bonds, which was an event that Bloomberg's proprietary methods proved incapable of coping with in an unbiased manner. It was in this information vacuum that JGN proposed using the most reliable measure of the cost of issuing debt at the point in time – namely the yield on a certain debt issue at the time of issue – adjusted to be consistent with debt with a 10 year term to maturity and BBB credit rating (the latter of which employed information from trades in credit default swaps).

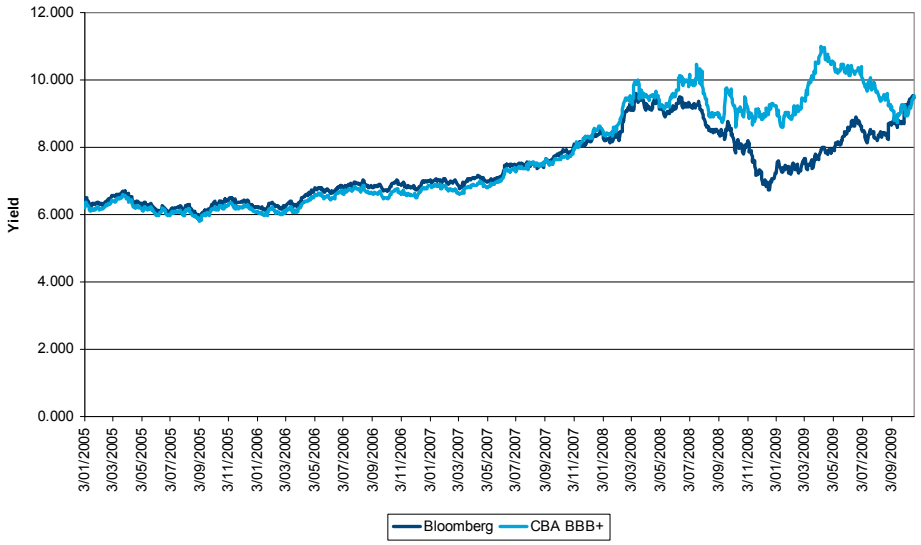
JGN notes that while this method was appropriate during the circumstances of the Global Financial Crisis – and indeed the only practicable method – it would be a second best method once capital markets have returned to normality.

JGN observes that the Bloomberg fair value curves since September 2009 have began to more closely reflect expectations of other market participants, including that the fair yield predictions of the CBA Spectrum and Bloomberg services are now very similar for the same maturities. It is also understood that the level of uncertainty about the value of corporate bonds across the financial institutions that supply Bloomberg with its information has reduced substantially, suggesting in turn that a degree of trade may have recommenced.

The graph below shows the convergence of the Bloomberg and CBA spectrum data.

Figure 1

Comparison of 7 year fair value curves: Bloomberg (BBB) and CBA Spectrum



While JGN does not consider there to be sufficient evidence at this stage to change from the approach to determining the cost of debt that it proposed in its initial Access Arrangement Information, it will keep the matter under review and would support a return to the use of Bloomberg fair value curves (appropriately extended to predict the yield for debt with a 10 year term to maturity) once normal market conditions have returned.

4 O&M Benchmarking [Confidential]

Commercial-in confidence

Commercial-in confidence

Appendix 1

Review of WACC parameters: Gamma

ETSA Price Reset

GILBERT TOBIN

LAWYERS

Review of WACC parameters: Gamma

ETSA Price Reset

22 June 2009

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Contents

1 Overview

1.1 Formulation of gamma

The estimated cost of corporate income tax of a *Distribution Network Service Provider* (**DNSP**) for each *regulatory year* is calculated in accordance with the following formula:

$$(ETC_t) = (ETI_t \times r_t)(1 - \gamma)$$

The γ represents the assumed utilisation of imputation credits.

It is noted by SFG Consulting[1] that there are two components to the γ. This can be expressed as follows:

$$\gamma = F \times \theta$$

where:

F = the distribution rate, or the rate at which franking credits that are created by the relevant firm are distributed to shareholders, attached to dividends; and

θ = the value to investors of a franking credit at the time they receive it

1.2 Franking credits distribution rate

The Australian Energy Regulator (AER) conducted a review of the weighted average cost of capital (WACC) parameters to be adopted in determinations for electricity transmission and DNSPs.

In the course of the review, the AER sought the view of John C Handley of the University of Melbourne on the valuation of imputation credits. In relation to the distribution rate, Handley stated:

> *"It is unreasonable to assume that such a build up of credits would not (eventually) attract the attention of investors, investment bankers and or potential corporate raiders. Further, when assessing the likelihood of eventual distribution of retained imputation credits, one should not restrict their thinking to existing mechanisms, schemes, structures and securities, for history has shown that financial markets are highly innovative when the incentives are large."* [2]

In other words, when assessing the value of F, Handley assumes that <u>all</u> imputation credits are eventually distributed and that irrespective of the perceived impediments, financial markets will, if sufficiently incentivised, find a way to distribute all imputation credits.

[1] SFG Consulting, 'The impact of franking credits on the cost of capital of Australian firms' dated 16 September 2008, at [3].

[2] John C Handley, 'Further Comments on the Valuation of Imputation Credits' dated 15 April 2009 (**Handley Supplementary Report**), at 8.

Handley's view is incorrect in the context of establishing the WACC. Whilst it is not possible to say that entities will never engage in "schemes" and "structures" to facilitate the eventual distribution of franking credits, the income tax law presents significant impediments to full, effective distribution of franking credits. [3] Furthermore, Treasury has in the past shown a readiness to not only adopt further specific measures to prevent these forms of schemes, but will sometimes do so retrospectively.

This paper demonstrates that in practice it is not "a given" that companies can effectively distribute retained franking credits. The effect and design of the imputation rules is such that the very policy and stated objective of the imputation rules is to ensure some credits are 'wasted' – that is not used or distributed. The mechanisms in the tax law described in this paper seek to give effect to this stated objective.

Furthermore, Handley's statement above disregards non-tax considerations associated with distributions. While a detailed analysis of non-tax considerations is beyond the scope of this paper, we make the following observations. The assumption that a company will distribute all franking credits is not consistent with all commercial practices. Commercial imperatives mean that companies may not be in a position to fully distribute all of their retained franking credits. In the case of franking credits attached to dividends paid on ordinary shares, a firm's retained earnings are often a significant practical consideration. A reduction in retained earnings will alter a company's capital structure. This could have significant implications and could influence the ability of a company to raise further capital. It is also significant that the AER's statement of regulatory intent assumes that a regulated business maintains a constant level of gearing.

It should also be noted that shareholder preferences place another important restriction on the ability of a company to distribute retained credits, such as a preference for capital gains rather than franked dividends (refer to section 4 for further commentary on this last point).

The discussion below describes the key impediments that currently exist in the income tax law, as well as their practical relevance to this issue.

2 The benchmark rule

A key element of imputation is the benchmark rule. This rule affects the quantum of credits available for distribution and may, in certain situations, result in a loss of franking credits.

2.1 Benchmark rule

Under the imputation system, a corporate tax entity is limited in its capacity to determine the extent to which it will frank a frankable distribution by the maximum franking credit rule[4] and the **benchmark rule**.[5] The benchmark rule provides that all frankable

[3] In particular, the *Income Tax Assessment Act 1936* (**ITAA36**) and *Income Tax Assessment Act 1997* (**ITAA97**).

[4] Section 202-60 of the ITAA97 creates a formula for the maximum franking credit which may be attached to a frankable distribution as: [the amount of the frankable distribution x 3/7].

[5] Certain publicly listed companies (or subsidiaries of such companies) are exempt from the benchmark rule under s 203-20(1). The publicly listed company must also satisfy the criteria that: (a) they cannot make a distr bution on one membership interest during the franking period without making a distr bution under the same resolution on all other membership interests; and (b) the company cannot frank a distribution made on one membership interest during the franking period without franking

distributions made during a particular franking period (there are generally two equal franking periods within the tax year for a public company) must be franked to the same extent (s 203-35, ITAA97).

The benchmark rule therefore severely curtails the capacity of companies to stream franking credits to members who are best able to use them and is bolstered by a number of anti-avoidance measures, discussed below.

The Explanatory Memorandum to the *New Business Tax System (Imputation) Act 2002* (Cth) states:

> *3.7 To gain a full understanding of the anti-streaming rules it is necessary to understand the underlying policy.*
>
> *3.8 Where members hold interests in the profits of a corporate tax entity, the policy is that credits for tax paid on behalf of all members should flow to all members and not to only some of them…the policy of the tax law assumes that the benefit of imputation will, over time, be spread more or less evenly across members in proportion to their holdings in a corporate tax entity, having regard to any particular rights that attach to those holdings.*
>
> *3.9 A consequence of generally spreading imputation benefits evenly across members is that members who cannot use, or cannot fully use, imputation benefits will nevertheless receive franked distributions. This results in the 'wastage' of those benefits, which is a design feature of the imputation system. Wastage of imputation benefits also includes the failure to use franking credits attributable to profits that are never distributed.*
>
> *3.10 The benchmark rule and the anti-streaming rules ensure that the intended wastage of imputation benefits is not undermined.*

An Explanatory Memorandum is not law, and does not have the force of law. However, it is valuable for use in interpretation of the law by providing the context to provisions and describing the particular circumstances for which the provision was enacted. It is therefore often referred to by tax practitioners as one of the clues for the likely approach the Courts and the ATO may adopt in interpreting provisions or in seeking guidance as to their practical application.

2.2 ATO supervision

In addition to the general auditing processes undertaken by the ATO, subdivision 204-E (ITAA97) contains a disclosure rule to support the benchmark rule and anti-streaming rules.

The disclosure obligations will be triggered when the benchmark franking percentage for the current franking period 'differs significantly' from the benchmark set for the last relevant franking period (ie, the last franking period in which the entity made a frankable distribution). Under s 204-75(2), there will be a significant difference between the benchmarks where there is a variation of more than 20 percentage points. For each

---

distributions made on all other membership interests under the same resolution with a franking credit worked out using the same franking percentage.

intervening franking period in which no frankable distribution is made, the maximum non-reportable variation increases by an additional 20 percentage points. Note also that a frankable distribution includes deemed dividends (per ss 202-40 and 960-120).

This regime allows the ATO further opportunity to scrutinise the franking activities of entities and ensure they are not breaching the benchmark rule or any of the anti-avoidance measures, and needs to be disclosed on the franking account return which accompanies a company's annual tax return.

3 Technical impediments to complete realisation of imputation credits

The Table below sets out a summary of the key measures intended to restrict the capacity for companies to stream and distribute imputation credits to certain shareholders, or to avoid the franking benchmark rule.

Effect of provision
Breach of benchmark rule
Under-franking (s 203-50 ITAA97) Where an entity makes a frankable distribution with a franking percentage less than the entity's benchmark franking percentage for the franking period, an additional franking debit will arise in the company's franking account to the extent of the difference. The ability to 'distribute retained credits at will' is subject to the benchmark rule which, together with the anti-avoidance rules discussed below, greatly restrict the capacity for a company to distribute retained credits. Under-franking, for example, will cause a permanent loss of a portion of the retained credits of the company before they are actually distributed.
Anti-streaming rules
As discussed in section 2 above, the benchmark rule creates a framework for ensuring that the benefit of franking credits are spread evenly across members in proportion to their ownership interest in the entity, regardless of the wastage this creates. A number of anti-streaming rules have developed over the past two decades to prevent the undermining of this framework. The importance of these provisions is that if companies seek to undermine the "wastage" concept, they risk permanently forfeiting franking credits. In addition to the impediments for streaming of franking credits, we note that neither the Handley Report nor the Handley Supplementary Report consider the consequences of breaching the rules – namely the permanent forfeiture of franking credits. **Linked distributions** (s 204-15 ITAA97) This provision applies to streaming arrangements involving linked distributions, where a member of an entity (the first entity) chooses to receive a distribution from a second entity that is franked to a greater or lesser extent than distributions made to

Effect of provision
other members of the first entity. Contravention of the rule results in a debit arising in the franking account of the entity with the higher benchmark franking percentage. This rule would apply, for example, where stapled stock arrangements are used for streaming by allowing holders to choose to receive either franked or unfranked dividends depending on the company paying the dividend. **Substitution of tax-exempt bonus shares** (s 204-25 ITAA97) This provision applies to streaming arrangements involving tax-exempt bonus shares, where a member of the entity chooses to have tax-exempt bonus shares issued to the member or another member of the entity, instead of receiving a franked dividend. Contravention of the rule results in a penalty franking debit to the entity's franking account. This would apply where the substituted shares in a listed company are provided without any credit in the company's share capital account. **Streaming distributions** (subdiv 204-D ITAA97) This provision applies to arrangements where an entity streams distributions to provide imputation benefits to members who benefit more from imputation credits than other members. The Commissioner may apply sanctions including debits to the franking account of the entity and denial of imputation benefits to a favoured member where this rule is breached. The Explanatory Memorandum[6] provides the example of a non-resident controlled company with residency minority shareholders. The company would infringe the provision by distributing all of its franking credits to the minority shareholders whilst retaining the share belonging to the controlling shareholder in the company, with a view to ultimately paying an unfranked dividend (or other benefit) to the majority shareholder. Contrary to John Handley's view,[7] the accumulation of franking credits would have limited value to investors where they would need to accept the wastage of credits paid to other investors (who may be non-resident for instance) because of the inability to stream franking credits.
Exempting entities (Div 208 ITAA97)
These provisions limit the franking benefits available to members who receive franked distributions from entities which are effectively owned by non-residents or tax exempt entities. They also quarantine the franking surpluses of entities which were formerly effectively owned by non-residents or tax exempt entities (former

[6] To the *New Business Tax System (Imputation) Bill 2002*.

[7] Handley Supplementary Report, page 8.

Effect of provision
exempting entities). Exempting entities and former exempting entities are generally not in a position to pass on the benefit of accumulated franking credits, the provisions are aimed at preventing such entities from paying franked distributions to resident members.
Schemes to provide capital benefits (s 45C ITAA36)
This section empowers the Commissioner to impose franking debits on a company where a determination has been made pursuant to s 45B. The purpose of these measures is to ensure that provision of capital benefits in substitution for dividends are treated as dividends for taxation purposes. By making a relevant determination, the Commissioner can require a company to forfeit franking credits. These provisions act as a complement to the share capital tainting provisions discussed below.
Qualified persons to use franking credits (s 207-145 ITAA97)
An entity is not entitled to take advantage of a franking credit where they are not a qualified person for the purposes of Division 1A of the former Part IIIAA (ITAA36) which provides, inter alia, that the member has held the shares 'at risk' for a continuous period of at least 45 days (for non-preference shares) These provisions are designed to counter manipulation of the imputation system. The requirement to have held the shares 'at risk' ensures that, for example, attempts to stream franking credits to persons who have been assigned the right to receive dividends, without undertaking any risk in the downturn in underlying share price, will be caught by the provision. See further *Tax Determination TD 2002/32*. While this provision does not necessarily cause there to be a loss of franking credits to the entity paying the dividend, it denies shareholders the benefit of the credits and operates as a further restriction on attempts by investors to take the benefit of accrued franking credits.
Schemes involving franking credit trading or dividend streaming (s 177EA ITAA36)
This section empowers the Commissioner to impose franking debits or exempting debits (and therefore causes a company to forfeit franking credits) where a company streams distributions so as to provide franking benefits to members who benefit more from franking credits and rebates than other members. The section was introduced as a 'catch-all' provision to counter franking credit trading and dividend streaming schemes, similarly to Subdivision 204-D above, except that it requires the existence of a scheme for disposal of shares (or interests therein) involving franking credit trading and/or dividend streaming with the purpose of obtaining a franking credit benefit. The measure specifically targets trading schemes which allow franking credits to be inappropriately transferred (such as by allowing credits to be accessed by those

Effect of provision
who do not bear the economic risk of holding the shares).
Tainted share capital accounts
Companies are permitted by s 254S of the *Corporations Act 2001* to capitalise their profits. If it does so, it may be able to distribute amounts to shareholders in a tax-free or tax-deferred manner. The share capital tainting rules are designed to prevent companies from capitalising by transferring amounts to their share capital account and subsequently making tax-free or tax-deferred distributions. **Tainting transfers** (s 197-45 ITAA97) Division 197 applies to amounts transferred to a company's share capital account from any other account of the company with some exceptions. One of the effects of Div 197 for tainting transfers is that a franking debit will arise in the company's franking account. **Untainting elections** (s 197-65 ITAA97) Upon electing to untaint a share capital account, a further franking debit will arise in the company's franking account if the benchmark franking percentage for the franking period in which the transfer occurred is less than the benchmark franking percentage for the franking period in which the untainting choice is made.

4 Observations from my experiences in advising on corporate distributions

In my 14 years of practice in Australian income tax law, I have had cause to advise companies on all manner of income tax considerations in planning their business affairs. Frequently the discussion concerns questions of capital management and gearing, with the follow-on question of returns to the holders of the debt and equity interests in the company, as well as questions emerging from M&A activity.

Professor Handley's comment is reproduced below:

> *"It is unreasonable to assume that such a build up of credits would not (eventually) attract the attention of investors, investment bankers and or potential corporate raiders. Further, when assessing the likelihood of eventual distribution of retained imputation credits, one should not restrict their thinking to existing mechanisms, schemes, structures and securities, for history has shown that financial markets are highly innovative when the incentives are large."*

This comment focuses on the financial incentives of "investors, bankers and or potential corporate raiders" to extract franking credits from corporate structures and therefore monetise those credits. In my view this is only one aspect of the considerations which go to the overall capital management strategy of a business and the returns provided to holders of equity and debt. For example:

- The value that company boards and their shareholders place on franking credits depends on a number of considerations, including:

(a) The profile of the majority and minority shareholders. For example, companies that are resident in certain jurisdictions such as the US or UK may not have any interest in franking credits if they can access 0% rates of withholding tax under the relevant Double Taxation Agreement.

(b) The investment focus of shareholders. Some shareholders will be interested in yield, whereas others have a preference for capital growth. The discount capital gains regime may be a relevant driver of decision making in this regard.

(c) The growth strategy of the company itself, in terms of re-investment and gearing considerations. This is discussed further below.

It is quite conceivable that as certain companies that do not distribute their franking credits because of the desire to re-invest, or because of a lack of interest from shareholders in receiving franked dividends, that those companies will be exposed to events in the longer term which cause those accrued franking credits to be lost. For example, a company that experienced rapid profit growth (and generates franking credits from the taxes paid thereon) followed by sustained losses in the course of a financial crisis may generate a store of franking credits which cannot be effectively distributed because there are no profits remaining to which the franking credits can attach or, one or more of the special franking integrity rules noted earlier in this paper could have the effect of causing franking credits to be lost.

- I have had cause to consider the position of companies which, while carrying significant retained franking credits and reserves, due to changes in the capital requirements of the business (eg. requiring the raising of additional debt), it is not appropriate commercially to distribute those reserves and, where that company is subject to Australian thin capitalisation rules, distribution may cause a denial of interest deductions.

- Raising debt to access additional funds to replace a reduction of working capital caused by the payment of franked dividends could, all things being equal, result in the entity increasing its gearing beyond the 60/40 assumption made by the AER in its Statement of Regulatory Intent. Retention of profits to preserve a gearing ratio of 60/40 would necessarily result in the accumulation of franking credits with respect to that pool of profits. It is difficult to say that these profits would eventually be distributed.

- A common component of my practice is advising on mergers and acquisitions. The shareholder profile of a company often changes considerably after a deal takes place, sometimes causing the accrued franking credits of the target to be unavailable for use by the purchaser. For example, a company sold by a non-resident to an Australian acquirer would not be eligible to effectively pass on any of the franking credits generated by the target company. Those franking credits are effectively quarantined (in an “exempting account”).

- Troubled businesses and corporate groups often have profitable operations isolated within certain group members. In such a situation, the profitable entity may well be a target for another group. However, if the purchaser acquires the profitable entity in isolation without acquiring the company, or in the case where a company is acquired which is a member of a consolidated group, the head company of that consolidated group is not acquired, any franking credits previously generated by that business or company remain with the company or the head company as the case may be. If that company or head company are unable to recover to a point where they are generating profits and worse, are placed into liquidation, those franking credits are at a practical level lost forever.

The above are examples which have either directly affected my clients or circumstances which I could envisage arising, particularly in the context of the current global economic uncertainty within which companies find themselves.

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Schedule 1 — Curriculum Vitae of Peter Feros

Peter Feros
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Tax

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Peter Feros joined Gilbert + Tobin in October 2008, as a tax partner. Prior to joining Gilbert + Tobin, Peter was a tax partner in a Big Four Accountancy Practice.

Peter has over 13 years experience in advising Australian listed and foreign multinational companies on Australian corporate taxation. Peter has diverse industry expertise, including the telecommunications, technology, entertainment, media, consumer product, industrial product and property sectors.

Recent transactions Peter has advised on include:

- Advising on income tax relating to mergers and acquisitions, due diligence, and structuring
- Advising on the income tax consequences of a significant joint venture infrastructure project
- Advising on income tax advice in relation to in-bound and out-bound cross border structuring
- Advising in relation to the income taxation issues associated with property and infrastructure funds
- Advising on the operation of the imputation regime, including the operation of the benchmarking, streaming and 45-day rule provisions
- General corporate tax advice, including:

    significant tax consolidation projects

    capital gains tax

    tax loss utilisation and management

    advising on the operation of the debt/equity provisions of the tax law

    conducting tax risk management and strategy reviews

Peter holds a Bachelor of Laws and Bachelor of Economics (obtained from Macquarie University) and a Master of Laws (obtained from the University of Sydney).

Appendix 2

Estimating the Distribution Rate of Imputation Tax Credits

Estimating the Distribution Rate of Imputation Tax Credits: Questions Raised by ETSA's Advisers

R.R.Officer

23rd June 2009

I have been asked to provide my views on a series of questions. The questions all involve the effect of the dividend distribution rate on the value of franking credits. Imputation tax credits or franking credits are valueless unless they are distributed to shareholders who can utilise them. Therefore assumptions about when franked dividends are paid out of a particular tax year's earnings are important since the attached franking credits are a 'wasting asset'.

Assumptions of 100% distribution are unrealistic and not correct since a significant proportion of the franking credits are probably never distributed as franked dividends. It is incorrect to assume that *all* credits are eventually distributed. The idea that all credits will be paid out in any range (ie 1-5 years or 1-10 years) is also incorrect and inconsistent with the evidence.

The only time when the franked dividends attached to retained earnings (the franking account balance) have any value is when they are distributed. Moreover, the only time in which any of them would be distributed would be when the payout ratio is greater than 100%. Empirical evidence demonstrates that the overall distribution rate is significantly below 100%. Long term averages estimate the economy wide distribution rate at about 70% and listed companies rarely exceed this rate.

More detailed response to the questions posed follow:

1 The AER's view of the proportion of dividends that are distributed in the same year that profits are earned;

The Australian Energy Regulator's (AER) view, ***AER WACC Review Final Decision, Chapter 10: Gamma,*** is expressed as follows:

10.5.2. Estimating the payout ratio

As stated in the issues paper, the generally accepted regulatory approach in Australia has been to define the value of imputation credits in accordance with the Monkhouse definition. Under this approach, 'gamma' (y) is defined as a product of the 'imputation credit payout ratio' and the 'utilisation rate'.

In its explanatory statement the AER considered that a positive value for retained imputation credits should be recognised in the analysis of gamma. Based on Handley's advice regarding the distribution of free cash flows under the standard approach to valuation and the Officer WACC framework, the AER proposed to adopt a payout ratio of 1.0. This proposal represented a departure from the standard Monkhouse approach.

The AER stressed that 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.[1]*(Page 410 of the Final Decision)*

There are three events in the 'life' of imputation credits:

1. They are created when a company pays Australian tax;
2. They are distributed to shareholders when a company pays a franked dividend; and
3. They are redeemed by shareholders as an offset against personal tax liabilities when they file their taxes.

Each of these 'events' affects the value of the imputation credits ($\hat{y}$). Clearly, if credits are not created they can have no value and therefore (1). is important. But, so are the other two stages in the life of imputation credits, unless the credits are distributed by way of franked dividends they can have no value (2.) and when distributed if they are not redeemed (3.), they have no value.

As I have noted, the credits have to be redeemed to have value and they are redeemed at face value. This means if the credits are not redeemed at the time they are created the 'time value' of the cash redemption they represent is reduced. Credits, once created are a 'financially decaying asset', they cannot be re-invested to earn revenue as retained earnings. Therefore the longer the time period between their creation and their redemption the greater the opportunity cost of capital represented by the credits and the lower the face value of the credits, in the limit having a zero value if they are never paid out or redeemed.

The Officer (1994) paper never addressed the issue. The numerical example in the paper assumed perpetuities, although this is not necessary since one can define a cost of capital as the simple weighted average of the company's sources of capital for a single or multiple periods. It worth noting that since tax credits cannot be traded in the manner of capital, the tax parameter, and therefore the value of franking credits must reflect the taxpayer's tax position and the value for the credits to the shareholder. The opportunity cost or price of tax and tax credits cannot be derived directly from a deep market like the cost of debt or equity. The use of averages or credit values from dividend drop-off and similar studies should be used when we have no better data or, alternatively, these estimates are used to reflect an 'efficient' derivation of the credits for the company to benchmark against.

The evidence that dividend payout ratios fall well short of unity (1.0) is compelling[2] and recognised by the AER. However, it does not follow that:

[1] *The AER also noted that while the value of retained credits may be affected by time value considerations, the effect is not expected to be material such that an estimate of 1.0 is unreasonable.*

[2] See the Appendix to this note for evidence that the dividend payout usually falls well short of 100%. It is typically around 70%.

… 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.[3]

While it might be appropriate to assume all earnings are distributed in the year they are earned in a valuation because it can be assumed that earnings retentions are earning their cost of capital, the same cannot be said for the imputation tax credits which are a 'wasting asset', as discussed above. The standard valuation formulae and imbedded assumptions, do not imply the credits are all paid out as they are earned. The value placed on the estimates of the credits ($\hat{y}$) in the valuation should reflect any delay in their receipt (as well as the extent to which they can be utilised) – events or stages 2 and 3 above. The Officer (1994) paper implicitly assumes that the $\hat{y}$ reflects the value of the credits at the time they are distributed which is consistent[4] with paying them out immediately or them being subject to significant (even infinite) delays.

2 the AER's view that all dividends *[earnings]* are eventually distributed;

Logically such a statement could **not** be so otherwise we would have no corporate liquidations or that in the event of liquidation all retained earnings were realised. However, we do not have to go to such logical extremities to prove the statement wrong. A company can adopt a constant payout ratio policy[5] indefinitely or into infinity without necessarily changing their size since earnings could be rising and falling (fluctuating) to maintain a constant or a variable size, depending on whether an increase earnings equalled or outweighed a fall in earnings and conversely.

Further, a constant proportion or amount of franking credits in a company's franking account balance (FAB) does not imply that credits are not distributed, just a constant proportion are maintained. However, in such circumstances it is equivalent to not distributing this amount or proportion and the value of the credits when distributed should reflect that.

3 the AER's description of the length of time before all dividends *[earnings]* are distributed (i.e. that the assumption is within 1-5 years is reasonable)?

The dividend payout rate is defined as the amount of the current period's earnings (or a defined period's earnings) that is paid out as dividends. For example, let us assume that a constant dividend payout rate of 70% was reasonable, this would imply of $1000 of after tax earnings in year 1, the retained earnings (including franking credits) would be $300. Year 2 earnings would have the same payout ratio on, say assumed earnings of $1000 and, therefore, the

[3] page 410 of the Final Decision. The AER also noted that while the value of retained credits may be affected by time value considerations, the effect is not expected to be material such that an estimate of 1.0 is unreasonable.

[4] As I pointed out above the Officer (1994) paper never addressed the issue but this does not imply the paper's analysis is wrong.

[5] In practice companies rarely adopt a constant payout **rate** policy, they are more inclined to adopt a constant payout **amount** policy.

same retained earnings and associated franking credits. The retained earnings (and franking credits) have accumulated and would continue to do so while the payout ratio was less than 100%.

The value of the franking credits associated with the retained earnings would have no value insofar as they are not distributed. Moreover, the only time any of them would be distributed would be when the payout ratio is above 100%. This is in contrast to the value of the retained earnings which are re-invested to earn (presumably) their cost of capital.

Therefore, unless it can be shown that a company's payout ratio exceeds 100% at least every five years and then by an amount that ensures the distribution of all the accumulated retained earnings and their associated franking credits, then the AER assumption is empirically at odd with the facts. For example, if a company had a 70% dividend payout rate for four years the fifth year payout rate would have to be 220% to exhaust the company's franking account balance (FAB account). The magnitude of the payout required to meet the AER assumption that earnings are paid out within five years of being earned is far greater than any empirical evidence would support (that I am aware of – see Appendix 1).

In fact, **on average** listed companies' payout ratios rarely exceed 70% and only very occasionally 100% and certainly not by an amount that it is reasonable to assume that the **average** company paid out earnings within five years of being earned. The empirical evidence is more supportive of a long term average payout rate of about 70%, implying that at least 30% of the franking credits attributable to those earnings are without value.

The above conjecture is supported by Australian Tax Office (ATO) data, for example a paper by Hathaway and Officer found:

From 1988-2002 (the latest ATO data available) there have been net tax collections of $265 billion and $77 billion of credits retained within FAB's. Hence 29% of credits are still held in companies and 71% or $188 billion have been distributed to shareholders. Not surprisingly, this pay out ratio is very similar to the dividend payout ratio of listed companies (Neville Hathaway and Bob Officer, The Value of Imputation Tax Credits: Update 2004, unpublished paper, page 4).

I believe more recent work by Hathaway has found an even greater proportion of the credits are retained.

4 whether the AER's time value analysis on all credits that are not immediately distributed is appropriate, having regard (in part) to:

(i) the value distributed by a company; and

(ii) the quantification of the loss of value being delayed in distribution?

Ignoring the fact that new earnings and associated credits are accruing each year, let us examine what might happen to a single years' credits. Assume the $1000 earnings after tax, in the above example, had associated credits of $300 and these credits were similarly distributed at a rate of 70%, for example 70% of $300 is distributed in the first year ($210) and 70% of the remaining $90 is distributed in the second year ($63) etc. The discounted value (at a 'risk free' discount rate of 4%) of these credits would be worth about $16 less than if the $300 that was assumed to be immediately distributed, and if only 50% was assumed to be utilised then these numbers would reduce accordingly.
If we assumed a discount rate of 12% (nearer the cost of equity) and made similar assumptions about the distribution, the $300 of credits would be worth about $44 less than the original $300. I believe the latter number is significant, it is a 15% reduction in value of the credits. Moreover, there are strong grounds for using the cost of equity capital to discount the credits rather than using a 'risk free rate'.

The WACC used in the regulatory hearings are used to discount future net cash flows or more accurately the cash flows that are attributable to the providers of capital to arrive at a 'fair price'. The credits in this context are ex-ante and are intimately tied to equity cash flows because these are the cash flows that are taxed to derive the imputation tax credits. Therefore, I believe the risk and 'risk premium' attached to equity cash flows are equally attributable to the expected imputation tax credits. Therefore an equity cost of capital is the appropriate discount use when valuing the time value of tax credits.

However, to the extent that some of the franking credits are never distributed, as discussed above in Question 3, then clearly the amount of the credits earned are much greater than the value of the credits distributed. In short, even if all credits were valued at their 'face value' when distributed, the fact that typically about 30% of them are never distributed means that their value is zero. In the above example the face value of a $1.00 of credits is $0.70 even if they are fully valued when distributed which they are typically not.

5 whether a 100% distribution rate is:

(i) a reasonable assumption to make in estimating gamma; and

(ii) whether this was what you meant in your article in Annex E?

Putting aside the issue of the 'utilisation rate' of franking credits which is a very important issue in arriving at a value for them, particularly because the rate is company rather than market centric, then the next major issue affecting the value of credits is the 'distribution rate'. Therefore, as my responses to questions 4 and 5 indicate, the assumption of a 100% distribution is unrealistic and would clearly lead to something like a 30% inflated value of the credits.

As I have indicated above, my original paper [Officer (1994)] did not address the issue of a variable distribution, the paper's conclusions are consistent with an immediate or full pay out of earnings or a delayed payment.

Appendix 3
Estimation of Gamma

Estimation of γ

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[1] The views expressed in this report are those of the author and do not necessarily reflect those of the University of Melbourne.

1. Executive Summary

The Australian Energy Regulator, hereafter AER, claim that 'a reasonable estimate of gamma lies in the range 0.57 and 0.74'.[2] The value of 0.57 is obtained from Beggs and Skeels (2006)[3] while the value 0.74 is obtained from Handley and Maheswaran (2008).[4]

The AER labels the Beggs and Skeels (2006) estimate as 'a lower bound'[5] and further labels the Handley and Maheswaran (2008) estimate as an 'upper bound'.[6] The AER argues that in view of the disparities in methodology of the two studies 'it is reasonable to regard them as providing bounds on the range for gamma'[7] and so arrive at a value of $\gamma = 0.65$, a simple average of these so-called bounds.

It is the considered opinion of this report that:

- It is not reasonable to treat the Beggs and Skeels (2006) estimate as a lower bound on γ.
- There is no scientific justification for the AER's proposed value of $\gamma = 0.65$ obtained by averaging the Beggs and Skeels (2006) and Handley and Maheswaran (2008) estimates.
- The AER's proposed estimator of γ is upwardly biased by construction.

In this report I confine my comments to the interpretation by the AER of the Beggs and Skeels paper and the use to which its conclusions are put because that paper is the one I am very familiar with. I have not sought to comment in detail on the interpretation by the AER of the Handley and Maheswaran paper nor have I discussed in an exhaustive way on the use to which its statistics have been put.

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[2] Australian Energy Regulator (2009). Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters.
[3] Beggs, D.J. and C.L. Skeels (2006). Market Arbitrage of Cash Dividends and Franking Credits. *The Economic Record*, 82 (258), 239-252.
[4] Handley, J.C. and K. Maheswaran (2008). A Measure of the Efficacy of the Australian Imputation Tax System. *The Economic Record*, 84 (264), 82-94.
[5] Australian Energy Regulator (2009), op.cit. page 467.
[6] Ibid page 467.
[7] Ibid page 467.

2. *Introduction*

The value of an imputation credit is traditionally viewed as deriving from the product of the payout ratio, F, and a redemption rate θ:

$$\gamma = F \times \theta$$

Here γ is the value of one dollar of redemption credit. The quantities γ, F, and θ are parameters, or characteristics, of a population and are not known with certainty. Consequently, in order to proceed, it is necessary that we provide some form of guess of the values of these parameters. There are two ways that we can make such guesses. One is speculation, that is to assume values for parameters. For example, the AER assume that the payout ratio $F = 1$, implying that γ θ. For the purpose of this report this assumption will not be challenged.[8] A more scientific approach to guessing involves statistical inference whereby data is observed and guesses are formed on the basis of the information contained in the observed data. This process of 'informed guessing' is called estimation.

Estimates of γ (and hence θ) are available in the literature, see Beggs and Skeels (2006) and Handley and Maheswaran (2008). The AER treats these point estimates as lower and upper bounds, respectively, on the true value of γ (and hence θ). The AER then forms an estimate of γ (and hence θ) using the midpoint between these bounds.

The approach of the AER to estimating γ (and hence θ) is subject to criticism on a number of grounds. First, the estimate of Beggs and Skeels (2006) is not an estimate of a lower bound for γ (and hence θ) and it makes little sense to treat it as such. Second the AER's methodology ignores the uncertainty inherent in the Beggs and Skeels (2006) and Handley and Maheswaran (2008) estimates. A consequence of this is that the AER ignores the uncertainty inherent in their own estimate of γ (and hence θ). When this uncertainty is appropriately accounted for it is impossible to conclude that the inference of the AER concerning the true value of γ (and hence θ) is supported by the evidence.

[8] This is strictly without prejudice to any further consideration regarding the value of *F*.

Misinterpreting the statistical nature of the exercise leads the AER to make invalid inference.

The structure of the report is as follows: Section 3 of this report discusses the AER's interpretation of the point estimates of Beggs and Skeels (2006) as a lower bound on the true value of γ (and hence θ). The fourth section considers valid inferential procedures about the true value of γ (and hence θ) using the information used by the AER in their report. The fifth section provides a summary and conclusion. Finally, some technical issues are relegated to an appendix.

3. Estimating bounds?

Our subsequent discussion is concerned with estimation of the parameters γ and θ. One advantage of the scientific approach of estimation (informed guessing) is that it comes with information about how reliable your estimates (or guesses) are. The measure of reliability most commonly used in the profession is the standard error of estimate, which is the positive square root of another commonly encountered measure, namely the variance. In the same way as parameters are unknown and must be estimated so too are the relevant standard errors and variances estimated on the basis of information contained in observations.

As one of the co-authors, I can state categorically that Beggs and Skeels (2006) were not concerned with the estimation of bounds for θ or γ. Yet, the approach adopted by the AER is to take the estimate provided by Beggs and Skeels (2006) and arbitrarily label it as an estimated lower bound, on the true value of γ (and hence θ). That the estimate of γ (and hence θ) reported by Beggs and Skeels (2006) is lower than another estimate (say that of Handley and Maheswaran (2008)) is a matter of chance rather than construction.

If one were actually concerned with finding bounds for the value of γ it should be done in one of two ways. The theory of order statistics facilitates direct estimation of bounds. By construction, such estimates will satisfy the obvious requirement that the upper bound is never less than the lower bound. Certainly, Beggs and Skeels (2006) makes no such appeal to the theory of order statistics. Therefore, the only appropriate way in which a valid lower bound on γ (and hence θ) may be inferred is via the construction of a confidence interval about the relevant point estimate, which I demonstrate below is a lower bound of 0.33 and an upper bound of 0.81.[9]

Given that the point estimate of 0.572 provided by Beggs and Skeels (2006) is evidently not an estimate of a lower bound, to be used as such by the AER is completely unjustifiable. Moreover, although the AER assert that the point estimate of Beggs and Skeels (2006) can be used as an estimate of a lower bound, it is no more appropriate for this task than is any other number drawn at random. The observation by the AER that the disparities in methodology of the two studies make it 'reasonable to regard them as providing bounds on the range for gamma' lacks any merit whatsoever and borders on being free of content.[10]

4. Appropriate inference for γ

The second aspect of the AER's approach that merits further scrutiny is implicit throughout the preceding section. Although the nature of the underlying data is very different, the numbers provided by Beggs and Skeels (2006) and Handley and Maheswaran (2008) are each *point estimates*, i.e. they are simply guesses. As such, any sensible usage of these point estimates requires that account be taken of the reliability of the estimates. It is a well known property of point estimates that they are extremely unlikely to be equal to the value of the unknown population parameter of interest. The role of the statistical analyst is to assess the reliability of point estimates in order to determine how seriously one can take the numerical values of the estimates. We note in passing that, in keeping with good scientific practice, the estimates of Beggs and Skeels

[9] The construction of confidence intervals is discussed in the next section.
[10] Ibid page 467.

(2006) are all accompanied by standard errors[11]. The same is not always true of the results of either Handley and Maheswaran (2008) or the AER, yet these measures are straightforward to construct. When estimate reliability is taken into account it is difficult to see how the AER can claim any support in the data for their conclusions concerning the true value of γ (and hence θ).

In the analysis that follows, our primary concern will be the proximity of various estimates to zero. There are two common ways of assessing the proximity of an estimate to zero. A first approach is to compare the ratio of the estimate to its standard error of estimate. Specifically, attention is focused on the so-called t statistic

$$t = \frac{\text{estimate}}{\text{standard error of estimate}}$$

If this ratio is large in magnitude (it may be either positive or negative, depending upon the sign of the estimate) then this suggests that the estimate is statistically significantly different from zero. That is, we have statistical support for the proposition that the parameter being estimated is actually different from zero. If the magnitude of this statistic is small (by which is meant close to zero, be it positive or negative) then we have no statistical evidence to believe that the estimate differs from zero. It remains only to decide when the t statistic is large or small.

A second approach involves the construction of so-called confidence intervals. Such intervals are constructed by the specification of lower and upper bounds, B_L and B_U respectively, which are calculated according to the formulae

$$B_L = \text{estimate} - c \times (\text{standard error of estimate})$$
$$B_U = \text{estimate} + c \times (\text{standard error of estimate})$$

where the positive constant c is chosen to yield the desired level of confidence. The greater the value of c the greater the level of confidence attached to the interval.

[11] Standard errors are the most commonly used measure of estimate reliability.

It is important to note that Beggs and Skeels (2006) report a point estimate for γ, $\hat{\gamma}_{BS}$ 0.57, Handley and Maheswaran (2008) report an estimate of γ, $\hat{\gamma}_{HM}$ 0.74.

The remainder of this section employs both t statistics and confidence intervals as appropriate inferential techniques about the value of γ (and hence θ). This section of the report is divided into three subsections. Subsection 4.1 presents appropriate inference using the Beggs and Skeels (2006) estimate of γ (and hence θ). The Handley and Maheswaran (2008) estimate is discussed in the second subsection. The final subsection discusses appropriate inference using the AER's proposed measure of γ (and hence θ).

4.1. The Beggs and Skeels (2006) measure of γ

Beggs and Skeels (2006) page 247, Table 5, report an estimate of γ, hereafter referred to as $\hat{\gamma}_{BS}$, of 0.57 with a standard error, *s.e.*$(\hat{\gamma}_{BS})$, of 0.12. Beggs and Skeels (2006) obtain their estimates and standard errors using a feasible generalized least squares estimator to allow for heteroskedasticity. The 95% confidence interval for γ is

$$\begin{aligned}&\hat{\gamma}_{BS} \pm 1.96 \times s.e.\left(\hat{\gamma}_{BS}\right)\\ &= 0.57 \pm 1.96 \times 0.12\\ &= 0.57 \pm 0.24\end{aligned}$$

The 95% confidence interval for γ is therefore anywhere from as low as 0.33 to as high as 0.81. Given this interval it is reasonable to conclude an appropriate lower bound for γ based on the Beggs and Skeels (2006) estimate is 0.33 and an upper bound of 0.81

4.2. Comments on the Handley and Maheswaran (2008) measure of γ when combined with Beggs and Skeels (2006)

Handley and Maheswaran (2008) obtain their measure of γ, $\hat{\gamma}_{HM}$ as:

$$\hat{\gamma}_{HM} = \frac{1}{n}\sum_{i=1}^{n}\gamma_i$$

where there are n 15 annual observations on γ_i sampled over the period 1990 2004.

An appropriate measure of uncertainty for $\hat{\gamma}_{HM}$ is the sample standard error, obtained as the positive square root of the sample variance.

$$s.e.\left(\hat{\gamma}_{HM}\right)=\sqrt{\frac{1}{n-1}\left(\gamma_i-\hat{\gamma}_{HM}\right)^2}$$

see Mood, Graybill and Boes (1974) page 229.[12]

Using the data reported in table 4 on page 90 of Handley and Maheswaran (2008) this measure of the standard error is $s.e.\left(\hat{\gamma}_{HM}\right)$ 0.16. Consider the t test of the hypothesis $H_0:\gamma-0.57=0$, that is a test of the proposition that the true value of γ is 0.57, which may be written as

$$\begin{aligned} t &= \frac{\hat{\gamma}_{HM}-0.57}{s.e.\left(\hat{\gamma}_{HM}\right)} \\ &= \frac{0.74-0.57}{0.16} \\ &= 1.06 \end{aligned}$$

The marginal significance level is 0.29. At any standard level of significance there is no evidence of a statistically significant difference between the Handley and Maheswaran (2008) estimate of the value of one dollar of imputation credit and 0.57. That is, on the basis of the information reported by Handley and Maheswaran (2008) there is no evidence to support the notion that γ is significantly different from 0.57. This implies that, the magnitudes deemed by the AER to provide bounds on the true value of γ, the Handley and Maheswaran (2008) estimate and the Beggs and Skeels (2006) point estimate are not significantly different from each other.

In the t test above no allowance has been made for the fact that the numbers 0.57 and 0.74 are point estimates, these numbers have been treated as constants. This was the

[12] Mood, A.M., F.A. Graybill and D.C. Boes (1974) Introduction to the Theory of Statistics, Third Edition. *McGraw and Company Limited*: Singapore.

approach of the AER but, as demonstrated above, there is no statistical evidence supporting the notion that any of the estimators yield estimates that are different from one another. However, treating these numbers as constants is a statistically invalid exercise. To allow for the fact that $\hat{\gamma}_{BS}$ and $\hat{\gamma}_{HM}$ are point estimates we construct a t test of the proposition $H_0 : \gamma_{BS} - \gamma_{HM} = 0$ where γ_{BS} is the parameter estimated by $\hat{\gamma}_{BS}$ and γ_{HM} is the parameter estimated by $\hat{\gamma}_{HM}$. Were this hypothesis to be rejected, it would imply that $\hat{\gamma}_{BS}$ and $\hat{\gamma}_{HM}$ were estimates of different quantities. The appropriate t statistic is

$$t = \frac{\hat{\gamma}_{BS} - \hat{\gamma}_{HM}}{s.e.\left(\hat{\gamma}_{BS} - \hat{\gamma}_{HM}\right)}$$
$$= \frac{\hat{\gamma}_{BS} - \hat{\gamma}_{HM}}{\sqrt{\text{var}\left(\hat{\gamma}_{BS}\right) + \text{var}\left(\hat{\gamma}_{HM}\right) - 2\,\text{cov}\left(\hat{\gamma}_{BS}, \hat{\gamma}_{HM}\right)}}$$

In the following, we shall assume that $\text{cov}\left(\hat{\gamma}_{BS}, \hat{\gamma}_{HM}\right) = 0$.[13] Proceeding we obtain:

$$t = \frac{\hat{\gamma}_{BS} - \hat{\gamma}_{HM}}{\sqrt{\text{var}\left(\hat{\gamma}_{BS}\right) + \text{var}\left(\hat{\gamma}_{HM}\right)}}$$
$$= \frac{0.57 - 0.74}{\sqrt{\left(0.12\right)^2 + \left(0.16\right)^2}}$$
$$= \frac{-0.17}{0.2} = -0.85$$

The marginal significance level is 0.4, which suggests the non-rejection of the hypothesis that the estimators are estimating the same value is very robust. To suggest, as does the AER, that $\hat{\gamma}_{BS}$ and $\hat{\gamma}_{HM}$ are bounds (where bounds might reasonably be interpreted as taking different values), or even estimates of bounds, is clearly at odds with the evidence in the data. This is consistent with all of the other evidence presented in this report.

[13] The assumption $\text{cov}\left(\hat{\gamma}_{BS}, \hat{\gamma}_{HM}\right) = 0$ is justified given that the two estimates are based on independent samples and reflect different methodologies.

4.3. The AER (2008) measure of γ

On the basis that $\hat{\gamma}_{BS}$ and $\hat{\gamma}_{HM}$ are interpreted as upper and lower bounds for γ, respectively, the AER (2008) propose the measure:

$$\bar{\gamma} = \frac{1}{2}\left(\hat{\gamma}_{BS} + \hat{\gamma}_{HM}\right)$$

Section 4.1 and 4.2 clearly demonstrate that the hypothesis $H_0 : \gamma_{BS} - \gamma_{HM} = 0$ cannot be rejected for any level of significance less than or equal to 40%. Consequently, there is no scientific justification for averaging $\hat{\gamma}_{BS}$ and $\hat{\gamma}_{HM}$ as these quantities do not differ in a statistically meaningful fashion. Therefore, it is incorrect to interpret $\hat{\gamma}_{BS}$ and $\hat{\gamma}_{HM}$ as upper and lower bounds for γ. Consequently, the AER (2008) measure $\bar{\gamma} = \frac{1}{2}\left(\hat{\gamma}_{BS} + \hat{\gamma}_{HM}\right)$ is entirely *ad hoc*.

The intention of the AER approach is to obtain a estimate of γ (and hence θ) as $\bar{\gamma} = \frac{1}{2}\left(\hat{\gamma}_{BS} + \hat{\gamma}_{HM}\right)$, where the AER assert that the Handley and Maheswaran (2008) estimate, $\hat{\gamma}_{HM}$, represents a valid upper bound value for γ and that the Beggs and Skeels (2006) estimate, $\hat{\gamma}_{BS}$, represents a reasonable lower bound estimate of γ.

The AER's approach may be graphically represented as

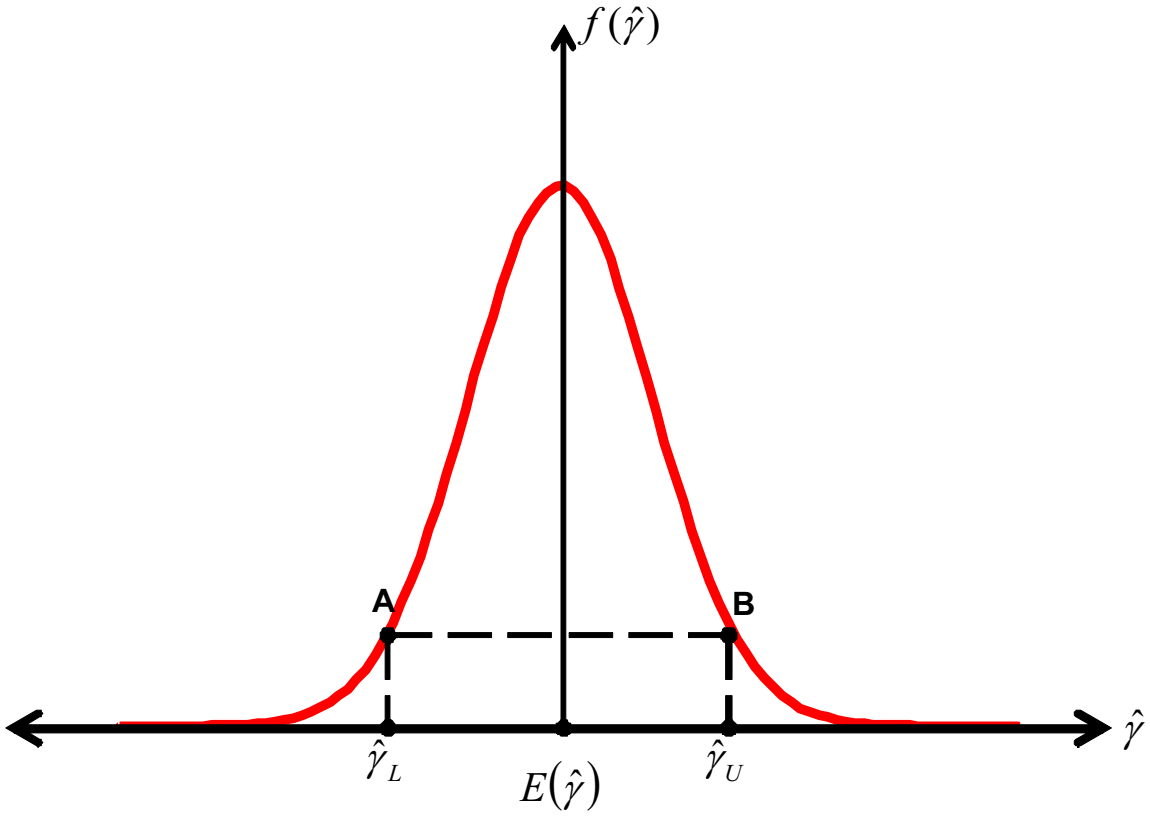

Figure 1: The AER approach under ideal circumstances.

Given valid upper bound and lower bound values for γ, the AER approach could yield a reasonable estimate of the parameter of interest under ideal circumstances. However, it is the opinion of the author of this report and co-author of Beggs and Skeels (2006) that the AER does not have a valid estimate of the lower bound as $\hat{\gamma}_{BS}$ cannot be interpreted as such. Moreover, even if you could interpret $\hat{\gamma}_{BS}$ as a lower bound, the fact remains that because $\hat{\gamma}_{BS}$ and $\hat{\gamma}_{HM}$ are insignificantly different from each other, the range between the bounds, depicted as AB in figure 1 is insignificantly different from zero. The AER measure $\bar{\gamma} = \frac{1}{2}\left(\hat{\gamma}_{BS} + \hat{\gamma}_{HM}\right)$ is essentially $\bar{\gamma} = \frac{1}{2}\left(2\hat{\gamma}_{BS}\right) = \frac{1}{2}\left(2\hat{\gamma}_{HM}\right)$ because the hypothesis $H_0 : \gamma_{BS} - \gamma_{HM} = 0$ cannot be refuted. Consequently, the finding that $\bar{\gamma}$, $\hat{\gamma}_{HM}$ and $\hat{\gamma}_{BS}$ are statistically insignificantly different from each other.[14]

[14] For ease of exposition it is assumed that the parameter estimators are normally distributed in Figures 1 and 2. This has no bearing on the generality of the conclusions.

The discussion in the preceding paragraph assumes that the AER were operating under ideal conditions, with valid estimates of the lower and upper bounds of γ. However, it is the opinion of the author of this report and co-author of Beggs and Skeels (2006) that the AER does not have a valid estimate of the lower bound as $\hat{\gamma}_{BS}$ should not be interpreted as such. The consequence of the misinterpretation of the evidence in the literature is to induce an upward bias in the AER point estimate of γ, $\bar{\gamma} = \frac{1}{2}(\hat{\gamma}_{BS} + \hat{\gamma}_{HM})$. Figure 2 provides a graphical representation of this bias.

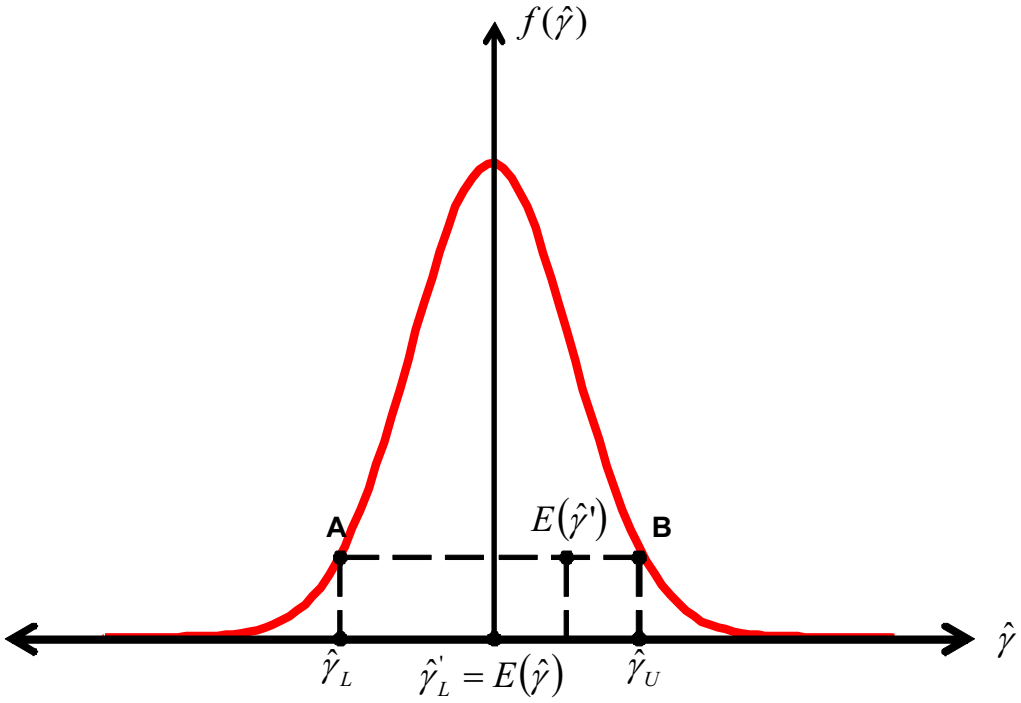

Figure 2: The AER approach under less than ideal circumstances.

The message to be gleaned from figure 2 is that by using $\hat{\gamma}_{BS}$ as a lower bound in place of an actual estimate of the lower bound, $\hat{\gamma}_L$, the methodology of the AER yields an upwardly biased estimate of γ. This is depicted in figure 2, by the point $E(\hat{\gamma}')$ which exceeds $E(\hat{\gamma})$, the point we are actually trying to estimate. If you accept the proposition that the methodology by Handley and Maheswaran (2008) yields an estimate of $\hat{\gamma}_U$, the

upper bound for γ, a proposition that we will not contest here, then the AER point estimator of γ must be upwardly biased by construction.

6. Summary and Conclusion

This report demonstrates that there is no evidence whatsoever that the Beggs and Skeels (2006) and Handley and Maheswaran (2008) estimates imply different values of γ as would be case if they were estimates of bounds. This, of course, implies that the AER measure of γ is baseless because it purports to average lower and upper bounds when in fact it averages two numbers that are not statistically significantly different to one another. The AER also misinterpret the results reported in Beggs and Skeels (2006), leading to an upward bias in their point estimate of γ.

Technical Appendix

Point Estimates and Interval Estimates

Estimation is the process of 'informed guessing' of values for unknown population parameters. A point estimate is a single number which represents a guess for the value of the unknown parameter. Being a single number, a point estimate contains no information about the precision of the guess. One way of conveying information about the precession of an estimate is to provide a range of values which may cover the true value of the parameter. Such a range is called an interval estimate. Clearly, the narrower the interval the more precise the estimate. A common way of constructing interval estimates involves confidence intervals which are obtained using

$$B_L = \text{estimate} - c \times (\text{standard error of estimate})$$
$$B_U = \text{estimate} + c \times (\text{standard error of estimate})$$

where B_L and B_U represent lower and upper bounds, respectively, and the positive constant c is chosen to yield the desired level of confidence. The greater the value of c the greater the level of confidence attached to the interval. In this report the value of c is chosen to be 1.96 which will be at least approximately valid for our purposes.

Standard Errors

Standard Errors are estimates of the standard deviation of a random variable. The standard deviation of a random variable is simply the square root of its variance. Thus, a standard error is the square root of an estimated variance.

Variances of Weighted Sums

Much of our consideration are in respect of weighted sums of random variables. For the purposes of illustration it suffices to think of two random variables, X and Y say. Our interest is then in the weighted sum $w_1X + w_2Y$, where w_1 and w_2 are weights. Of particular concern is the variance of such a sum. It is easy to establish that

$$\text{Var}\left(w_1X + w_2Y\right) = w_1^2\text{Var}\left(X\right) + w_2^2\text{Var}\left(Y\right) + 2 \times w_1 \times w_2 \times \text{Cov}\left(X,Y\right)$$

where $\mathrm{Var}(X)$ and $\mathrm{Var}(X)$ denote the variance of X and the variance of Y, respectively, and $\mathrm{Cov}(X,Y)$ denotes the covariance between X and Y. Two examples are of particular importance. First, suppose that we wish to find the variance of a simple average of X and Y. In this case we have $w_1 = w_2 = \frac{1}{2}$ and

$$\begin{aligned}\mathrm{Var}\left(\frac{X+Y}{2}\right) &= \left(\frac{1}{2}\right)^2 \mathrm{Var}(X) + \left(\frac{1}{2}\right)^2 \mathrm{Var}(Y) + \left(\frac{1}{2}\right) \times \mathrm{Cov}(X,Y) \\ &= \frac{\mathrm{Var}(X) + \mathrm{Var}(Y) + 2 \times \mathrm{Cov}(X,Y)}{4}\end{aligned}$$

The special case that will concern us is the variance of $\bar{\gamma} = \frac{1}{2}(\hat{\gamma}_{BS} + \hat{\gamma}_{HM})$. As discussed in footnote 14 we assume that $\mathrm{cov}(\hat{\gamma}_{BS}, \hat{\gamma}_{HM}) = 0$ and so we have immediately

$$s.e.(\bar{\gamma}) = \sqrt{\left(\frac{1}{2}\right)^2 \mathrm{var}(\hat{\gamma}_{BS}) + \left(\frac{1}{2}\right)^2 \mathrm{var}(\hat{\gamma}_{HM})}$$

The other case that we encounter is the variance of a difference between two random variables. In this case we have $w_1 = 1$ and $w_2 = -1$, say, and

$$\begin{aligned}\mathrm{Var}(X-Y) &= (1)^2 \times \mathrm{Var}(X) + (-1)^2 \times \mathrm{Var}(Y) + 2 \times (1) \times (-1) \times \mathrm{Cov}(X,Y) \\ &= \mathrm{Var}(X) + \mathrm{Var}(Y) - 2 \times \mathrm{Cov}(X,Y)\end{aligned}$$

The special cases that will concern us occur in calculating $s.e.(\hat{\gamma}_{BS} - \bar{\gamma})$ and $s.e.(\hat{\gamma}_{HM} - \bar{\gamma})$. This will entail calculation of the $\mathrm{cov}(\hat{\gamma}_{BS}, \bar{\gamma})$ and $\mathrm{cov}(\hat{\gamma}_{HM}, \bar{\gamma})$. Let $\hat{\gamma}_i$ be $\hat{\gamma}_{BS}$ or $\hat{\gamma}_{HM}$ as required, and let $\hat{\gamma}_j$ denote the other of this pair. Then

$$\begin{aligned}\mathrm{cov}(\bar{\gamma}, \hat{\gamma}_i) &= \mathrm{cov}\left(\frac{1}{2}(\hat{\gamma}_i + \hat{\gamma}_j), \hat{\gamma}_i\right) \\ &= \frac{1}{2}\mathrm{cov}(\hat{\gamma}_i, \hat{\gamma}_i) + \frac{1}{2}\mathrm{cov}(\hat{\gamma}_i, \hat{\gamma}_j) \\ &= \frac{1}{2}\mathrm{var}(\hat{\gamma}_i)\end{aligned}$$

where the final equality follows from the independence assumption discussed in footnote 14. Thus, given that $s.e.(\hat{\gamma}_i - \overline{\gamma}) \quad \sqrt{\text{var}(\hat{\gamma}_i) + \text{var}(\overline{\gamma}) - 2\,\text{cov}(\hat{\gamma}_i, \overline{\gamma})}$, we deduce

$$\text{var}(\hat{\gamma}_{BS} - \overline{\gamma}) = \text{var}(\hat{\gamma}_{HM} - \overline{\gamma}) = \text{var}(\overline{\gamma}).$$

Hence $s.e.(\hat{\gamma}_{BS} - \overline{\gamma}) = s.e.(\hat{\gamma}_{HM} - \overline{\gamma}) \quad \sqrt{\text{var}(\overline{\gamma})}$ as reported in the text.

Marginal Significance Level (p-value)

The marginal significance level of a test statistic is the probability of obtaining a value for the statistic at least as extreme as the one observed given that the hypothesis is true. Specifically, when testing an hypothesis one would be unable to reject the hypothesis at any level of significance less than or equal to the marginal significance level. That is, the larger the p-value the less likely is a rejection. In practice the standard levels of significance used in hypothesis testing are 1% , 5% and 10%, and of these 5% is the most commonly used. P-values in excess of 5% signify a failure to reject the null and p-values bigger than 10% are deemed to provide very strong evidence that the hypothesis should not be rejected.

Appendix 4

A review of the SFG study

A Review of the SFG Dividend Drop-Off Study

A Report prepared for Gilbert and Tobin by

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[1] The views expressed in this report are those of the author and do not necessarily reflect those of the University of Melbourne.

Executive Summary

I am a co-author of "Market Arbitrage of Cash Dividends and Franking Credits", published in *The Economic Record in 2006* (Volume 82 (258), 239-252). This paper was reviewed by Strategic Finance Group Consulting (SFG) in their 2008 and 2009 reports and by the Australian Energy Regulator (AER) in 2009.

In this report I review the Strategic Finance Group Consulting report entitled "The value of imputation credits as implied by the methodology of Beggs and Skeels (2006)", and the associated comments by the Australian Energy Regulator in "Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters" (AER (2009))[2]. In light of these reviews I formulated a series of questions that were given to SFG which they answered.

The main findings of my report are:

1. On the basis of my analysis of the SFG study I conclude that:
    - The SFG study chose not to adopt a scaling of some data that was used by Beggs and Skeels (2006) on the grounds that it would have little material impact. That said, SFG now provide results where this scaling is included which allows greater comparability with the results of Beggs and Skeels (2006).
    - The SFG study adopt a different approach to filtering out unreliable observations from the sample than do Beggs and Skeels (2006). The approach adopted lacks the economic justification of Beggs and Skeels (2006). This raised the question of the extent to which their results were contingent upon their choice of data filtering methodology. In response to questions along these lines, SFG have produced a new set of results where no observations identified as potentially

[2] The issues raised by the AER, which I review in this paper arise from SFG's 2009 report, "The value of imputation credits as implied by the methodology of Beggs and Skeels (2006)", which builds on an earlier report by SFG, produced in 2008, entitled "The impact of franking credits on the cost of capital of Australian firms". Hereafter, a reference to the "SFG study" is a reference to both of the reports listed above.

unreliable are excluded from the analysis in the absence of an economic justification. This make the results presented here (in Appendix I) much more credible than those in the SFG study.

- The extension of the post 1 July 2000 sub-sample by an additional 28 months of observations represents a significant contribution which should result in parameter estimates more accurately reflecting the true population values than does the sub-sample used by Beggs and Skeels (2006) which end in May 2004.

2. On reviewing AER (2009) I found the following:
    - 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.
    - The AER did raise some more substantial points that required attention from SFG. The most important of these were the issues of scaling and the use of Cook's D statistic for data filtering. SFG's response to the issue of filtering provides more reliable parameter estimates, which are presented in the appendix to this report. Furthermore, SFG's response to the issue of scaling demonstrates that their original results were not manifestly affected by the omission of scaling. The estimates obtained from the rescaled data are more comparable to those of Beggs and Skeels (2006) and are reported in the appendix to this report.
    - The other matter of substance raised by the AER was the use of incorrect corporate tax rates in the analysis by SFG. This was a mistake that simply had to be corrected for SFG's results to have any credibility at all. The results presented in Appendix I address this problem. It is seen that the error was relatively small and had little impact. Nevertheless, only the correct results are of interest and these are now available.

- The AER were concerned about the magnitudes of some of the estimated standard errors accompanying the estimates presented in the SFG study. One consequence of reworking their results to correct the corporate tax rates, to do a better job of data filtering, and to apply appropriate scaling is that the relevant estimated standard errors are smaller than seen in the SFG study, thereby mitigating the AER's cause for concern.

3. 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.
4. It is clear that the more recent data used in the SFG results presented in Appendix I favour an estimate of theta that is lower than that of 0.57 which was obtained by Beggs and Skeels on the basis of less recent data. However, it might be argued that the minor methodological differences that remain between the methodology of Beggs and Skeels (2006) and that of SFG bias their estimate of theta downwards. (This is not a position to which I subscribe and I present it only in the garb of a devil's advocate.) Were such a position to be taken then, in my opinion, a compelling case can be made that the empirical evidence overwhelmingly supports the notion that the true value of theta lies between the SFG estimate of 0.23 and the Beggs and Skeels (2006) estimate of 0.57, and that in all probability it lies closer to 0.23 than 0.57.

Declaration

This report has been commissioned by Gilbert and Tobin ultimately for all six South Australian and Victorian electricity distribution businesses. I provide an independent review of the SFG study and the AER (2009) criticisms thereof. At no stage have I had any direct contact with SFG. Through Gilbert and Tobin, SFG have provided copies of their original SAS code, their data set, and copies of their results. At the conclusion of the first stage of this report I prepared a set of questions for SFG that were conveyed to them by Gilbert and Tobin. The response from SFG was conveyed to me through Gilbert and Tobin. The questions and SFG's responses appear as an Appendix to this document, together with the SAS code used to obtain the relevant results, the data used, and the results obtained.

C. Skeels

28 August 2009

1. Introduction

I provide (i) an independent assessment of "The value of imputation credits as implied by the methodology of Beggs and Skeels (2006)" a report prepared by SFG Consulting for ENA, APIA, and Grid Australia and submitted to the AER, and (ii) an evaluation of the AER's assessment of the SFG study. These items are presented in the next two sections of this report. As a consequence of these reviews I posed a series of questions to SFG. These questions and the response from SFG appear as Appendix I. I discuss this response in Section 4 of this document. The fifth and final section of this report provides concluding remarks summarizing my findings.

2. The SFG Study

The SFG study is divided into seven main sections. The first two sections provide a context for the report and a survey of the recent literature on estimating the value of imputation credits, while the final section simply lists the references cited by the report. This review will focus on the four remaining sections which present (i) The AER approach (ii) a comparison of the SFG study and Beggs and Skeels (2006) results (iii) results based on an extended sample period and (iv) results based on a sample which excludes certain observations deemed to be "influential".

The AER Approach

The AER states 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. Accordingly the AER has placed significant weight on the 2001 – 2004 estimate of theta from this study, of 0.57" (AER 2009 p.328).

The essential feature of the AER approach is the use of a regression-based methodology focusing on the post 1 July 2000 period. The analysis of the SFG study adopts the same broad strategy. An important contribution by the SFG study is to extend the sample period to 30 September 2006; that used in Beggs and Skeels (2006) ended at 10 May 2004. By extending this period more information is available for use in estimation and, all things equal, one would expect the estimates obtained in the SFG study to more accurately reflect the true population values than do those provided by Beggs and Skeels (2006) on the basis of a smaller sample. Specifically, I believe that the SFG study estimates are of equal significance as those of Beggs and Skeels (2006).

A Comparison of SFG and Beggs and Skeels results

SFG argue that their report is more comprehensive than that of Beggs and Skeels because

(i) The SFG study employs a wider cross section of firms

(ii) The SFG study employs a "a longer and more recent data period" (SFG 2009, p.8).

I note in passing that the Beggs and Skeels (2006) data begins in 1986 while the SFG study data set begins in 1997, so the contribution of the SFG study is to bring more information to bear on the problems involved in estimating theta in the post-2000 sub-sample, the period of particular interest to the AER. Consequently, I would expect the SFG study estimate of theta for the post-2000 sub-sample to be a more accurate reflection of the population values than those of Beggs and Skeels (2006).

The SFG study follows the Beggs and Skeels (2006) using a Feasible Generalised Least Squares (FGLS) estimator to obtain coefficient estimates for the regression

$$\Delta P_i = \alpha_0 + \alpha_1 D_i + \alpha_2 F_i + \varepsilon_i \,, \tag{1}$$

where i is the index of the dividend event, $\Delta P_i = P_{c,i} - P_{x,i}$ denotes the difference between cum-dividend prices $P_{c,i}$ and ex-dividend prices $P_{x,i}$ (the so-called price drop-off), D_i is the cash dividend per share, and F_i is the corresponding franking credit. Here the weights in the FGLS estimator were obtained from an auxiliary regression of the squared residual from (1) on the gross dividend:

$$\ln \hat{\varepsilon}_i^2 = \lambda_0 + \lambda_1 W_i + \lambda_2 G_i + \lambda_3 P_{c,i} + u_i \,, \tag{2}$$

where W_i is the company size measured by market capitalization as a proportion of the All Ordinaries Index and $G_i = D_i + F_i$ is the gross dividend. I note in passing that Beggs and Skeels (2006, Footnote 6) scale $P_{c,i}$ in an attempt to further mitigate the effects of heteroskedasticty. There was no clear evidence that a similar scaling was performed in the SFG study.[3]

The empirical results of the SFG study are presented in Table 1 (SFG, 2009, p.8), which is reproduced below.

[3] This point was subsequently confirmed by SFG; see the SFG response to Question 2 in Appendix I, where the scaling is shown to have little effect, and the discussion in Section 4.

Table 1. Comparison with Beggs and Skeels (2006)

	Beggs & Skeels (2006)			SFG (2008)			SFG (2008) excl. influential 1%		
	Cash	Franking	N	Cash	Franking	N	Cash	Franking	N
Regression analysis ending 10 May 2004									
1 July 1985 –	0.465	0.752	910						
30 June 1988	(0.040)	(0.157)							
1 July 1988 –	0.646	0.450	546						
30 June 1990	(0.064)	(0.119)							
1 July 1990 –	0.765	0.376	236						
30 June 1991	(0.115)	(0.206)							
1 July 1991 –	0.861	0.201	1,669						
30 June 1997	(0.059)	(0.103)							
1 July 1997 –	0.795	0.418	573	0.773	0.361	710	0.871	0.142	699
30 June 1999	(0.099)	(0.186)		(0.270)	(0.645)		(0.087)	(0.184)	
1 July 1999 –	1.168	0.128	267	0.205	1.163	329	0.746	0.360	326
30 June 2000	(0.099)	(0.204)		(0.184)	(0.710)		(0.102)	(0.239)	
1 July 2000 –	0.800	0.572	1,310	0.895	0.526	1,389	0.945	0.190	1,378
10 May 2004	(0.052)	(0.121)		(0.227)	(0.541)		(0.059)	(0.136)	
			5,511	Adj-R^2	1.9%	2,428	Adj-R^2	24.1%	2,403
Regression analysis ending 30 September 2006									
1 July 1997 –				0.761	0.437	710	0.844	0.246	696
30 June 1999				(0.235)	(0.577)		(0.085)	(0.186)	
1 July 1999 –				0.100	0.369	329	0.797	0.224	326
30 June 2000				(0.077)	(0.388)		(0.102)	(0.240)	
1 July 2000 –				0.913	0.913	2,182	0.916	0.235	2,166
31 December 2006				(0.168)	(0.388)		(0.049)	(0.111)	
				Adj-R2	3.5%	3,221	Adj-R2	31.0%	3,188

In the first instance we will restrict attention to the first two columns of Table 1.In the first column SFG reproduce results from Beggs and Skeels (2006) and in the second column they report results based on a sample of 'large' firms, where 'large' firms have a market capitalization of at least 0.03% of the All Ordinaries Index, which was a necessary condition for inclusion in the sample used by Beggs and Skeels (2006).

For the most part the parameter estimates in these two columns are very similar although there are some differences. For example, for the sub-sample 1 July 2000 – 10 May 2004, The SFG study estimates the value of a dollar of cash dividends at 89.5 cents per dollar whereas Beggs and Skeels (2006) report an estimate of 80.0 cents per dollar. Similarly, the SFG study reports a corresponding estimate for imputation credits of 52.6 cents per dollar whereas the Beggs and Skeels estimate is 57.2 cents per dollar. Some of these differences may be explained by the failure of the SFG study to incorporate in their methodology the scaling of $P_{x,i}$ that was used by Beggs and Skeels (2006). This absence of scaling is unlikely to explain the differences observed for the 1999-2000 sub-sample.[4] The SFG study comments on the curious pattern in the estimates of the value of a dollar of cash dividends reported by Beggs and Skeels (2006) which peaks in this sub-sample but are silent about the fact that they report a trough in this estimate for the same sub-sample. While Beggs and Skeels (2006) report an implausible value of 1.168 for the peak

[4] Indeed, as was subsequently demonstrated in Appendix I, the scaling has little impact on the results.

value of a dollar of cash dividends, the SFG study reports an equally implausible value of 1.163 for the estimated value of a dollar of imputation credits.[5] Given the relatively small sample size for this particular sub-sample great caution should be taken in drawing any conclusions from this sub-sample.

With the exception of the 1999-2000 sub-sample, it is difficult to argue that there is a manifest difference between the results reported by SFG in the second column of Table 1 on page 9 and those reported by Beggs and Skeels (2006). The AER, in their discussion of the SFG study, focus on the difference in magnitude of the estimated standard error for the estimate of the franking credit drop-off ratio. I will return to this point in the sub-section discussing outliers/influential observations and also in the section assessing the AER's comments on the SFG study.

Extension of time period to include additional data

The SFG study extends the sample period to include an additional 28 months of data in the post-2000 sub-sample. The Beggs and Skeels (2006) study employs data to 10 May 2004 while SFG have data to 30 September 2006.[6] Results based on the extended sample can be found in the bottom panels of columns 2 and 3 of Table 1, respectively. The SFG study observes that "when more recent data is included but the estimation process remains unchanged in all other respects, the estimate of theta falls from 0.57 (as estimated by Beggs and Skeels) to 0.37" (SFG study, p.10). All statistical theory and, indeed, common sense indicates that the provision of additional data points makes available more information for estimation and so estimates obtained on the basis of a larger data set should provide a more accurate reflection of the underlying population. The proviso here is that there is nothing wrong with the data. I observe that the nature of the extra data points used by the SFG study in extending the data set is exactly the same as that used in the shorter data sets that finish at 10 May 2004. Consequently, the only reasonable conclusion to be drawn is that the extended data set should yield more accurate parameter estimates for the 1 July 2000 onwards sub-sample than does the shorter data set.

[5] These are the circled values in Table 1. In the response to Question 1, Appendix I this peculiar behaviour in the SFG study is shown to be largely driven by a single outlier, viz. Transurban.

[6] Table 1 includes a curious conflict in the claimed date at which the sample finishes, being variously cited as 30 September 2006 and 31 December 2006. This was clarified by SFG who confirm that the end date was 30 September 2006.

I note in passing that the results for the period 1999 – 2000 remain problematic even with the extended data set.[7]

Exclusion of outliers/influential observations

If I compare the sub-sample sizes used by Beggs and Skeels (2006) with those of the SFG study, and look at the comparable sub-samples in columns 1 and 2 of Table 1, I note that the sub-sample sizes used by the latter report are larger. Beggs and Skeels (2006) used a proprietary data set provided to them by CommSec under strict non-disclosure conditions.[8] As observed by SFG (2009, p.9), "Beggs and Skeels (2006) do not list the observations for which they were unable to obtain all of the required data items, so it is impossible to know exactly what sample they use." This statement is perfectly correct. In my opinion it is these differences in samples that are primarily responsible for differences in parameter estimates over the interval 1 July 1997 – 10 May 2004.

It is important to consider the source of differences between the samples used by the two studies. Beggs and Skeels (2006) excluded from their sample all observations for which any of the dividend payout, the corporate tax rate, the cum-dividend share price, the ex-dividend share price, or the market capitalization of the company were not known. In addition they restricted attention to 'large' firms for which the market capitalization was at least 0.03% of the All Ordinaries Index. Finally, Beggs and Skeels (2006) also excluded all observations that changed their basis for quotation within 5 days either side of the ex-dividend day and also removed all special dividend payments. The SFG study restricted their sample to large firms, in accord with the procedure of Beggs and Skeels (2006) but have not applied the other filters. Note, however, that the other filters fall into two distinct classes. The first class reflects shortcomings in the data available to Beggs and Skeels (2006) and the second class excludes observations for which there are economic grounds to believe that they may be unreliable. To the extent that the increased sub-sample sizes of the SFG study reflect the fact that they were able to find information that

[7] This is discussed by SFG in Appendix I

[8] The data set is described in Beggs and Skeels (2006, Appendix I).

Beggs and Skeels (2006) were missing, the data used by the SFG study are an improvement over those used by Beggs and Skeels (2006). To the extent that the SFG study data contains observations that Beggs and Skeels (2006) felt were economically unreliable then the larger samples are a concern. The problem is that, in the absence of the data used by Beggs and Skeels (2006), it is impossible to know whether the increased sample sizes were due to the inclusion of observations deemed unreliable by Beggs and Skeels (2006) or good observations that Beggs and Skeels (2006) simply did not have.[9]

Given the uncertainty about (i) the extent to which the sub-samples used by Beggs and Skeels (2006) and by the SFG study overlap and (ii) the extent to which the observations used by the SFG study that are not in the Beggs and Skeels (2006) data set are economically reliable it seems sensible to examine the robustness of the results to the chosen data set. One common statistical device for this is to use Cook's D statistic to determine those observations that are most influential in determining the values of the parameter estimates and then to explore those observations and decide whether they are reliable data points or not. The important point to recognize is that not all influential observations are unreliable. Moreover, not all unreliable observations are influential. However, it is clear that any influential observations that are unreliable should be removed from the analysis.

The SFG study adopts a strategy of excluding from the analysis 1% of observations which are most influential. The results obtained using this restricted sample are reported in the third column of Table 1. On the basis of these results, the SFG study erroneously argues that the Beggs and Skeels (2006) results are driven by outliers or influential observations. The reason this argument is wrong is simply because SFGdo not know whether or not the influential observations excluded from the analysis in this way were part of the data set used by Beggs and Skeels (2006) or not.

In comparing the results of Beggs and Skeels (2006), for the 1 July 2000 – 10 May 2004 sub-sample, with those presented by the SFG study in the third column of Table 1, it is clear that the

[9] In the results presented in Appendix I, SFG follow a middle path of using Cook's D statistic to identify potentially unreliable observations but only excluding those observations for which an economic justification can be found. This procedure is very similar in spirit to that of Beggs and Skeels (2006) and yields both plausible and credible results.

estimate of theta is sensitive to the presence of influential observations. Note that the two estimates of the cash drop-off ratio for this sub-sample, reported in columns 2 and 3 of Table 1 are not statistically significantly different from each other and so the excluded data points do not seem to exert much influence over these estimates.[10] It is interesting to note that the exclusion of just 3 influential observations from the sub-sample 1 July 1999 – 30 June 2000 has had a dramatic effect on the estimates there and it is difficult to draw any other conclusion than that, amongst the three excluded observations, there were some extremely unreliable observations.[11]

It is important to note that the deletion of an observation deemed to be influential in terms of the Cooks D metric is not mandatory. An observation that is influential in terms of leverage need not necessarily be an outlier. Moreover, even in the face of outliers, deletion of the offending observation is not obligatory. A number of alternative estimators are available to the researcher, the most commonly used of which is the Least Absolute Deviations estimator. The LAD, approach is given by

$$\sum_{i=1}^{N} |\varepsilon_i| = \sum_{i=1}^{N} \left|\Delta P_i - \Delta \widehat{P}_i\right| = \sum_{i=1}^{N} \left|\Delta P_i - \alpha_0 + \alpha_1 D_i + \alpha_2 F_i\right| \qquad (3)$$

The estimates are obtained by minimizing the sum of the absolute value of the residuals rather than the sum of the squared residuals as in OLS estimation. By focusing on minimizing the sum of the absolute values of the residuals rather than the sum of the squared residuals, the effect of the LAD estimator is to reduce the influence of outlying observations.

[10] To be clear on this point, the cash drop-off estimates of 0.895 and 0.945 are insignificantly different from each other but significantly different from zero in a statistically meaningful sense. However, the franking credit drop-off estimates are both statistically insignificantly different from each other and from zero.

[11] This has subsequently been determined to be shares related to Transurban; see the discussion in Appendix I in response to Question 1.

3. Criticisms of the SFG Study by the AER

In this section I explore the AER's findings with respect to the SFG study.[12] In what follows the AER's findings are presented in italics and my comments are presented in an upright font.

- *SFG's outputs (i.e. regression coefficients) as presented in its report to the AER (and including the p-values submitted later) were found to be replicable.*

  I concur.

- *Under all three methods employed by SFG (i.e. Beggs and Skeels, Hathaway and Officer, and ACG), the estimate of theta is highly sensitive to the sample selected.*

  This was also my experience during the writing of Beggs and Skeels (2006). There are two aspects to this issue. First, there is a question of which stocks to include in the study. In price drop-off studies, such as Beggs and Skeels (2006), it is essential that the price data is of a high quality. Prices which fully and instantaneously reflect all of the available information in the market are said to be efficient prices. In order for prices to be efficient it is necessary that sufficient trades occur for all of the available information to be revealed and so it is common practice to exclude from such studies stocks that are not traded with sufficient frequency or in sufficient volume to be thought of as having efficient prices. In the Beggs and Skeels (2006) study we followed the advice of the then manager of the CommSec Share Portfolio Database and chose a market capitalization of 0.03% of the All Ordinaries Index as the cut-off for particular stocks to be included in the study. Clearly this choice is arbitrary and, moreover, the results obtained are clearly sensitive to this choice. Other choices can quite reasonably lead to different outcomes. We note that the SFG study also models the price drop-off for large firms, using the same 0.03% market capitalization filter as Beggs and Skeels (2008).

[12] Specifically I am dealing with the material presented in AER (2009, pp. 438 – 441).

The second aspect of sensitivity to data stems from the fact that the appropriate data themselves are difficult to construct.[13] One of the important features of Beggs and Skeels (2006) was our access to the CommSec data. The type of data used in our study is difficult to assemble and, in particular, not all of the required data are available in readily accessible sources such as Bloomberg. Specifically, finding reliable cum-dividend and ex-dividend event prices on the dividend event date can be extremely difficult.[14] An important feature of the SFG study is that considerable attention has been devoted to the development of a 'clean' data set, i.e. a data set relatively free of unreliable or incomplete observations. Moreover this data set extends the available data set until the end of September 2006. Beggs and Skeels (2006) were constrained by a relatively short sample period after the 2000 legislative change and the additional information contained in the extended data set used in the SFG study should be beneficial in respect of more precisely estimating the effect of the 2000 legislative change.

The data set used by Beggs and Skeels (2006) extends back to the introduction of dividend imputation in 1986 whereas that used by SFG only starts in 1997. Note that when testing for a change in the franking credit drop-off as a consequence of the 2000 legislative change Beggs and Skeels (2006) only use data from 1998 onwards and so this difference in starting points for the different data sets will be immaterial.

- *In studying the program codes written by SFG, the AER identified a number of issues which may detract from the reliability of the results. For example:*
    - *It is common in the literature for the market return variable to be included as a control variable in assessing the dividend drop off ratio. Whilst the Beggs and Skeels study adjusted the daily observed ex-dividend share price for the aggregate movement in the market to account for the noise in the data associated with general market movements, it appears the SFG study did not make such adjustments.*

[13] Indeed, much of the feedback that I received at the time of its publication was in the form of enquiries seeking access to our data.
[14] The great benefit of using the CommSec data was that considerable resources had already been directed to 'cleaning' the data, i.e. filtering out incomplete or unreliable observations, as discussed in the previous section.

I concur with this observation.[15] Furthermore, the duration of the data sets differ, with the Beggs and Skeels (2006) study covering the period 1 April 1986 to 10 May 2004 whereas the SFG study covers the period 1 July 1997 to 30 September 2006. The important question, however, is the extent to which this matters. From Table 10.10 of AER (2009, p.440) we see that the actual estimates of various parameters are reasonably close to one another and so, in terms of formulating a best guess of the true parameter values,[16] it appears that the scaling does not have much impact. This is hardly surprising because the scale factor is simply 1+RI, where RI is the rate of return to the All Ordinaries Index over the ex-dividend day. For any given ex-dividend day, 1+RI will be close to 1 because RI is close to 0.[17] Hence, the impact of this scaling on the estimated coefficients will be minimal.[18]

In summary, there is nothing in the results to suggest that the difference in scaling between the two studies has any significant impact on the results obtained. Consequently, in my opinion, this reason does not constitute grounds to question the reliability of the SFG results.

- *The company tax rates applied by SFG over time do not appear to correspond with the official period over which the various tax rates apply (i.e. as reported by the ATO).*

  I concur.[19]

- *SFG's dividend drop off study is prone to the common problem of multi-collinearity in the regression model. However, consistent with the methodologies adopted in its study, it has attempted to deal with some of these issues – in particular through its use of the Beggs and Skeels methodology.*

[15] This scaling is subsequently used in obtaining the results presented in Appendix I, where it is seen not to make much difference to the results.
[16] The word 'estimation' is simply statistical jargon for forming a best guess.
[17] Not only is this an empirical 'stylized fact, it is consistent with the predictions of the theory of efficient markets which suggests that E(RI)=0 on any given day, implying that E[1+RI]=1.
[18] The impact of the scaling is addressed by SFG and is presented in Appendix I. In summary, the absence of scaling was confirmed to have minimal impact on the estimated coefficients.
[19] This error is corrected in the results presented in Appendix I.

Except for certain orthogonal designs, typically only observed in the experimental sciences, there is always some degree of multicollinearity present amongst explanatory variables in multiple regression models. Such multicollinearity does not materially impact upon the usefulness of these models nor does it materially impact upon the usefulness their results. The real issue that needs to be considered is the extent of the multicollinearity present which requires an understanding of the underlying problem.

By way of a simple analogy consider the songs of, say, Lennon and McCartney. It is straight-forward to measure the success of the songs but, without more information than just the measured success of the songs, it is impossible to know the individual contributions of Lennon and McCartney to that success. In multiple regression models, such as those under discussion, multicollinearity is a problem whereby the individual effects of each of the explanatory variables can be difficult to distinguish from each other even though we observe that, collectively, the explanatory variables do a reasonable job of explaining variability in the dependent variable.[20]

The question then is what circumstances might cause you to believe that multicollinearity is a problem. As per the discussion of the preceding paragraph the tell-tale signs are (i) the fitted model appears to have some ability to explain variability in the dependent variable and (ii) the estimated coefficients of the model are statistically insignificantly different from zero. Any estimated regression model presenting these symptoms presents a conundrum because, on the one hand, the model provides a reasonable fit to the dependent variable but, on the other hand, it seems that this reasonable fit is not caused by the explanatory variables in the model because the coefficients on these variables cannot be distinguished from zero. Clearly this is a contradiction because the explanatory power of the estimated model can only come from the explanatory variables and

[20] As an aside, just like the problem of separating the effects of Lennon from McCartney, the solution to the problem of multicollinearity is always to use more information to help isolate the individual effects of the various explanatory variables.

so they can't all be unrelated to the dependent variable (which is what a coefficient of zero implies).

An important caveat to the preceding discussion is that a single coefficient estimate being insignificantly different from zero is not symptomatic of multicollinearity. Indeed, a single coefficient being insignificantly different from zero simply implies that your best guess of the true parameter value is no different to zero.

If we turn to the results presented in AER (2009, Table 10.10) we see that the SFG study estimates of the regression coefficients for the franking credit drop-off are both insignificantly different from zero.[21] However, both of the estimated regression coefficients for the cash dividend drop-off are statistically significantly different from zero.[22] Consequently, we see no evidence of a conundrum whereby the estimated coefficients are statistically insignificantly different from zero even though the estimated model is doing a reasonable job of explaining the variability in the dependent variable. That is, in my opinion multicollinearity is not problematic in the SFG study. Specifically, because the estimated coefficient on the cash dividend is statistically significantly different from zero, the results from the SFG study unequivocally indicate that the cash-dividend is explaining the price drop-off of the share and that the franking credit is not obviously responsible for explaining any of the price drop-off stemming from the dividend event.

The AER also examined the results (and derivation thereof) reported by SFG in its latest report prepared for the JIA. Specifically the AER has explored the differences (if any) between the results from the SFG study and the Beggs and Skeels (2006) study. Table 10.10 presents the comparison of results as presented in the SFG's report for the JIA.

[21] To see this one need only calculate the relevant t statistics, which are clearly both less than unity in value – 0.526/0.541 and 0.369/0.388 – and so one would accept a null hypothesis that the true value of the franking credit drop-off was statistically insignificantly different from zero at any reasonable size.

[22] Here the relevant t-ratios are 0.895/0.227 and 0.913/0.168 and these clearly present compelling evidence that the true value of the cash dividend drop-off is statistically significantly different from zero at any reasonable size.

Table 10.10: SFG – comparison of results from Beggs and Skeels (2006) with SFG (2008) over the post July 2000 period

Period	Beggs and Skeels (2006)			SFG (2008)		
	Cash[(a)]	FC[(b)]	N[(c)]	Cash	FC	N*
1 July 2000 – 10 May 2004	0.800 (0.052)	0.572 (0.121)	1,310	0.895 (0.227)	0.526 (0.541)	1,389
1 July 2000 – 31 Dec 2006				0.913 (0.168)	0.369 (0.388)	2,182

Source: SFG, table 1 (extract).[1079]

Notes:

(a) Cash: Regression coefficient for the cash dividend drop-off

(b) FC: Regression coefficient for the cash dividend drop-off

(c) N: Number of observations in sample

Numbers in parentheses are standard errors

[1079] *SFG, op. cit., 1 February 2009 (e), p.8.*

The AER notes from table 10.10 that while theta estimates over the period 2001-04 are relatively close across the two studies (i.e. 0.572 and 0.526), the standard errors are markedly different (i.e. 0.121 and 0.541). On this basis the AER has explored the differences between these two studies, and found the following:

- *The Beggs and Skeels study has a smaller sample for most years in the sampling period,*

  This point was addressed in the previous section. The only way that a smaller sample size can be hailed as a good thing is if the excluded observations are deemed unreliable. As observed earlier, there is no reason to make such a presumption and good reasons to believe otherwise.

- *For each sampling year, the results from the Beggs and Skeels study generally have a lower standard deviation on the key variables (i.e. including dividends, imputation credits, cum-dividend price, ex-dividend price),*

  This observation is a consequence of the different samples used. The obvious question,

however, is whether or not it matters. What is important is not the magnitudes of various sample statistics but rather how well these statistics reflect the underlying population. With larger sample sizes there is every reason to believe that your sample statistics will more accurately reflect the population. If this comes with larger standard deviations then so be it, the world is what it is.

- *SFG does not report the adoption of data filters which are reported by Beggs and Skeels as having been adopted in their study (e.g. the removal of special dividend events).*

  This is an important issue.[23] As discussed earlier, in the absence of the Beggs and Skeels (2006) data set as a reference one can never be sure how closely another data set corresponds to it. That said, the really important question is how much do the differences matter. The fact of the matter is that for most of the results it doesn't seem to matter very much. In cases where it does matter the question reduces to one of whose results to believe. In my opinion, as a matter of good statistical practice, one should go with the larger sample size unless there is reason to believe that there are problems with it. I have seen no compelling argument to believe that the larger sample sizes used by the SFG study should be dismissed as unreliable. By way of analogy we should know more about tomorrow's weather today than we did yesterday. If the two forecasts differ that doesn't make yesterday's forecast wrong, it was made conditional on the information available yesterday whereas the forecast made today incorporates today's information. The fact that there are differences between the estimates of Beggs and Skeels (2006) and SFG(2009) for the post 1 July 2000 sub-sample does not imply that either is wrong. Rather, it simply reflects the fact that the SFG results are conditioned on a more recent sample of observations than are those of Beggs and Skeels (2006).

On this basis, due to the differences in the data used and the sampling / filtering process undertaken across the two studies, the AER considers that the results from the two studies cannot be directly compared. Accordingly, the AER will continue to treat the SFG study and the Beggs and Skeels study as two separate and distinct studies.

[23] Note that SFG address this issue in Appendix I in their response to Question 7, where they state that these filters had been applied.

This is a curious position for the AER to take. The objective and broad strategies of the two studies are the same. The fact that there are some differences does not preclude a comparison. As outlined previously in this section, in my opinion the differences focused on by the AER are largely immaterial.

In order to examine the underlying reliability of the SFG results further (i.e. higher relative standard errors), the AER compared the SFG data set to data independently obtained from Bloomberg. Based on this analysis the AER notes a number of potential underlying shortcomings with the data used by SFG, including:

- *Stock price and dividend series are not consistent in terms of the company-specific basis of quotation, which is potentially a significant issue in cases when the total number of shares outstanding changes (e.g. stock split, bonus share issues),*[1080]

  These are exactly the sorts of observations that are likely to be captured by application of Cook's D statistic. Whether or not this is a problem is something that requires further investigation.[24]

- *It appears that firm-specific announcements made around the ex-dividend date (other than the dividend announcement itself) have not been appropriately controlled for in some cases,*

  This is a valid point, however, what remains unclear is the extent to which such observations are subsequently caught by the filter based on application of Cook's D statistic.[25]

- *Certain dividend-paying observations are excluded from the SFG data, without explanation.*

[1080] *For example, firms using share splits or bonus share issues in the past report artificially high share prices and high dividends quoted on the basis of smaller number of shares outstanding. These observations often have an excessive influence in a least squares regression, under which observations are weighted by their deviation from the sample mean.*

[24] This issue is considered by SFG in Appendix I.

[25] This is investigated further by SFG in Appendix I, where it is seen that approximately two-thirds of the observations identified using Cook's D statistic are readily seen to be unreliable on economic grounds.

> I do not see what this observation is based on. There are observations excluded through the use of Cook's D statistic that one may wish to debate but before either side of the debate could be established it would be necessary for both sides to go and examine the individual observations and to try to establish whether or not their exclusion could be justified on economic grounds.[26]

For these reasons the AER is less confident about the reliability of SFG's results due to the identified data problems (e.g. noise) and the sensitivity of its results to the sample selected. In a relative sense, the AER considers that higher confidence may be placed upon the Beggs and Skeels study, due to the reported data filters and the reported lower standard deviations of key variables compared with the SFG study.

There are issues raised here that are potentially of importance. However, the key word of the previous sentence is 'potentially'. To the extent that the problems occur then they are cause for concern. But to merely allude to the potential for problems does not establish that they are, in fact, problems. There are differences in the approach to filtering between Beggs and Skeels (2006) and the SFG study. In my opinion the former does a better job of it but that is a long way short of saying that the approach adopted by the SFG study is deficient, which is the position taken by the AER even though they have not actually established any such deficiency.[27]

The AER has also considered SFG's use of the Cook's D-statistic to exclude certain observations considered influential. While the AER considers the Cook's D-statistic can be useful to identify specific observations which have an undue influence on the estimation and fitting process, arbitrary exclusion of any observation that is diagnosed as being influential without examination of the underlying reasons is not justified. In addition, SFG's exclusion of the 'most influential 1 per cent' of observations appears arbitrary, and in fact none of the observations identified in the study seem to have a sufficiently high value for the Cook's D-statistic such as to even justify a conclusion that it is indeed influential. On these grounds the AER does not consider that SFG's application of the Cook's D-statistic is appropriate. Accordingly, the AER considers theta estimates generated using this approach are not sufficiently reliable.

[26] This issue is pursued in Appendix I.

[27] The results presented by SFG in Appendix I, in response to Question 1, address this problem in a manner that, in my opinion, is convincing.

I agree with the AER on this point. I think that the use of Cook's D statistic in the SFG study is not ideal.[28] Specifically, the fact that an observation is influential does not mean that it is a bad observation that should be excluded from the analysis. An observation may be influential because it contains relatively more information than do other observations and so it is important to include it in the analysis. The AER themselves acknowledge that observations identified by Cook's D statistic should be examined to determine why they are influential. Therefore, it is somewhat surprising that the AER chose to hold as evidence against the SFG study information suggesting that the results are sensitive to influential observations rather than exploring why they are influential. In my opinion, this position is no more justifiable than is SFG's decision to arbitrarily exclude the observations. Moreover, if, as alluded to by the AER, the SFG study excludes observations that are not really influential then that should cause no concern at all. If they are not influential then their exclusion will have no significant impact on the estimated coefficients. When one takes into account that the sample sizes used by the SFG study, after the exclusion of observations on the basis of Cook's D statistic, are still larger than those used in Beggs and Skeels (2006) then this amounts to a very minor issue indeed.

In summary, based on its detailed analysis, the AER has concerns over the quality of the market data used in the SFG study, and the robustness of its regression results. The AER's concerns in this regard also relate to the methodology employed, the sampling selection and the filtering process undertaken by SFG. Moreover, while the AER has not re-run its own dividend drop-off study completely, in the process of correcting some of the identified deficiencies in the SFG study, the AER notes the re-estimated values of theta are highly variable.[1081]

[1081] *In particular, once some of the identified discrepancies in the SFG study are corrected by the AER, the point estimate for theta ranges from -0.23 to 0.47.*

Given these concerns, and the likely material impact on the results, the AER does not consider that the SFG study provides persuasive evidence regarding the value of imputation credits. Accordingly, while the AER has given full consideration to the SFG study, it has placed limited weight on theta estimates generated by the SFG study for the purposes of this final decision.

[28] SFG's use of Cook's D statistic in Appendix I is, to my mind, far superior to its use in the SFG study. In Appendix I points identified by Cook's D statistic are only excluded if an economic justification for such an exclusion is found.

In light of my analysis presented above it is difficult to see how the AER has reached its final position on the results of the SFG study. The SFG study does not exactly replicate the methodology of Beggs and Skeels (2006) nor is the data set used in the analysis identical to that used by Beggs and Skeels (2006). However, in my opinion, these differences are of little consequence in assessing the relative merits of the results. Sometimes the differences work in favour of one report over the other, sometimes they work in the other direction.

4. Further Explorations With SFG

In light of questions raised in my review of the SFG study (see Section 4) coupled with the inconclusive nature of many of the issues raised by the AER it seemed sensible to seek some clarification from SFG about these matters. To this end a series of questions was communicated to SFG. The questions and the SFG response to these questions can both be found in Appendix I. In this section I review this response and discuss its implications for my earlier observations. I shall step through the questions and answers in turn.

Question 1: *In respect of the data points excluded from the analysis on the basis of Cook's D statistic, it would be useful if these data were identified and investigated to determine what, if anything, was unusual about them.*

This was clearly one of the most important questions asked. The exclusion of influential observations on the basis of Cook's D statistic alone was difficult to justify. By searching for economic justifications for the exclusion of observations SFG have been able to obtain similar results to those obtained in the SFG study without the spectre of the statistical black box that was their use of Cook's D statistic clouding the issue. Indeed, the results that they obtain are even better. If one compares the final line of results presented in column 3 of the Table of results for this question with the corresponding results from Table 1 of the SFG study we see that the franking credit drop-off ratio is now significantly different from zero with an estimated standard error of 0.082 as compared to 0.111 previously. Similarly, for the period ending in May 2004 this estimated standard error reduces from 0.136 to 0.106. At the same time we are also seeing a substantial increase in the adjusted R^2 for the estimated models.

Question 2: *Beggs and Skeels (2006) scale their data using a factor of (1+RI), where RI is the rate of return to the All Ordinaries Index over the ex-dividend day.*

- *I can find no evidence of such a scaling of data in the SFG Consulting SAS code provided to me by GT. Was there any such scaling of the data in the construction of data set that accompanied the SAS code provided by SFG?*
- *If the scaling has not been employed, what would be the impact on the magnitudes of the coefficient estimates and the corresponding standard errors of estimate if the data were scaled?*

The example provided by SFG illustrates just how small the scaling factor is in practice, which is why its impact on the results is so small. For this reason it is clear that the omission of this scaling factor in the SFG study was a minor issue. Nevertheless, it is better to establish this with certainty (which is now done) rather than simply speculate about it as had been the case before the response by SFG to this question. In any event, it should also be remembered that Beggs and Skeels (2006) explicitly acknowledged that this scaling was an imperfect way of dealing with noise and so the SFG study had some grounds to question its use.

Question 3: *In Table 1 of SFG (2009), over the period starting 1 July 1997 and continuing through to the end of the period of analysis, it is the case that the estimated coefficient for cash dividend drop-off is always larger in magnitude than the estimated coefficient on the franking credit drop-off except in the middle column of the table, where this relationship is reversed in the 1 July 1999 – 30 June 2000 sub-sample. This reversal does not occur in either the Beggs and Skeels (2006) results or in the SFG (2009) results in the third column of the table. Is there an explanation for this reversal?*

SFG now present compelling economic justifications for why certain observations should be excluded from the analysis. This makes their results much more credible and their results presented in Appendix I represent a substantial improvement over those in the SFG study.

Question 4: *In Table 1 of SFG (2009) why does the addition of observations covering the period 11 May 2004 – 31 December 2006 have so much impact on the parameter*

estimates for the period 1 July 1999 – 30 June 2000 and why is this effect restricted to the middle column?

The response of SFG identifies a potential shortcoming of the Beggs and Skeels (2006) formulation if the data are not properly filtered. The path is not through equation (1) but rather through equation (2). In any event, now that SFG have seriously addressed the issue of finding economic justifications for the exclusion of observations this area of concern has become a non-issue.

Question 5: *In the second panel of results presented in Table 1 of SFG (2009), what is the true sample end date as both 30 September 2006 and 31 December 2006 are reported?*

The issue of the end date of the sample is now completely resolved.

Question 6: *As an alternative to excluding influential observations, how would adopting an estimation technique that is more robust to the presence of outliers than are least squares-based estimators affect the results? For example, it would be interesting to see the impact of re-estimating the model using a Least Absolute Deviations estimator.*

The decision not to explore LAD estimation is not unreasonable. The question was posed as an alternative way of thinking about unreliable observations but the correct solution was always to properly interrogate those observations thought to be unreliable. SFG have now done this and so the problem becomes moot.

Question 7: *Beggs and Skeels (2006) applied a series of filters to their data set, as described in Appendix II of their paper. Specifically:*

- *All observations where the dividend payment, the corporate tax rate, the cum-dividend share price or the ex-dividend share price was not known were removed.*
- *All cases where the market capitalization of a company was not reported, or where the weight of market capitalization in the All Ordinaries index was less that 0.03 percent were eliminated.*

- *The data set was screened for any companies that changed their basis for quotation within 5 days either side of the ex-dividend day and any 'special' dividend payments were also removed, where special dividends are an irregular distribution of excess cash reserves.*

Which, if any of these filters have been applied as part of the analysis reported in SFG (2009)? How would the application of all of these filters impact upon the results obtained? Do these filters exclude from the analysis all of those data points excluded through the use of Cook's D statistic?

SFG observe that the filters used by Beggs and Skeels (2006) were, in fact, used in the SFG study and that exclusion on the basis of Cook's D statistic was an additional level of filtering. I return to my previous observation that SFG are now interrogating the data economically, as well as statistically, making their new results much more credible than their earlier results.

Question 8: *The AER (2009) notes differences in the magnitudes of the reported standard errors of estimate between Beggs and Skeels (2006) and those provided in the middle column of SFG (2009) for the 1 July 2000 – 10 May 2004 sub-sample. I note that there is not a corresponding difference between the results of Beggs and Skeels (2006) and those of the third column of SFG (2009). Would applying the filters discussed above materially impact upon the disparities between the two sets of standard errors of estimate?*

It is clear that the results in the second column of Table 1 were provided in the SFG study as a basis of comparison but were not their preferred results. That the AER chose to focus its attention on these results was unfortunate. Still, it was somewhat understandable given the questions that existed surrounding the use of Cook's D statistic. Now that these questions have been resolved, so that Cook's D statistic is used in a more sensible and justifiable way, there is no reason to consider any of SFG's results other than those provided in column 3 of the table appearing in the response to Question 1 in Appendix I.

Question 9: *The AER (2009) raised a concern about the company tax rates applied by SFG (2009) not corresponding to the reported ATO tax rates. The SAS code provided by SFG employs the following tax rates (denoted by t):*

01 July 1996 – 30 June 2001:	*t=0.36;*
01 July 2001 – 30 June 2002:	*t=0.34;*
On or after 01 July 2002:	*t=0.30;*

Please comment on any differences between these rates and the ATO rates and what, if any, are the empirical implications of any differences.

There was an error with the corporate tax rates and it has now been resolved. The observation that it had minimal impact is no substitute for correcting the mistake, which has now been done.

5. Concluding Remarks

The arguments presented by the AER against the results presented by the SFG study are, in my opinion, unconvincing. For the most part the AER's arguments are nothing more than allusions to potential problems in SFG's analysis, problems whose existence can readily be determined one way or the other; for example, problems arising from multicollinearity in the data. For the most part, my analysis suggests that these problems do not exist; for example, the absence of evidence of multicollinearity affecting SFG's results. Although there are some minor issues that one may wish to take with the SFG analysis it is difficult to see how the AER came to a conclusion that they would likely have had a 'material impact on the results.

Of course, the most complete response in this case is to actually investigate those aspects of the SFG study that were causes of concern. This has now been done through (i) the questions presented in Appendix I and (ii) the SFG response presented in Appendix I. I find that the results now presented by SFG are quite convincing. This leads me to consider that their estimate of theta

of 0.23 is the best such estimate currently available for Australia. It might be argued that their methodology does not perfectly replicate that of Beggs and Skeels (2006) and that the remaining differences may downwardly bias the estimates provided by SFG in Appendix I. I am not one who shares that view as I think that their analysis is now compelling. However, if one was to take that view then I think that a very strong case could be made for the true value of theta to lie somewhere between the SFG estimate of 0.23 and the Beggs and Skeels (2006) estimate of 0.57, and in all probability to lie towards the lower end of that range. Any higher value for theta seems completely implausible, both in terms of the empirical evidence presented and in terms of the theoretical arguments underpinning them.

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Appendix I: The response by SFG to questions raised by this report

Note: Supplied with the answers to these questions are three additional outputs of the model which we have prepared to illustrate particular points made in the answers. These are:

- Model A which amends only the tax rates applicable in 2000-01 and 2001-02 which we have done in response to Question 9;
- Model B which includes the amendments above and also scales the data for the changes in the All Ordinaries Index which we have done in response to Question 2; and
- Model C which removes 20 data points which we have done in response to Question 1.

The code and output files from each of these are provided with these answers.

Question 1: *In respect of the data points excluded from the analysis on the basis of Cook's D statistic, it would be useful if these data were identified and investigated to determine what, if anything, was unusual about them.*

Answer:

We used the Cook's D influence statistic to identify the most influential 1 per cent of observations (33 observations), and repeated our analysis excluding these data points. Of these 33 data points, 16 correspond to the period subsequent to 1 July 2000, three correspond to the period 1 July 1999 – 30 June 2000 and 14 correspond to the period 1 July 1997 – 30 June 2000. The data points excluded are listed in the table below.

Code	Date	Code	Date	Code	Date
AGG	21-Feb-00	CHB	22-Jun-06	CHO	9-Sep-03
BIL	8-Aug-01	FPA	6-Jun-03	AQP	11-Sep-06
CPU	25-Sep-97	BSO	21-Dec-98	SMS	29-Oct-97
PSN	10-Sep-98	AMW	6-Nov-97	TPI	27-Mar-06
BSO	22-Jun-98	CSL	18-Sep-06	AGG	4-Aug-00
AGG	20-Aug-01	PSN	18-Mar-02	PDG	26-Feb-01

Code	Date	Code	Date	Code	Date
AGG	17-Feb-03	AHA	26-Mar-98	CIN	8-May-01
MRL	3-Sep-01	MAY	8-Oct-98	HAN	4-Apr-05
HSM	10-Nov-00	AMW	17-Jul-97	COH	24-Feb-00
TCL	15-Sep-97	PSN	26-Mar-98	CSL	29-Oct-97
AMW	21-Jan-98	STV	8-Mar-00	SEV	8-Oct-98

A data point could be influential because of an error in the data which generates an extreme share price or dividend change. Or it could be a valid data point but merely has a large amount of influence on the coefficient estimates. In an event study (a dividend drop-off study is just one type of event study in which we measure the share price reaction) each share price movement will be affected to some degree by other price relevant information released on the same date. For example, on the same day that the stock trades ex-dividend, the company could announce the acquisition of a competitor. In the individual case it would be difficult to infer whether the share price movement is due to the ex-dividend event, or the market's reaction to the other price-relevant information.

However, if the sample is large enough we would expect observations in which the share price was positively affected by contemporaneous information to be countered by observations in which the share price was negatively impacted by contemporaneous information.

Despite this expectation, if a handful of observations are extreme, the sample may not be large enough for this noise to be filtered out of the analysis. Hence, our technique was to determine whether a very small proportion of data points had a material impact on the analysis. It turns out that this was the case, as evidenced by the substantial increase in explanatory power (R-squared statistic), lower standard errors and stability of coefficients over time, once this very small number of data points is removed. When we wrote our report we did not separately investigate these influential data points, preferring to present our analysis both including and excluding these data points, and express our preference for the filtered sample on the basis that the excluded data points have a high chance of containing data errors.

Subsequent to the AER's review, we identified that 11 of the 33 excluded data points are likely to have been affected by contemporaneous information, so should not be relied upon. In particular, in four instances, the ex-dividend date corresponded to the date at which shareholders were eligible to participate in new share issues. These issues substantially increase the number of shares on issue, resulting in large share price falls on the ex-dividend date. The remaining seven data points are likely to have been affected by price-sensitive information released on or around the announcement date. The table below lists the 11 data points which we have identified are likely to have been affected by contemporaneous price-sensitive information.

Code	Date	Reason
BIL	8-Aug-01	Bonus issue (3.1287 for 1) associated with dual listing.
CPU	25-Sep-97	Bonus issue (3 for 1).
PSN	10-Sep-98	Interim results announced on cum-dividend date.
AGG	20-Aug-01	Native title determination announced on day after ex-dividend date.
MRL	3-Sep-01	Bonus issue (4 for 5).
CSL	18-Sep-06	Merger announcements either side of ex-dividend date
AHA	26-Mar-98	New power plant agreement announced on ex-dividend date.
SMS	29-Oct-97	New contract announced on day after ex-dividend date.
TPI	27-Mar-06	Merger announced on ex-dividend date.
AGG	4-Aug-00	New gold mine officially opened with release of production information.
CIN	8-May-01	Issue of shares in AHL (1 for 1) in exchange for CIN shares

While conducting this analysis of individual data points we also excluded nine data points comprising Transurban stapled securities, each of which comprised one share in Transurban City Link Ltd, one unit in the Transurban City Link Unit Trust and 499 Equity Infrastructure Bonds. These nine data points had cum-dividend prices which ranged from $1,045 to $2,005, respectively which is approximately 10 – 20 times the next highest cum-dividend price in the data set which is $110.40. As the form of the analysis is in dollars per share, these extreme high priced securities have a substantial influence on coefficient estimates. None of these data points appear in the period post July 2000 but they contribute to the instability of coefficient estimates over time and the standard errors of the estimates.

We repeated our analysis after excluding these 20 data points. As discussed below in respect of questions 2 and 8, we now also account for the market movement on the ex-dividend date and correct for incorrect corporate tax rates which affected two years of analysis. After incorporating these changes, we summarise our results in the table below.

	Beggs&Skeels (2006)			All observations			Excl. 20 contaminated points		
	Cash	Franking	N	Cash	Franking	N	Cash	Franking	N
Regression analysis ending 10 May 2004									
1 Jul 85 –	0.465	0.752	910						
30 Jun 88	(0.040)	(0.157)							
1 Jul 88 –	0.646	0.450	546						
30 Jun 90	(0.064)	(0.119)							
1 Jul 90 –	0.765	0.376	239						
30 Jun 91	(0.115)	(0.206)							
1 Jul 91 –	0.861	0.201	1,669						
30 Jun 97	(0.059)	(0.103)							
1 Jul 97 –	0.795	0.418	573	0.904	0.287	710	0.901	0.295	698
30 Jun 99	(0.099)	(0.186)		(0.289)	(0.676)		(0.084)	(0.180)	
1 Jul 99 –	1.168	0.128	267	0.311	1.061	329	0.827	0.358	328
30 Jun 00	(0.099)	(0.204)		(0.228)	(0.402)		(0.106)	(0.236)	
1 Jul 00 –	0.800	0.572	1,310	0.998	0.402	1,391	1.015	0.129	1,386
10 May 04	(0.052)	(0.121)		(0.251)	(0.610)		(0.038)	(0.106)	
			5,511	Adj-R^2	2.1%	2,430	Adj-R^2	37.0%	2,412
Regression analysis ending 30 September 2006									
1 Jul 97 –				0.936	0.289	710	0.931	0.240	698
30 Jun 99				(0.269)	(0.643)		(0.074)	(0.171)	
1 Jul 99 –				0.166	1.434	329	0.827	0.358	328
30 Jun 00				(0.118)	(0.646)		(0.109)	(0.241)	
1 Jul 00 –				1.040	0.260	2,182	0.983	0.230	2,175
30 Sep 06				(0.181)	(0.428)		(0.031)	(0.082)	
				Adj-R^2	3.9%	3,221	Adj-R^2	44.5%	3,201

We observe that the estimated value for imputation credits dividends in the period from 1 July 2000 – 30 September 2006 is 0.26 using all observations and 0.23 if the data points discussed above are excluded. The corresponding estimates for the value of cash dividends are 1.04 and 0.98, respectively. With the exclusion of the data points discussed above, we observe considerably greater stability in coefficient estimates over time, and substantial increases in explanatory power, with the adjusted R-squared statistic increasing from 3.9 to 44.5 per cent.

Question 2: *Beggs and Skeels (2006) scale their data using a factor of (1+RI), where RI is the rate of return to the All Ordinaries Index over the ex-dividend day.*

- *I can find no evidence of such a scaling of data in the SFG Consulting SAS code provided to me by GT. Was there any such scaling of the data in the construction of data set that accompanied the SAS code provided by SFG?*

- *If the scaling has not been employed, what would be the impact on the magnitudes of the coefficient estimates and the corresponding standard errors of estimate if the data were scaled?*

Answer:

In our earlier paper, we did not scale our ex-dividend share prices by (1 + the return on the All Ordinaries Index) as we did not expect this to have a material impact on the coefficient estimates and standard errors. The objective of a dividend drop-off study is to estimate the price of a stock including and excluding the attached dividend. Our proxies for these two values are share prices observed on the cum- and ex-dividend dates. This is an imperfect proxy because in the intervening 24 hours, price-sensitive information may be conveyed to the market which affects the price we would expect to observe excluding the dividend. The scaling factor is used to remove the impact of market movements on the expected share price, under the expectation that each stock is affected by the same degree to market-wide information.

This market-wide information is sometimes positive news and sometimes negative news, so the average market return on any given day is expected to be approximately zero. For example, if the annual market return is 12 per cent and there are 260 trading days in a year, the expected return on any given day is 0.04 per cent, computed as (1.12)^(1/260)-1. Provided the ex-dividend events occur with equal probability on days in which the market rises or falls, the coefficient estimates should be unchanged. In theory, the standard errors would be expected to fall, under the assumption that this scaling reduces the noise in data associated with overall market fluctuations.

In the results presented in the table above, we have now incorporated this scaling adjustment. As noted above, we prepared Model B which when compared with Model A differed only in that the scaling was undertaken. This change did not materially affect the results.

Question 3: *In Table 1 of SFG (2009), over the period starting 1 July 1997 and continuing through to the end of the period of analysis, it is the case that the estimated coefficient for cash dividend drop-off is always larger in magnitude than the estimated coefficient on the franking credit drop-off except in the middle column of the table, where this relationship is reversed in the 1 July 1999 – 30 June 2000 sub-sample. This reversal does not occur in either the Beggs and Skeels (2006) results or in the SFG (2009) results in the third column of the table.Is there an explanation for this reversal?*

Answer:

The one-year period from 1 July 1999 to 30 June 2000 contains just 329 observations out of 3,221 (or 10% of data points) so the coefficient estimates from this period are relatively more susceptible to influential observations. Once we excluded the most influential 1 per cent of data points, the estimated value for cash dividends increases from 0.100 to 0.797, and the estimated value for imputation credits decreases from 1.439 to 0.224.

In the analysis presented above, there is one data point excluded from the period 1 July 1999 to 30 June 2000, relating to the Transurban stapled security, which had a cum-dividend price of $2,005. With this exclusion we observe the estimated value for cash dividends increase from 0.166 to 0.827, and the estimated value for imputation credits decrease from 1.434 to 0.358.

This illustrates an important point we have made throughout our analysis - that coefficient estimates from regression analysis need to be interpreted jointly. In sub-samples where the estimated value for imputation credits is high, the estimated value for cash dividends is low, and vice versa. In theory, the market's estimate of the value of cash dividends should be independent of its valuation of imputation credits. However, when a stock paying a fully-franked dividend has a high drop-off ratio, this will increase the model's estimated value for imputation credits, and also lower its estimated value for cash dividends, and vice versa.

Question 4: *In Table 1 of SFG (2009) why does the addition of observations covering the period 11 May 2004 – 31 December 2006 have so much impact on the parameter estimates for the period 1 July 1999 – 30 June 2000 and why is this effect restricted to the middle column?*

Answer:

The form of the regression model estimates the coefficients for all time periods jointly, applying weights to observations throughout the three time periods which fluctuate according to the characteristics of the entire data set. This means that when we add additional data points to the third time period, the weights placed on observations in the earlier time periods are affected, and the coefficient estimates are subsequently altered. This has considerably less impact when the most influential 1 per cent of observations are excluded (or just removing the Transurban data point), because with this cleaner sample, the coefficients are already more stable and have relatively lower standard errors than the full sample.

Question 5: *In the second panel of results presented in Table 1 of SFG (2009), what is the true sample end date as both 30 September 2006 and 31 December 2006 are reported?*

Answer:

30 September 2006.

Question 6: *As an alternative to excluding influential observations, how would adopting an estimation technique that is more robust to the presence of outliers than are least squares-based estimators affect the results? For example, it would be interesting to see the impact of re-estimating the model using a Least Absolute Deviations estimator.*

Answer:

We would not recommend the use of the Least Absolute Deviation technique as a preferred method for dealing with influential observations, because the basis for excluding 1 per cent of data points was not merely that they were influential. The data points were excluded because they had a high probability of being invalid, implying that they should carry zero weight in the analysis, rather than the reduced weight which would be implied by a Least Absolute Deviation approach.

We understand that the question that arises with the use of our exclusion technique is not that we have excluded some data points which are invalid. Rather, what can only be of potential concern is that we may have also excluded a handful of valid data points, but which merely showed up as being highly influential.

However, our response is that we are excluding only a very small proportion of the sample, and achieving a large improvement in explanatory power and error minimisation. In other words, we want to draw conclusions from a sample of over 3,000 data points. By keeping a handful of influential data points we would end up drawing conclusions primarily based on a fraction of the sample, and that fraction is the sub-sample most likely to be affected by invalid data.

In the analysis presented above we have excluded data points only if we could identify specific price-sensitive information released on or around the ex-dividend date, or in one instance (ie Transurban) a security with an extremely high price. With these exclusions the standard errors are considerably reduced, explanatory power increases substantially and the coefficient estimates are relatively stable across time.

Question 7: *Beggs and Skeels (2006) applied a series of filters to their data set, as described in Appendix II of their paper. Specifically:*

- *All observations where the dividend payment, the corporate tax rate, the cum-dividend share price or the ex-dividend share price was not known were removed.*

- *All cases where the market capitalization of a company was not reported, or where the weight of market capitalization in the All Ordinaries index was less that 0.03 percent were eliminated.*
- *The data set was screened for any companies that changed their basis for quotation within 5 days either side of the ex-dividend day and any 'special' dividend payments were also removed, where special dividends are an irregular distribution of excess cash reserves.*

Which, if any of these filters have been applied as part of the analysis reported in SFG (2009)?How would the application of all of these filters impact upon the results obtained? Do these filters exclude from the analysis all of those data points excluded through the use of Cook's D statistic?

Answer:

We excluded observations in which:

- the market capitalisation was less than 0.03 per cent of the All Ordinaries Index, where market capitalisation was measured at the end of the month in which the shares traded ex-dividend.
- the share prices or dividends were unknown.

We did not exclude any data points for lack of corporate tax rate data. However, please refer to the discussion of the corporate tax rate under point 9 below.

The application of the filters do not exclude from the analysis all of the data points excluded through the use of the Cook's D statistic. All the results reported in columns two and three of our February 2009 report and the table above apply the filters described in this question and the differences between the second and third columns in the February 2009 table results from the application of the Cook's D statistic.

Question 8: *The AER (2009) notes differences in the magnitudes of the reported standard errors of estimate between Beggs and Skeels (2006) and those provided in the middle column of SFG (2009) for the 1 July 2000 – 10 May 2004 sub-sample. I note that there is not a corresponding difference between the results of Beggs and Skeels (2006) and those of the third column of SFG (2009). Would applying the filters discussed above materially impact upon the disparities between the two sets of standard errors of estimate?*

Answer:

The third column reported in our analysis is the more reliable sample, because of the exclusion of the most influential 1 per cent of observations. The standard errors are considerably lower for this sample and hence are closer in magnitude to those reported in Beggs and Skeels (2006).

Question 9: *The AER (2009) raised a concern about the company tax rates applied by SFG (2009) not corresponding to the reported ATO tax rates. The SAS code provided by SFG employs the following tax rates (denoted by t):*

01 July 1996 – 30 June 2001:	*t=0.36;*
01 July 2001 – 30 June 2002:	*t=0.34;*
On or after 01 July 2002:	*t=0.30;*

Please comment on any differences between these rates and the ATO rates and what, if any, are the empirical implications of any differences.

Answer:

Our analysis assumes the following corporate tax rates, which are marginally different from the actual tax rates and which are in error. This is an error on our part but one which is unlikely to have a material impact on the results. The differences are as follows:

2000-01: We used a company tax rate of 36% when the actual company tax rate was 34%.

2001-02: We used a company tax rate of 34% when the actual company tax rate was 30%.

The company tax rate was reduced from 36% to 34% and then 30% over this two year period. Our code had the timing of this adjustment incorrect by a one year in each instance.

The analysis presented above uses the correct tax rates. This change would not have materially affected our earlier conclusions.

	Model A. Tax estimates corrected				Model B. Market adjustment included			
	All observations		Excl influential 1%		All observations		Excl influential 1%	
	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error
Large firms (Market cap > 0.03% of All Ords)								
Intercept	0.001	0.009	-0.007	0.003	-0.002	0.010	-0.007	0.003
Cash - Period 5	0.763	0.238	0.843	0.085	0.936	0.269	0.888	0.091
Cash - Period 6	0.101	0.079	0.796	0.102	0.166	0.118	0.900	0.106
Cash - Period 7	0.933	0.172	0.912	0.050	1.040	0.181	0.969	0.050
Franking credit - Period 5	0.436	0.583	0.246	0.186	0.289	0.643	0.221	0.197
Franking credits - Period 6	1.442	0.570	0.224	0.240	1.434	0.646	0.098	0.254
Franking credits - Period 7	0.336	0.412	0.251	0.116	0.260	0.428	0.234	0.117
N	3221		3188		3221		3188	
Adjusted R squared	3.4%		30.9%		3.9%		34.0%	

Model C. Excluding 20 datapoints and not excluding on the basis of the Cook's D statistic presented in response to Question 1.

Appendix 5

Hedging interest risk rate future borrowings

Hedging Interest Rate Risk on Future Borrowings

A Report for ENERGEX and Ergon Energy

August 2009
Synergies Economic Consulting Pty Ltd
www.synergies.com.au

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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

Synergies Economic Consulting (Synergies), in conjunction with SFG Consulting (SFG) and Queensland Treasury Corporation (QTC), have been asked by ENERGEX and Ergon Energy (the businesses) to review the implications of interest rate risk for the borrowing requirements they have proposed to undertake in the next regulatory control period, including:

- is it appropriate that this risk should be hedged;
- is it appropriate for these costs to be compensated as part of the businesses' maximum allowable revenue (based on an assumed efficient benchmark hedging strategy); and if so,
- how would the costs of a benchmark hedging strategy be determined.

It is understood that each business raised this issue as part of their regulatory proposals, but indicated that further consideration was needed, particularly given the uncertainty that continues to pervade global capital markets. The case for compensation needs to be consistent with the principles of the National Electricity Law, and the more specific provisions contained in the National Electricity Rules.

The exposures faced by ENERGEX and Ergon Energy in the next regulatory control period are material. This is because each business is proposing a capital expenditure program for the five year period that is equivalent to more than 80% of their respective opening Regulatory Asset Values, with the projected borrowing requirement consistent with maintaining the target gearing level of 60%.

This report will set out to show that, particularly given the materiality of the exposures in this next regulatory control period:

1. depending on prevailing market conditions, it is efficient for the businesses to hedge at least some of the interest rate risk on their future borrowings using derivatives. This is consistent with empirical evidence as well as the risk management practices employed by other relevant businesses;
2. the benefits of hedging should exceed the costs of hedging, with these costs determined based on an assumed efficient benchmark strategy under a range of plausible future interest rate scenarios;
3. the benchmark hedging strategy will be based on reducing the probability of financial distress, which is the risk that unfavourable movements in interest

rates trigger a credit rating downgrade from the assumed benchmark credit rating of BBB+ based on key credit metrics (such as interest coverage);

4. it is not appropriate to assume that this risk is currently compensated via the Weighted Average Cost of Capital (WACC), or in the term structure of interest rates.

Given the benchmark hedging strategy, and the cost of hedging based on that benchmark strategy, is influenced by prevailing market conditions – and these conditions remain volatile and uncertain - we are not proposing to forecast a benchmark hedging cost allowance at this point.

Just as the risk-free rate and debt margin are set based on the conditions prevailing close to the start of the regulatory control period, we submit that the most appropriate strategy is to seek prior approval of the principles governing how the benchmark hedging costs might be determined. It is proposed that these costs would then be estimated over the same averaging period that is used to set the risk-free rate and debt margin, in order to ensure that they reflect prevailing market interest rates.

One of the key assumptions underpinning this proposal is materiality, based on the projected borrowings for the next regulatory control period. In subsequent regulatory periods it would need to be demonstrated that the magnitude of the borrowings required by the business are sufficient to increase the risk of financial distress, to the point where the benefits of hedging (that is, the risk potentially avoided by hedging) exceed the costs.

This report is set out as follows:

- section 2 provides an overview of the risks and the regulatory environment;
- section 3 addresses the question of whether it is efficient to hedge; and
- section 4 summarises the proposal.

Separate reports prepared by SFG and QTC accompany this report and should be read in conjunction with it. Curricula vitae of our consultants that have prepared this report are attached.

2 Overview

2.1 Capital expenditure requirement

ENERGEX and Ergon Energy have significant capital expenditure requirements during the forthcoming regulatory period. ENERGEX is proposing a capital expenditure program of $6,466 million for the 2010-2015 regulatory control period, relative to an opening 2010-11 Regulated Asset Base (RAB) of $7,887 million.[1] In other words, the projected expenditure is over 80% of the size of the opening RAB. Ergon Energy is proposing to spend a total of $6,180 million,[2] which is over 88% of the size of its opening RAB of $6,999 million.[3] In both cases the majority of the expenditure is for system assets.

The profile of the expenditure is shown below.

Table 1 ENERGEX: Proposed Capital Expenditure 2010–15 ($m)

2010-11	2011-12	2012-13	2013-14	2014-15
1,239.5	1,269.7	1,301.9	1,292.4	1,362.5

Source: ENERGEX (2009), ENERGEX Regulatory Proposal for the Period July 2010 – June 2015, July, p.209.

Table 2 Ergon Energy: Proposed Capital Expenditure 2010-15 ($m real 2009-10)

2010-11	2011-12	2012-13	2013-14	2014-15
1,086.2	1,199.9	1,177.3	1,228.0	1,341.5

Source: Ergon Energy (2009), Regulatory Proposal to he Australian Energy Regulator, Distribution Services for the Period 1 July 2010 to 30 June 2015, 1 July, p.192.

Given the size of these requirements, both businesses will need to raise additional borrowings to fund the expenditure. This borrowing requirement is determined based on the target gearing assumption of 60%. Hence, the businesses' total borrowings should increase by a similar order of magnitude as the projected growth in their total asset base.

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1 ENERGEX (2009), ENERGEX Regulatory Proposal for the Period July 2010 – June 2015, July.

2 The capital expenditure is expressed in real $2009-10 in the regulatory proposal. This has been grossed up by the forecast inflation of 2.45% for the purpose of enabling a comparison with the value of the RAB, which is expressed in nominal terms.

3 Ergon Energy (2009), Regulatory Proposal to the Australian Energy Regulator, Distribution Services for the Period 1 July 2010 to 30 June 2015, 1 July.

Under the current regulatory framework, the cost of debt that is assumed to apply to the new expenditure is the rate that is set at the start of the regulatory control period. The cost of debt on these new borrowings, along with the existing debt, will then be reset at the beginning of the next regulatory control period (2015 – 2020).

2.2 Interest rate risk on new borrowings

It is extremely difficult to forecast future interest rates over the five years of the regulatory control period. However, what is almost certain is that the actual cost of the new debt when it is raised will be different from the regulated cost of debt. The businesses are therefore exposed to interest rate risk on these new borrowings. Given the amounts involved, this exposure is material.

Any large commercial organisation with future borrowing requirements is exposed to interest rate risk on those borrowings. This 'risk' is the risk that at the time the funds are drawn down, prevailing interest rates are higher than current interest rates, or, particularly in the case of a major project, higher than the interest rate assumption used in the cash flow analysis as part of the project evaluation. In the case of a regulated business, the risk is that the prevailing interest rates at the time of drawdown are higher than the regulated cost of debt.

An unregulated business may have a number of options here in mitigating its exposure to this risk, including:

1. deferring the expenditure;
2. increasing prices to reflect the increase in interest costs;
3. accepting the risk, on the basis that it has the capacity to absorb the losses within the business; or
4. hedging the risk upfront. The hedging costs are then reflected in the cost of the project.

As will be outlined further below, ENERGEX and Ergon Energy do not have the flexibility to do either of the first two options. As we will also demonstrate, given the materiality of these exposures, we do not consider it acceptable to assume that the financial consequences can or should be absorbed by the regulated business, or that these consequences will only ultimately flow through to its shareholders and not to its customers.

2.3 Materiality of the exposures

Both QTC and SFG have examined the potential materiality of the exposures faced by ENERGEX and Ergon Energy (refer accompanying reports).

For example, QTC undertook an analysis assuming that interest rates rose by 2% during the first year of the regulatory period and then remain constant for the duration of the regulatory control period:

> Based on the forecast borrowing profiles the increase in total interest costs relative to the regulated cost would be approximately $88 million and $69 million in present value terms for Ergon and ENERGEX respectively.[4]

In its report, SFG has examined the potential impact that increases in interest rates might have on key credit rating metrics.[5] This has also been applied to the cash flow forecasts for ENERGEX and Ergon Energy in each business's Post Tax Revenue Model (PTRM). The interest rate scenario assumed was that interest rates increase by 2% in year two of the regulatory control period, and then decline by 0.5% per year back towards the original year one rate.

SFG's analysis shows that even if perfectly hedged, the key financial ratios (FFO/Total Debt and FFO/Interest Expense) are below what would be expected from a stand-alone investment grade utility (based on Standard and Poor's indicative metrics). If unhedged, the interest rate shock assumed above would result in these ratios being substantially below benchmark. For the efficient benchmark firm, this could trigger a credit rating downgrade.

These exposures are clearly material and could expose the businesses to financial distress. The way in which we propose to interpret 'financial distress' is considered further in section 3.

2.4 Options within the regulatory framework

One way that this issue could be dealt with is some form of adjustment to regulated revenues for movements in the cost of debt. This is not currently provided for under the regulatory framework. This could be done in a number of ways, for example:

1. periodic and automatic resetting of the risk-free rate and debt margin during the regulatory control period, say once every twelve months;

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[4] Queensland Treasury Corporation (2009), Hedging Cost Submission – Ergon Energy and ENERGEX Limited.

[5] SFG Consulting (2009), Consistency of Regulatory Assumptions in Relation to Debt Hedging Costs, Report Prepared for ENERGEX and Ergon Energy, August.

2. a 'trigger' mechanism, which resets the cost of debt only if rates move outside a certain band or threshold; or

3. treatment as a cost pass through event.

Regulators have been generally averse to re-opening the revenue cap during the course of the regulatory period, given this can lead to uncertainty for the consumers (and the regulated business). We have therefore not considered these options in any further detail at this stage.

In relation to cost pass throughs, the AER has previously explicitly excluded interest rate risk from the list of pass through events, because it was assumed that this risk is addressed by the Weighted Average Cost of Capital (WACC). As we will set out in section **Error! Reference source not found.**, we refute that this risk is fully compensated by the WACC, particularly in view of the materiality of the exposures faced by ENERGEX and Ergon Energy this regulatory control period. However, there are some other parallels that can be drawn with the treatment of cost pass throughs, which will be considered further below.

Another option is to set the cost of debt for the new borrowings upfront, based on the forward curve prevailing during the reset period. However, one of the practical difficulties with this approach is that different rates would apply to existing borrowings and new borrowings.

Presuming that the above options are not available to ENERGEX and Ergon Energy, hedging is the main strategy that is available to mitigate the impact of the risk. This also parallels the strategy that other large, commercial businesses are likely to employ when faced with these exposures and in our view, is consistent with what would be undertaken by an efficient benchmark firm (refer section **Error! Reference source not found.** below). However the benchmark costs of this are not currently compensated under the regulatory regime. Any case for compensation needs to satisfy the requirements under the National Electricity Rules (NER), which are set out below.

2.5 Criteria for compensation

2.5.1 Requirements under the National Electricity Law

The overarching principles governing the regulation of electricity distribution are set out in the National Electricity Law (NEL). The revenue and pricing principles (Part 7A) of the NEL provide that, amongst other things:

(2) A regulated network service provider should be provided with a reasonable opportunity to recover at least the efficient costs the operator incurs in—

(a) providing direct control network services; and

(b) complying with a regulatory obligation or requirement or making a regulatory payment.

(3) A regulated network service provider should be provided with effective incentives in order to promote economic efficiency with respect to direct control network services the operator provides. The economic efficiency that should be promoted includes—

(a) efficient investment in a distribution system or transmission system with which the operator provides direct control network services; and

(b) the efficient provision of electricity network services; and

(c) the efficient use of the distribution system or transmission system with which the operator provides direct control network services.

These principles provide that the regulated network service provider (NSP) should be able to be compensated for the efficient costs incurred in providing the relevant services. This is directly linked to the third principle, because if adequate compensation is not provided for efficient costs this could undermine ensuring efficient investment in, and utilisation of, the relevant infrastructure. In our view, this should also allow the NSP to implement appropriate risk mitigation techniques to manage the commercial risks faced by the business and be compensated for the reasonable and efficient costs of doing so. This is also consistent with regulation complementing appropriate commercial practice, rather than driving that practice.

A key objective of incentive regulation is providing regulated businesses with sufficient incentive to improve performance, including increasing efficiency. It is not appropriate to assume that providing compensation for the benchmark costs of hedging somehow reduces the incentive for the businesses to reduce their cost of debt. The cost of debt on future borrowings is completely beyond the control of the business. Unless interest rates fall at the time the funds are borrowed, the only way the business can reduce that future cost is to reduce the amount borrowed (or not undertake the expenditure). In our view, it is appropriate to provide sufficient incentive to implement a reasonable level of hedging for the risks that the NSP can't control and reduce the risk of financial distress, which also enables the NSP to focus on those activities that it is able to influence.

2.5.2 Requirements under the National Electricity Rules

Clause 6.5.2 of the NER provides that the debt risk premium:

> ...is the premium determined for that regulatory control period by the AER as 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.

Under Clause 6.5.4(e)(2), in undertaking its periodic review of the rate of return the AER must have regard to:

> ...the need for the return on debt to reflect the current cost of borrowings for comparable debt...

There is no provision in the rate of return for the benchmark costs of hedging interest rate risk on future borrowings. In our view, these costs need to be treated in the same way as debt and equity raising costs, which are considered as part of forecast operating expenditure. As will be evident from the analysis that follows, this is considered particularly appropriate given the case for compensation is not necessarily 'one size fits all'.

This in turn will require satisfaction of the operating expenditure criteria, which are set out in Clause 6.5.6(c) of the NER. This clause provides that:

> The AER must accept the forecast of required operating expenditure of a Distribution Network Service Provider that is included in a building block proposal if the AER is satisfied that the total of the forecast operating expenditure for the regulatory control period reasonably reflects:
>
> 1) the efficient costs of achieving the operating expenditure objectives; and
>
> 2) the costs that a prudent operator in the circumstances of the relevant Distribution Network Service Provider would require to achieve the operating expenditure objectives; and
>
> 3) a realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives.

The following table sets out our interpretation of each of these requirements in relation to hedging the interest rate risk on new capital expenditure.

Table 3 NER operating expenditure criteria

NER criteria	What is needed to demonstrate satisfaction of criteria
1) the efficient costs of achieving the operating expenditure objectives	That it is efficient to incur these costs, which in turn requires demonstrating that: (a) it is efficient for the benchmark NSP to hedge the interest rate risk on future borrowings; (b) the assumed benchmark hedging strategy that is employed is in itself, efficient; and (c) these costs are not otherwise compensated elsewhere.
2) the costs that a prudent operator in the circumstances of the relevant Distribution Network Service Provider would require to achieve the operating expenditure objectives	That the costs are prudent and reasonable in the current market environment.
3) a realistic expectation of the demand forecast and cost inputs required to achieve the operating expenditure objectives	That the underlying rationale for the borrowing has been proven, which requires demonstrating that: (a) the capital expenditure forecasts meet the relevant requirements under the NER; and (b) the case for external borrowing to fund these requirements has been demonstrated, based on a target gearing level of 60%.

Satisfaction of the first two requirements will be addressed in this report. This will include addressing any relevant regulatory precedent in this area (which is limited). One of the most crucial aspects of this is establishing what is 'efficient' practice in managing future interest rate risk.

In relation to the rate of return, clause 6.5.4(e) of the NER provides that in reviewing the parameters, reference will be made to an efficient benchmark NSP. While this matter does not specifically relate to the rate of return, in examining the issue of efficient hedging practice we will consider this from the perspective of the 'efficient benchmark firm'. In its Statement of Regulatory Intent (SoRI), the AER defined this to be a large, stock market listed NSP "that does not impute support or advantage from its portfolio of other activities."[6]

Further to this, it is important to highlight that the 'costs' are 'efficient benchmark hedging costs', which in turn will be a function of establishing an 'efficient benchmark hedging strategy' and estimating the costs of that strategy based on prevailing market rates. This is consistent with the treatment of other costs, including debt and equity raising costs, under the regulatory framework. These costs are not necessarily specific to the regulated business. At the same time, we agree that each business needs to be able to put a case for compensation, as will be set out below. If this case is successfully

[6] Australian Energy Regulator (2009), Electricity Transmission and Distribution Network Service Providers: Statement of the Revised WACC Parameters (Transmission), Statement of Regulatory Intent of the Revised WACC Parameters (Distribution), May, p.79.

put (which will be largely driven by the materiality of the exposures faced at the time), the allowance provided will be based on these benchmark costs.

Satisfaction of the third requirement has already been addressed as part of the regulatory proposals, with borrowing assumptions incorporated in the post tax revenue model. As outlined above, the borrowing requirement is established based on the target gearing level of 60%.

3 Is it efficient to hedge

3.1 How can this risk be managed by the regulated business

Interest rate risk is beyond the control of the business. While a business cannot undertake any actions to reduce the probability of an adverse movement in interest rates (given this is market determined), it can potentially take actions to mitigate the *impact* of this risk on the business.

As outlined above, unregulated businesses have a number of options in relation to managing this risk. One option is to undertake the expenditure and then increase prices to compensate for the higher borrowing cost. This option is not available to a regulated business given there is no currently no provision to increase prices for this reason (this is considered further below). An unregulated business may not be in a position to do this if it is operating in a competitive market and its price elasticity of demand is high. At the same time, given its competitors are likely to be faced with similar increases in costs, at least some of those costs may be able to be passed through to consumers.

Another option that a regulated NSP does not necessarily have is to not undertake the expenditure. While the capital expenditure proposals submitted by the businesses must be approved by the regulator, most of that expenditure is not discretionary. This is because of the essential nature of the services provided. In other words, if a NSP chose not to invest because the economics of the project changed unfavourably relative to the assumptions that prevailed at the start of the regulatory control period, it may risk being seen to compromise the national electricity objective (as set out in the NEL), which is:

> …to promote efficient investment in, and efficient operation and use of, electricity services for the long term interests of consumers of electricity with respect to –
>
> 1. price, quality, safety, reliability, and security of supply of electricity; and
>
> 2. the reliability, safety and security of the national electricity system.

This situation was highlighted in Queensland with the political and community scrutiny that was applied with the commissioning of an Independent Panel to undertake the Electricity Distribution and Service Delivery Review.[7] One of the overall

[7] Independent Panel (2004), Summary Report of the Independent Panel, Electricity Distribution and Service Delivery for the 21st Century, State of Queensland, July.

conclusions reached in the report was that there had been insufficient expenditure on the networks to meet increased demand from growth.

A substitute for hedging using tools such as derivatives is operational hedging, for example, diversifying this risk across the business to the extent that different parts of the business have different exposures to interest rates (including operations that borrow in different markets). Alternatively, debt could be sourced from different jurisdictions. However, this will not necessarily provide protection from a major economic shock (such as the sub-prime crisis), which affects global capital markets.

The efficient benchmark firm is assumed to be a stand-alone business. It therefore cannot be assumed that this risk could be somehow spread or absorbed across a wider portfolio of activities. Further, the debt margin is set with reference to Australian corporate bonds. Based on the current method that is used to set to the cost of debt under the NER, the main way a NSP can reduce its exposure to this risk is by hedging.

3.2 Previous consideration by the AER

In its revenue proposal to the AER for the 2007 to 2012 regulatory proposal, Powerlink sought to claim additional compensation for the costs associated with refinancing its existing debt, as well as the costs of hedging the interest rate risks on future borrowings (by using instruments such as Forward Rate Agreements). The AER, based on the advice of its consultant (NERA)[8], rejected the claim.[9]

There were a couple of reasons provided for this. The first was that it was considered that Powerlink had not demonstrated that the value of the reduction of risk was greater than or equal to the cost of achieving that reduction. Further, even if was efficient to hedge the risk:

> ...it does not follow that customers should pay for it because the beneficiaries of this reduction in risk are not Powerlink's customers but rather its owners.[10]

Second, while there is evidence in the literature that the CAPM does not necessarily fully explain stock returns, it is not evident that it is optimal for a business is to eliminate all risk. Further, even if CAPM is a "poor predictor" of how the market prices risk, it already provides compensation for interest rate risk. While we intend to address the issue of the extent to which it can already be assumed to be compensated

[8] NERA (2007), Hedging for Regulated Businesses, 12 April.

[9] Australian Energy Regulator (2007), Decision: Powerlink Queensland Transmission Network Revenue Cap 2007-08 to 2011-12, June.

[10] ibid., p.96.

by the equity beta, we concur that it is not necessarily a prudent and efficient strategy to hedge 100% of the business's future interest rate exposure. The aim of this report is to demonstrate that it is efficient for the benchmark firm to hedge at least part of this exposure, but not necessarily all of it.

In order to address these concerns in the balance of this section we will examine the following:

- the empirical evidence on hedging strategy;
- actual hedging strategies of other relevant businesses;
- whether it is appropriate to assume that the risk is already compensated via beta;
- the benefits of hedging relative to the costs;
- whether it is appropriate for customers to bear the costs of hedging; and
- other regulatory precedent.

3.3 Empirical evidence on hedging

A review of the literature on hedging practices has been undertaken and is summarised in Attachment A. This shows that there is a considerable volume of literature that confirms that businesses do hedge in practice, and explores why they hedge. Again, implementing a hedging strategy is not necessarily assumed to imply hedging 100% of the exposure. However, there is clear evidence to show that hedging at least part of this exposure is prudent and consistent with commercial practice.

3.3.1 The rationale for hedging

The assumption that it is not appropriate to hedge – or that hedging has no impact on firm value – stems from Miller and Modigliani's proposition that corporate financial policy is irrelevant.[11] Under this model, it is unnecessary to hedge given investors can do this themselves (at no cost).

However, this assumes perfect markets. In the presence of market imperfections, such as contracting costs, taxes and financial distress, this proposition does not hold. Indeed, if regulators accepted Miller and Modigliani's proposition, there would be no consideration of optimal capital structure because we would assume that it would not

[11] M.Miller & F. Modigliani (1958), "The Cost of Capital, Corporation Finance and the Theory of Investment", American Economic Review, Vol. XLVIII No. 3, pp. 261-97.

matter. We would assume that shareholders could undertake 'homemade leverage' themselves. The reality for regulated businesses (and all businesses), however, is the existence of market imperfections and these imperfections have a direct impact on how much capital they can raise, in what form, and at what cost.

There are a number of reasons discussed in the literature as to why firms hedge and they are all based on the existence of these market imperfections. One of the main reasons is to reduce the probability of financial distress, which in turn imposes costs on the business.[12] It is important to highlight that financial distress need not imply bankruptcy. While bankruptcy clearly involves costs, a firm can still experience costs arising from financial distress even if it can still remain solvent. These costs can erode firm value. Haushalter (2001) states:

> Even if the firm doesn't wind up in bankruptcy, shareholders of distressed firms are likely to bear indirect costs of financial distress, including lost sales or a further decline in a company's performance because of loss of managerial focus. Both of the interpretations of these results are consistent with hedging as a means to increase shareholder value.[13]

Financial distress can also result in restrictive covenants that can significantly reduce the firm's financial and commercial flexibility, which can compromise the maximisation of firm value. It has also been proposed that hedging reduces the variance in firm value.[14]

Another key reason that firms hedge is to avoid the underinvestment problem. In making investments, firms need some predictability in terms of future cash flows.[15] Unanticipated variations in these cash flows can reduce the debt capacity of the firm and reduce the amount of investment that is made. Berkman and Bradbury (1996) argue that an alternative way of looking at this is that it is not the presence of growth options per se that determines the hedging strategy, but the risks of not being able to convert growth options into assets in place.[16]

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[12] C. Smith and R. Stultz (1985), "The Determinants of Firms' Hedging Policies", The Journal of Financial and Quantitative Analysis, Vol.20, No.4, December, pp.391-405.

[13] D. Haushalter (2001), "Why Hedge? Some Evidence from Oil and Gas Producers", Journal of Applied Corporate Finance, Winter, Vol.13.4, pp.87-92.

[14] H. Berkman, M. Bradbury, P. Hancock & C. Innes (2002), "Derivative Instrument Use in Australia", Accounting and Finance, Vol.42, pp.97-109.

[15] A. Dhanani, S. Fifield, C. Helliar & L. Stevenson (2007), "Why UK Companies Hedge Interest Rate Risk", Studies in Economics and Finance, Vol.24, No.1, pp. 72-90.

[16] H. Berkman & M. Bradbury (1996), "Empirical Evidence on the Corporate Use of Derivatives", Financial Management, Vol.25, No.2, Summer, pp.5-13.

Hedging can enable the firm to negotiate better contracting terms and lower borrowing costs.[17] Berkman et al (2002) argue:

> Since the firm's ability to generate internal cashflows can be disrupted by internal shocks, the firm's hedging policy is aimed at transferring funds from future states of the world with a surplus to states of the world with a deficit.[18]

In their paper examining international evidence on the motivations for derivatives use, Bartram et al conclude that the use of derivatives allows firms to undertake other value-enhancing financial policies that might involve risk.[19]

Other key reasons for hedging addressed in the literature include taxes (in reducing the variability of income, hedging avoids the deferral of tax losses to future periods)[20] and managerial risk aversion.[21] In most of the studies we examined that reviewed evidence of hedging in practice, there was also a correlation between firm size and hedging activity, given the economies of scale that larger firms can achieve.[22] Firms with higher leverage were also more likely to hedge, given this will naturally drive their exposure to financial price risk.[23]

Most of the literature deals with 'hedging' in general, rather than distinguishing between hedging existing exposures or future exposures. A number also encompass foreign exchange, interest rate and commodity price risks. However, the conclusions drawn here in relation to risk management practices by firms are seen to be just as applicable to hedging future exposures compared to existing ones. Some of the surveys did explicitly address this issue, for example, Mallin et al (2001)[24], observed that a number of firms in their sample hedged future transactions. De Ceuster et al (2000)

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17 A. Judge (2006), "Why and How UK Firms Hedge", European Financial Management, Vol.12, No.3, pp.407-441.

18 H. Berkman, M. Bradbury, P. Hancock & C. Innes (2002), op.cit., p.99.

19 S. Bartram, G. Brown & F. Fehle (2009), "International Evidence on Financial Derivatives Usage", Financial Management, Spring, pp.105-206.

20 H. Berkman, M. Bradbury, P. Hancock & C. Innes (2002), op.cit.

21 C. Smith and R. Stultz (1985),op.cit.

22 For example, refer: A. Judge (2006), op.cit.; H. Berkman & M. Bradbury (1996), op.cit.; H. Berkman, M. Bradbury, P. Hancock & C. Innes (2002), op.cit.; G. Bodnar & G. Gebhardt (1999), "Derivatives Usage in Risk Management by US and German Non-Financial Firms: A Comparative Survey", Journal of International Financial Management and Accounting, Vol.10, No 3; A. Dhanani, S. Fifield, C. Helliar & L. Stevenson (2007), op.cit.; K. Grant & A. Marshall (1997), "Large UK Companies and Derivatives", European Financial Management, Vol.3, No.2; D. Haushalter (2001), op.cit.; S. Mian (1996), "Evidence on Corporate Hedging Policy", The Journal of Financial and Quantitative Analysis, Vol.31, September, ppp.419-439;

23 For example, refer: S. Bartram, G. Brown & F. Fehle (2009), op.cit.; H. Berkman & M. Bradbury (1996), op.cit ; H. Berkman, M. Bradbury, P. Hancock & C. Innes (2002), op.cit.; S. Mian (1996), op.cit.

24 C. Mallin, K.Ow-Yong, M.Reynolds (2001), "Derivatives Usage in UK Non-Financial Listed Companies", The European Journal of Finance, Vol.7, pp.63-91.

noted that a "large fraction" of their sample consider hedging interest rate exposures up to a time horizon of three years.[25]

A number of the studies that explore the rationale for hedging also considered the reasons why firms don't hedge. In most of those studies a key reason was that their financial exposures were not considered significant enough[26] (which supports hedging to reduce financial distress and/or avoid underinvestment). This also suggests that the benefits of hedging need to at least justify the costs.

Firms are also less likely to hedge if they hold larger cash balances (which will not necessarily be a value-maximising strategy). As outlined above, it may also be unnecessary to hedge if a firm has 'natural' hedges across the business, or can reduce risk via operational strategies.

3.3.2 Hedging and value maximisation

A number of studies cited above demonstrate how hedging can maximise firm value. Hedging can also enable the firm to undertake other value-maximising strategies that might involve risk.

The overall rationale for hedging is due to the presence of market imperfections. For example, to the extent that hedging can reduce the probability of financial distress (which imposes costs on the business) and/or avoids under-investment, it can increase the value of the firm, or at minimum, prevent this value from being eroded by risks that the firm cannot control. Froot et al (1993) summarise the reasoning for this as follows:

> If a firm does not hedge, there will be some variability in the cash flows generated by assets in place. Simple accounting implies that this variability in internal cash flow must result in either: (a) variability in the amount of money raised externally, or (b) variability in the amount of investment. Variability in investment will generally be undesirable, to the extent that there are diminishing marginal returns to investment (i.e., to the extent that output is a concave function of investment). If the supply of external finance were perfectly elastic, the optimal ex post solution would thus be to leave investment plans unaltered in the face of variations in internal cash flow, taking up all the slack by changing the quantity of outside money

[25] M. De Ceuster, D.Durinck, E.Laveren & J. Lodewycky (2000), "A Survey into the Use of Derivatives by Large Non-Financial Firms Operating in Belgium", European Financial Management, Vol.6, No.3, pp 301-318.

[26] For example, refer: G. Bodnar & G. Gebhardt (1999), op.cit.; M. De Ceuster, D.Durinck, E.Laveren & J. Lodewycky (2000), op.cit.; C. Mallin, K.Ow-Yong, M.Reynolds (2001), op.cit.; E.Sheedy (2002), "Corporate Use of Derivatives in Hong Kong & Singapore: A Survey" Macquarie University.

> raised. Unfortunately, this approach no longer works well if the marginal cost of funds goes up with the amount raised exterrnally. Now a shortfall in cash may be met with some increase in outside financing, but also some decrease in investment. Thus variability in cash flows now disturbs both investment and financing plans in a way that is costly to the firm. To the extent that hedging can reduce this variability in cash flows, it can increase the value of the firm.[27]

Graham and Rogers (1999), who found mixed evidence on the use of derivatives, did find that firms who use derivatives do so in a manner that is consistent with value maximisation.[28] They found that large firms that are subject to underinvestment problems and higher expected distress costs are more likely to use derivatives to hedge interest rate risk.

Notwithstanding the linkage between hedging and firm value, we cannot necessarily conclude that hedging is value-maximising for all firms, in all circumstances. This is because depending on these circumstances, hedging may not increase firm value, for example, because the exposures are not material and hence the risks (and potential costs) of financial distress are low relative to the cost of hedging.

Further, to the extent that some hedging may be considered optimal, we cannot draw general conclusions about the amount of hedging that should be undertaken by an efficient benchmark firm. Based on the evidence in the literature, this will depend on a number of things, including the competitive environment the firm operates in (and the hedging strategies employed by competitors)[29], the existence of growth options, the capital market environment and interest rate outlook, the firm's (and shareholders') tolerance for volatility in cash flows or accounting earnings, availability of operational or natural hedges, dividend policy, tax profile and the attitude of management and/or stakeholders towards derivatives use.

As noted above, it is not proposed that hedging 100% of the firm's exposures is the optimal strategy, nor is this suggested by the literature. However, this evidence clearly refutes the assumption that it is unnecessary to undertake any hedging, or that it will have no impact on firm value, particularly if it can be demonstrated that the benefits of hedging exceed the costs.

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[27] K. Froot, D. Scharfstein & J. Stein (1993), "Risk Management: Coordinating Corporate Investment and Financing Policies", The Journal of Finance, Vol.48. (5), pp.1630-1631.

[28] J. Graham & D.Rogers (1999), "Is Corporate Hedging Consistent with Value Maximisation? An Empirical Analysis", June 25, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=170348.

[29] ibid.

While there are no clear rules as to what constitutes an optimal hedging strategy, it will be necessary to demonstrate that the proposed hedging strategy is optimal for the efficient benchmark firm. This is considered further in section **Error! Reference source not found.**.

3.3.3 Implications for Ergon Energy and ENERGEX

Given the magnitude of the interest rate exposures on future borrowings faced by Ergon Energy and ENERGEX, it is probable that adverse movements in interest rates could expose the firms to financial distress (particularly if the expenditure is not discretionary). It is also reasonable for the firms to desire some level of cash flow certainty in undertaking such a significant capital expenditure program over a five year period. It is reasonable to assume that the 'efficient benchmark firm" is a large firm. As we know, with an assumed 60% target gearing level this firm is relatively highly leveraged. The literature shows that large firms with higher leverage are more likely to hedge.

As noted above, financial distress does not necessarily imply bankruptcy. In this case, the most likely scenario is considered to be a deterioration in key credit metrics (while maintaining the target gearing level), triggering a downgrade in the credit rating. This in turn will impact the availability and cost of finance. It is also likely to influence the terms of the loan facility, including the inclusion of more restrictive covenants on activities. These costs will ultimately be borne by customers.

It is therefore proposed that the efficient benchmark hedging strategy for a regulated NSP with material future borrowing requirements will be partially hedging the exposures, to a level that minimises the likelihood that a credit rating downgrade would be triggered (from the notional benchmark credit rating of BBB+). This can be done by determining the level of hedging that maintains key credit metrics above a certain threshold, for a plausible range of future interest rate scenarios. This is considered further in section **Error! Reference source not found.**.

3.4 Existing compensation

3.4.1 Beta

As noted above, one argument that has previously been made by the AER in rejecting Powerlink's claim for hedging costs was that compensation for interest rate risk is already provided in the equity beta. This was also the reasoning behind the exclusion of interest rates from cost pass through events. In this regard, it is important to highlight that ENERGEX and Ergon Energy are not seeking any compensation for

hedging costs associated with managing the interest rate and refinancing risks on existing borrowings – this issue is limited to the interest rate risk on new borrowings that will be undertaken during the course of the regulatory control period.

We do not propose to debate the extent to which the Capital Asset Pricing Model (CAPM) effectively prices interest rate risk or fully explains stock returns. However, we are not of the view that the nature of the risk that we have highlighted here is contemplated by the CAPM. The risk that is created by the regulatory regime is unique – prices are set at the commencement of the regulatory period based on the prevailing cost of debt and remain unchanged for a five year period. This is a fundamental difference between a regulated and unregulated firm.

In saying this, we are of the view that it is reasonable to assume that some compensation for interest rate risk is provided via the equity beta, although we consider that it would be impossible to precisely determine what the assumed level of compensation might be.

In relation to the interest rate risk on existing borrowings, this risk is eliminated if the business is able to refinance all of its existing borrowings over the same averaging period that is used to reset the risk-free rate and debt margin, and then is able to implement the same strategy again at the end of the regulatory control period. As was evidenced in submissions made to the AER as part of the development of the SoRI, it is not considered reasonable to assume that the 'efficient benchmark firm' will be able to implement such a strategy (and even less so in the current environment). Hence, it is not appropriate to assume that the interest rate risk on existing borrowings is eliminated by the periodic reset of the cost of debt. It is therefore also not appropriate to assume that the only risk 'left over' to be compensated via WACC is the interest rate risk on future borrowings. At least some (if not all) of that compensation must be for the risk on the existing debt portfolio.

The issue here is not the interest rate risk on existing borrowings but future borrowings. As outlined in section 2, the borrowing requirements facing ENERGEX and Ergon Energy during this regulatory control period are substantial, exposing the businesses to material interest rate risk. While it may be considered appropriate for a benchmark efficient NSP to remain exposed to risks if the borrowings were only incremental in nature, we do not consider that this is appropriate where the expenditures represent such a significant proportion of its existing asset base.

An important issue that also needs to be examined is the interest rate risk that is borne by the comparator firms that have been used to determine the equity beta. As outlined above, QTC has examined the hedging disclosures made by the comparator firms that were referenced by the AER in setting its recommended equity beta and it is evident

that these firms are active hedgers of interest rate risk. Hence, the equity beta that has been set by the AER does not reflect the risk profile of an efficient benchmark firm that does not hedge its interest rate risk – instead, it reflects the risk profile of a business that does engage in some hedging.

The other relevant consideration here is whether these businesses had similar growth options to ENERGEX and Ergon Energy at the time their betas were estimated. We have shown that the materiality of the exposures faced by ENERGEX and Ergon Energy provides strong support for hedging, particularly if they have limited (if any) discretion in relation to their projected investments and want to (reasonably) reduce the risk of financial distress. If all (or at least most) of the comparator companies used to establish the equity beta did not have expenditures of a similar order of magnitude, the interest risk faced by these businesses in relation to future borrowings is not as significant as the risks currently faced by ENERGEX and Ergon Energy. We consider this unlikely. Therefore, we cannot assume that the equity beta already reflects this risk, and we can therefore not assume that ENERGEX and Ergon Energy are already fully compensated for it.

In conclusion, we do not consider it appropriate to assume that the equity beta already compensates ENERGEX and Ergon Energy for the interest rate risks faced in the next regulatory control period. Apart from the fact that the CAPM does not contemplate the nature of the interest rate risk posed by the regulatory framework, it is evident that the comparators referenced by the AER in setting the beta, which are assumed to approximate the "efficient benchmark firm":

- engage in some hedging of their interest rate risk; and
- did not have interest rate exposures on new borrowings of the same order of magnitude as ENERGEX and Ergon Energy face in the next regulatory control period (that is, at least most of these firms did not have capital expenditure programs of this magnitude).

3.4.2 Term structure

The AER has also suggested that compensation is already provided in the term structure of interest rates. This is because the risk-free rate and debt margins are set based on a ten-year term, yet it concluded that the average term to maturity of the businesses it referenced in its final SoRI was 7.37 years.

The Joint Industry Associations (JIA) has already submitted evidence to the AER to show that the average term to maturity for the relevant businesses exceeds ten years.

While we do not accept the average term assumption of 7.37 years adopted by the AER, we do not intend to revisit that issue here.

Even if a term of 7.37 years is assumed, the current term premium implied relative to the ten year bond rate (for Commonwealth Government bonds) has currently been estimated by QTC to be in the order of 0.08% per annum. This is inconsequential relative to the magnitude of the exposures faced by Ergon Energy and ENERGEX. In any case, to the extent that this is assumed to provide some compensation, it is reasonable to interpret from the AER's decision is that this relates to managing the interest rate and refinancing risks on existing exposures (to align with the regulatory cycle):

> On average a 10-year term assumption is expected to over-compensate the benchmark efficient energy network business on the cost of debt. The major source of over-compensation is the term premium on the base interest rate component of the cost of debt, which via hedging instruments is converted to a term matching the length of the regulatory period.[30]

While we dispute the AER's assumption of 'over-compensation', the hedging that is proposed here is not to align the interest cost to a term matching the length of the regulatory period, but to hedge the risk on future borrowings to be undertaken during that period.

Further, we cannot assume that a term premium is reflected in the debt margin. The AER continues to prefer to use Bloomberg data to estimate the yield on ten year BBB rated bonds. However, since the sub-prime crisis, liquidity has virtually dried up in the long-term BBB corporate bond market. As a consequence, the longest yield to maturity quoted by Bloomberg is eight years. The AER then adds the difference between the yield on A-rated eight and ten year corporate bonds in order to estimate a ten year BBB rate.

[30] Australian Energy Regulator (2009), op.cit., p.xiii.

Table 4 details the bonds included in Bloomberg's calculation of the eight year BBB yield on June 10 2009. It can be seen that there were only a small number of issues (seven) included and importantly, the longest dated bond was a four year bond, which is four years short of the period for which the yield is being estimated – eight years.

Table 4 Bonds included in the 8 year BBB yield calculation

Ticker	Coupon	Maturity	Price	Fair Value	Yield
FBG	6.25	3/17/2010	100.83	100.55	5.12
BQDAU	6.00	12/02/2010	99.86	99.76	6.10
DXSAU	6.75	2/08/2011	100.08	100.6	6.69
ORGAU	6.50	10/06/2011	99.38	99.03	6.79
TABAU	6.50	10/13/2011	98.59	98.99	7.16
WESAU	6.00	7/25/2012	96.48	95.69	7.28
SNOWY	6.50	2/25/2013	94.44	95.62	8.27

Source: Bloomberg

Apart from the issues associated with a small sample size, given the term structure of interest rates is normally upward sloping the use of shorter term instruments to estimate eight year BBB yields risks materially understating them.

Hence, while we recognise the difficulties associated with estimating ten year BBB bond yields at the current time, the methodology currently employed by the AER is most likely to be under-estimating them. We are certainly not of the view that sufficient compensation is provided in the implied difference between a yield based on a term to maturity of 7.37 years and ten years (if it was accepted that a 7.37 year term was appropriate).

3.5 Benefits relative to costs

As outlined above, we concur that in order for hedging to be value-adding, the benefits need to outweigh the costs. The benefits are the avoided costs if there is an adverse movement in interest rates. This in turn will be a direct function of the nature and extent of the exposures faced by the business.

As outlined in section 2.3, the magnitude of the exposures faced by ENERGEX and Ergon Energy in the next regulatory control period are significant. Further, these costs only reflect the additional interest costs that will need to be met by the business – they do not capture the additional costs that could arise due to financial distress, including the negative impact that the loss of commercial and financial flexibility could have on firm value (which is difficult to quantify). The estimates of the potential benefits of hedging should therefore be considered a 'lower bound' estimate.

The costs of hedging will vary with market conditions. In its accompanying report, QTC provides indicative costs based on the current margins between the spot and forward curve (the forward points). The indicative costs of **fully** hedging 100% of the

exposures are $43 million and $34 million (in present value terms) for Ergon Energy and ENERGEX respectively.

Given we are proposing that it only appropriate to assume that a proportion of the exposures might be hedged by the efficient benchmark NSP, the indicative costs of the actual hedging strategy, if implemented now, will be less than this. However, even if 100% of the exposures are hedged, the hedging costs still well exceed the potential costs that could be incurred by the business if the exposures remain unhedged and interest rates move adversely during the course of the regulatory period (recognising that those costs do not include the costs of financial distress).

As interest rates are inherently volatile, particularly in the current uncertain environment, the actual benchmark hedging costs cannot be predicted with certainty. The proposed means for dealing with this uncertainty as part of the regulatory proposal is addressed in section **Error! Reference source not found.**.

3.6 Is it appropriate for customers to bear this cost

One of the issues raised by NERA in its 2007 report to the AER was that the costs of hedging should not necessarily be paid for by customers, particularly given hedging primarily benefits the firm's owners.[31] Again, this argument assumes that the owners are already compensated for this risk via the equity beta. NERA is also making the assumption that 100% of the risk is being hedged, which would potentially guarantee the business's net cash flows.

We have already addressed the assumption regarding what is compensated by the equity beta in section 3.4. Further, we concur that it is not necessarily prudent or appropriate to hedge 100% of the interest rate risk on the future borrowings.

Reducing the probability of financial distress will not only benefit shareholders via firm value, but will also benefit customers. Given the magnitude of the exposures faced by ENERGEX and Ergon Energy, it is not appropriate to assume that any material and adverse movements in interest rates can be borne by the businesses. The costs of financial distress will ultimately be borne by customers and shareholders.

Assuming that it is not appropriate to assume that this risk is already compensated via the WACC – which we have established above – in our view, the situation here is no different from the situation faced in relation to cost pass through events.

[31] NERA (2007), op.cit.

Under the NER, a NSP can seek to obtain a pass through where certain exogenous events occur that will materially increase the costs of providing the relevant services. These events are assumed to be beyond the control of the firm, and primarily include changes in taxes, service standards, terrorism or insurance. According to the Position Paper developed by the AER in relation to pass through events for transmission, any reopening of the revenue cap is conditional on demonstration by the transmission NSP that it is materially adversely affected by the event.[32] The materiality threshold has been set at 1% of average maximum allowable revenue (MAR) for that year.

While we are not proposing that interest rate risk on future borrowings should be treated as a pass through event, there are some parallels that can be drawn here. Interest rate risk is beyond the control of the firm. However, it can mitigate the potential impact of this risk on the firm by hedging. Currently, however, there is no incentive for the business to do this as the costs are not compensated.

Provided the risk has not been compensated elsewhere, if it is considered appropriate to pass through the costs of material exogenous changes to customers, we question why it is not appropriate for the business to be compensated for reasonable and prudent costs of implementing a strategy that could actually reduce the impact of an material and adverse change in the interest costs on future borrowings (similar to insuring against other risks that cannot be controlled). Consistent with the treatment of other financing costs, that strategy, and the associated costs, should be based on an assumed notional strategy that would be undertaken by an efficient benchmark NSP.

We are not proposing that these benchmark costs are routinely reimbursed as a matter of course. Each business must still be able to demonstrate that the exposures are material (and cannot assume to be compensated via WACC).

3.7 Other regulatory precedent

UK regulators in water, rail and electricity have considered the potential impact of adverse changes in interest rates during the course of the regulatory control period on the regulated business. In August 2009, OFGEM released an issues paper in relation to its review of allowed revenues and financial issues for electricity distribution.[33] As part of this review, it commissioned a report from PriceWaterhouseCoopers (PWC) on the management of the cost of debt fluctuations. This has been considered particularly

[32] Australian Energy Regulator (2005), Statement of Principles for the Regulation of Electricity Transmission Revenues, Position Paper: Pass-throughs and Revenue Cap Re-openers, December.

[33] OFGEM (2009), Electricity Distribution Price Control Review, Initial Proposals – Allowed Revenues and Financial Issues, August.

important given the uncertainty and volatility in the markets following the sub-prime crisis.

OFGEM had previously indicated that if market conditions meant that the regulated businesses found their financeability was jeopardised, they could request a reopening of the revenue cap based on the existing 'disapplication' mechanism. OFGEM stated:

> The cause of financial distress is largely due to factors beyond the company's control. These might include…a material change in financial market conditions relative to those prevailing at the time a price control was set such that an efficient company with an investment grade credit rating would no longer be able to finance its activities. It would be for the applicant company to set out the evidence and to persuade us that the costs of financial distress were beyond its control.[34]

The PWC report addressed strategies that involved potential changes to the regulatory framework, including:

1. continuing with the existing approach;
2. raising the allowed cost of debt relative to the long-term average to reflect the recent market conditions;
3. introduce a cost of debt trigger mechanism (that is, an adjustment if rates moved beyond a certain band);
4. introduce a 'substantial effect' clause;
5. introduce a time based reopener (that is, periodic reviews within the regulatory period).

All of these options (with the exception of the first) contemplate some form of adjustment to allowable revenue to reflect changes in the cost of debt. The issue of hedging and compensation for hedging costs was not considered.

OFGEM's starting position in its issues paper is to retain the status quo:

> This is because we consider that long-term debt is available at rates that, if inflation returns to the levels typically seen over the last ten years, are consistent with recent price control decisions.[35]

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[34] OFGEM (2008), Arrangements for Responding in the Event that a Network Company Experiences Deteriorating Financial Health, December.

[35] OFGEM (2009), op.cit.

This does not necessarily address the risk that future increases in interest rates (relative to the current market levels they are citing) could adversely impact the regulated business's ability to financing new borrowings. Alternatively, it could reflect an assumption that the businesses could hedge this risk at these rates. However, OFGEM remains open to feedback on the other options as part of its consultation process.

3.8 Summary: why hedging is efficient

To summarise, we consider that it is appropriate to assume that an efficient benchmark NSP, which has interest rate exposure of the order of magnitude faced by Ergon Energy and ENERGEX in the next regulatory control period, may hedge some of the interest rate risk on its future borrowings. We consider that it is appropriate that the businesses be provided with compensation for these costs as part of their operating expenditure allowance. These costs are based on a benchmark allowance, which requires establishing an efficient benchmark hedging strategy and then estimating the benchmark costs of that strategy based on current market rates.

The benchmark hedging strategy would based on reducing the probability of financial distress, which is the level of risk at which a credit rating downgrade from the assumed notional benchmark credit rating of BBB+ is likely to be triggered. These costs are prudently and efficiently incurred as part of the providing the relevant services.

We consider this to be appropriate for Ergon Energy and ENERGEX in the next regulatory period for the following reasons:

1. the exposures are material, to the extent that:
    a) not hedging could expose the businesses to the risk of financial distress. These costs cannot be avoided by not undertaking the expenditure given much of this is non-discretionary; and
    b) they are of a magnitude that will ensure that over a range of plausible interest rate scenarios, the benefits of hedging (via avoiding the costs of a material increase in actual future borrowing costs relative to the regulated cost of debt) exceed the costs (based on current indicative rates);
2. the assumption that hedging has no impact on firm value assumes perfect capital markets. It is in the presence of market imperfections, such as the costs of financial distress, that hedging may have a positive impact on firm value;

3. hedging is a common practice employed by businesses similar to Ergon Energy and ENERGEX. This is supported by empirical evidence as well as data from the AER's beta sample;

4. this risk is not compensated via the beta, because:

    a) the betas of the comparator sample relied upon by the AER in the main, reflect an interest rate risk profile that includes some hedging. Further, those businesses did not necessarily face a growth profile of this order of magnitude at the time the betas were estimated;

    b) the materiality of the exposures faced by Ergon Energy and ENERGEX in the next regulatory control period are likely to well exceed any reasonable level of compensation that we might assume beta provides;

5. given the magnitude of the exposures and current market rates, we can also not assume that there is sufficient compensation provided in the term structure of interest rates, even though we do not consider it appropriate to assume that these businesses fund themselves for an average term to maturity of only 7.37 years;

6. to the extent that the risk is not otherwise compensated, we consider that it is appropriate for the businesses to be compensated for the reasonable benchmark costs of reducing their likely exposure to interest rate risk, which, if not hedged, could have a far more material and adverse impact on the businesses in the long-run. While the businesses cannot control interest rate risk, they can employ reasonable strategies to mitigate the impact. This is considered to be in the best interests of consumers and stakeholders.

We consider that such compensation is consistent with the revenue and pricing principles contained in the NEL, because these are efficient costs that are incurred in provision of the relevant services. This in turn is consistent with the promotion of economic efficiency, in particular, assisting in providing a regulatory environment that encourages prudent risk management, which in turn contributes towards ensuring that efficient investment is undertaken in the distribution networks.

4 Determining the benchmark hedging costs

4.1 Approval of framework

Given that any hedging strategy, and the cost of hedging, is driven by prevailing market conditions – and these conditions remain volatile and uncertain - we are not proposing to forecast a hedging cost allowance at this point. The key issue with setting the costs now, is that it could under- or over-estimate the costs depending on how interest rates move between now and the end of the regulatory period.

In a similar way, we would not seek to set the regulated cost of debt on existing borrowings now. In order to satisfy the requirements of the NER (which is that rates reflect current market conditions), this is not done until a nominated point in time that is close to the expiration of the current regulatory control period. Further, this cost sets a benchmark allowance for the businesses. How the businesses then fund themselves in practice remains completely at their discretion. This similarly applies in relation to hedging.

We therefore submit that the most appropriate strategy is to consider how the methodology that would be applied in estimating the benchmark hedging costs would be established. Further work may need to be done in consultation with the AER and stakeholders to set out that framework. The key matters that this framework could address include:

1. how future exposures will be measured (given this must be done with reference to hypothetical interest rate scenarios);
2. the key credit metrics and the threshold levels that could trigger a credit rating downgrade;
3. the evidence that the businesses would need to submit to show that the benefits of hedging exceed the costs, within the context of the Post Tax Revenue Model (which we would propose is based on the modelling that has been done by SFG); and
4. any other requirements that would need to be satisfied in implementing the hedging strategy over the averaging period, such as how changes in forward points might influence the hedging strategy; and
5. how the actual costs of that assumed benchmark strategy would be estimated over the averaging period.

4.2 Hedging Profile

As noted above, there is no 'optimal' level of hedging that we can reference for an efficient benchmark firm. This is because it depends on the circumstances of the industry, the firm, and current market conditions.

Overall, our stated objective is that if any hedging is undertaken it would be based on the level of hedging that would reduce the probability of financial distress, as reflected in a downgrade in the notional benchmark credit rating. As we have outlined in this report, the proposal is to determine an efficient benchmark hedging strategy based on the level of hedging that would be reasonably expected to preserve a BBB+ credit rating, based on a reasonable range of future interest rate scenarios. This in turn would be linked to the key credit metrics, such as FFO/Total Debt and FFO/Interest Expense, which are addressed in more detail in the accompany report by SFG.

It is important to note that there is not necessarily a single 'optimal' hedging profile that would achieve this (nor do we consider it appropriate for the AER to be prescriptive in this regard). There could be a range of alternative hedging profiles that could achieve this. For example, one profile might involve hedging more of the closer exposures and less (or none) of the more distant ones. Alternatively, the business might seek to hedge the same proportion each year. It may also be appropriate to estimate the benchmark hedging cost based on the average costs of a number of alternative hedging profiles.

The primary objective of establishing an efficient benchmark hedging strategy is to estimate an appropriate benchmark allowance. Once this has been determined, the businesses should then be free to implement their desired benchmark hedging strategy based on their own circumstances and commercial requirements. It is not appropriate for the regulator to prescribe what the businesses actually do in practice. At the same time, if compensation is to be provided for implementing a strategy that could reduce risk (and improve efficiency), it is reasonable to expect that the businesses would take active steps to achieve the best outcomes for their customers and shareholders.

5 Conclusion

This report, in conjunction with the accompanying reports prepared by SFG and QTC, has considered the issues and costs associated with hedging interest rate risk on future borrowings. We have recommended that a framework is developed for approval of an efficient benchmark cost allowance as part of the operating expenditure allowance (along with debt and equity raising costs). The costs would be set with reference to an efficient benchmark hedging strategy, based on the prevailing market conditions over the same averaging period that is used to set the risk-free rate and debt margin.

The benchmark allowance would be sought on a case by case basis depending on the materiality of the exposures faced by the business. This could also mean that an allowance approved in one regulatory control period (when the business is undertaking significant capital expenditure) is not approved in the next (when growth is more incremental in nature).

Overall, we are of the view that compensation of a reasonable proportion (but not necessarily 100%) of future material exposures is consistent with the principles set out in the governing legislation, and will promote economic efficiency. It will also ensure that regulation complements, rather than drives, commercial financing practices, and also provides the businesses with an opportunity to reduce their exposure to a risk that they cannot directly control. Apart from avoiding the costs of financial distress or underinvestment, this frees the business to pursue other initiatives in areas that they can influence, in order to improve the overall efficiency of the services delivered.

A Summary of literature

S. Bartram, G. Brown & F. Fehle (2009), "International Evidence on Financial Derivatives Usage", Financial Management, Spring, pp.105-206.

- This primarily examines what motivates financial derivative usage. They examined foreign exchange (fx), commodity price and interest rate derivatives.
- Their review covered 7,319 companies, which is about 80% of the global market capitalisation of non-financial firms. They reviewed annual report data.
- Overall, their analysis showed that 60.3% of these firms used some type of derivative. 33.1% used interest rate derivatives.
  - In Australia, 66.6% used some type of derivative, and 42.3% used interest rate derivatives.
- Derivatives use was highest in the utilities and chemicals sectors.
- In terms of motivations, some of the results were consistent with theoretical predictions, but others weren't.
  - However, they did conclude that the use of derivatives allows firms to undertake other value-enhancing financial policies that might involve risk.
  - The use of derivatives can also reduce the need to carry additional cash, or can reduce or replace the need for operational hedging.
  - Firms with more leverage were also more likely to use derivatives.

Berkman & M. Bradbury (1996), "Empirical Evidence on the Corporate Use of Derivatives", Financial Management, Vol.25, No.2, Summer, pp.5-13.

- They examined the financial statements of 116 firms in New Zealand – one of the reasons they focussed on this jurisdiction was because the fair value and notional value of off- and on-balance sheet financial instruments must be disclosed.
- They assume derivatives are used after operating and financing decisions have been made.
- They hypothesised that there is a positive relationship between hedging and growth options.

  - This is based on the theory that hedging reduces underinvestment.
  - An alternative way of looking at this is that it is not the growth options per se that determine hedging, but the risk of not being able to convert those options into assets in place.

- The measures hedging activity based on fair and contract values of derivatives, scaled by the market value of the firm.
- They found that derivatives use increases with: leverage, size, tax losses, proportion of shares held by directors and dividend payout ratios.
- Derivatives use was found to decrease with: interest cover and liquidity.
- The found a positive relationship between the use of derivatives and growth options, but only when fair value is used as the measure of hedging activity.

H. Berkman, M. Bradbury, P. Hancock & C. Innes (2002), "Derivative Instrument Use in Australia", Accounting and Finance, Vol.42, pp.97-109.

- According to the theory, firm value would be independent of hedging strategy, if market imperfections did not exist.
- This study examines 158 firms, 158 industrials and 56 mining companies. They examined the use of fx, commodity and interest rate derivatives.
- They found that:
  - 52.8% of the industrials and 61.5% of mining firms were derivative users (holding at least one type).
  - 27.4% of the industrials and 15.4% of the mining firms use interest rate derivatives.
  - The industrials that used derivatives were more likely to have tax losses, are larger and less liquid.
  - For the mining companies, firm size and leverage were positive and significant.

Bodnar & G. Gebhardt (1999), "Derivatives Usage in Risk Management by US and German Non-Financial Firms: A Comparative Survey", Journal of International Financial Management and Accounting, Vol.10, No.3.

- Examined fx, interest rate and commodity price derivatives by non-financial firms in the US and Germany. To enable comparisons between the two jurisdictions, they matched the sample of firms in each country based on size and industry composition. The study was survey-based.
- 77.8% of the German companies use derivatives; 56.9% of the US.
  - 88.8% of the German users used interest rate derivatives; 75.9% of the US.
  - Usage increased with firm size.
- Of the users of interest rate derivatives, 45.6% of US respondents sometimes use derivatives to lock in a rate for future financing (another 1.1% do this frequently). This was also the case for 65.5% of German users (another 20.2% do this frequently).
- Most users indicated that they would sometimes alter the timing and size of their interest rate hedges based on future views on interest rates.
- When non-users were asked why they did not use derivatives, the most common response was that their exposures were not big enough (47.1% of US non-users, 61.1% of German non-users). The next main reason was because the exposure could be managed by other means. Public perception of derivatives use was another key concern.
- For those who user derivatives, most of the German firms indicated that they do so to manage accounting earnings. For the US firms, minimising variability in cashflows was most important.

M. De Ceuster, D.Durinck, E.Laveren & J. Lodewycky (2000), "A Survey into the Use of Derivatives by Large Non-Financial Firms Operating in Belgium", European Financial Management, Vol.6, No.3, pp.301-318.

- This survey of Belgian non-financial firms revealed that 65.8% use derivatives.
- The most important reason why they were used was to manage earnings volatility.
  - 68.2% used interest rate derivatives to lock in funding rates.

- Of those firms who do not use derivatives, the main reason was that they were able to hedge risk by other means. Policy restrictions imposed by treasurers or directors was also important. Other reasons included: the perceived risk of derivative products, insignificance of exposures.

S. Dhanani, C. Fifield, L. Helliar & L. Stevenson (2007), "Why UK Companies Hedge Interest Rate Risk", Studies in Economics and Finance, Vol.24, No.1, pp. 72-90.

- This study focuses on interest rate risk only. Interest rate risk is seen as an issue because:
  - increased volatility of interest rates;
  - increased use of corporate debt;
  - interest rate-based covenants are often present in lending agreements;
  - emphasis on financial risk in corporate governance codes.
- The two problems with Miller and Modigliani's conclusion that corporate financial policy doesn't matter are:
  - the time horizons of individuals are often shorter than what their model assumes;
  - market imperfections.

  Based on their assumptions, financial distress is costless.
- This study examined derivative use by 116 listed UK companies (based on the number of respondents).
- The key reasons for hedging were:
  - managing reported profits (most important);
  - reducing the risk of financial distress;
  - managing possible future acquisitions.
- They found that larger companies are more likely to use derivatives.
- Some firms will also look at global economic indicators in making decisions and seek to mitigate the impact of adverse movements.

- They also found some evidence to support the taxes and managerial incentives arguments.

J. Graham & D.Rogers (1999), "Is Corporate Hedging Consistent with Value Maximisation? An Empirical Analysis", June 25, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=170348.

- This study examines net notional derivatives (fx and interest rate) holdings by a broad cross-section of US firms.
- The objective of the study was to determine which market imperfections drive hedging.
- They found:
  - no relation between derivative holdings and tax function convexity;
  - hedging increases debt capacity (and hence potentially firm value);
  - most firms use derivatives in a manner that is consistent with value maximisation;
  - larger firms engage in more hedging.

K. Grant & A. Marshall (1997), "Large UK Companies and Derivatives", European Financial Management, Vol.3, No.2.

- Derivatives use in large companies is now well established.
- The most common reason for use was to reduce cashflow volatility.
- A survey of the top 250 UK companies by Record Treasury Management revealed that close to 100% of respondents used derivatives to hedge interest rate risk.

D. Haushalter (2001), "Why Hedge? Some Evidence from Oil and Gas Producers", Journal of Applied Corporate Finance, Winter, Vol.13.4, pp.87-92.

- Surveys 177 US oil and gas producers.
- This study finds that there is considerable variability in firms' risk management policies. This suggests that there may be differences in firm and manager characteristics that influence hedging.
- Hedging policies are highly correlated with financing policies, for example, those who used more derivatives hedged a greater proportion of their production (in

order to reduce the risk of distress and/or ensure sufficient future cashflows to fund investment).

- They find that larger companies are more likely to hedge.
- They did not find any clear relation between hedging policy and the shareholdings or compensation of managers.

A. Judge (2006), "Why and How UK Firms Hedge", European Financial Management, Vol.12, No.3, pp.407-441.

- The key motivations for hedging include:
  - reducing the transaction costs of financial distress;
  - reducing underinvestment costs;
  - reducing the level of exposure to financial price risk.
- Examined a sample of large non-financial firms listed on the FT500, using annual reports and direct surveying of corporate treasurers. Found that:
  - 77.9% of the firms reviewed using annual report data hedge financial price exposures;
  - 86.5% of survey respondents hedge financial price exposures;
  - note that 'hedging' includes derivatives and other methods.
- Judge concluded that:
  - this study confirms that reducing financial distress costs is a particularly relevant motivation when hedging;
  - larger firms, firms with less cash, and firms with a greater probability of financial distress are more likely to hedge using derivatives;
  - there is evidence that hedging may enhance firm value, although this is an area for further future work;
  - this study revealed that more UK firms hedge compared to US firms (based on some of the US studies). This could be due to jurisdictional differences, or the wider definition of 'hedging' applied here.

C. Mallin, K.Ow-Yong, M.Reynolds (2001), "Derivatives Usage in UK Non-Financial Listed Companies", The European Journal of Finance, Vol.7, pp.63-91.

- Surveys 231 UK non-financial firms.
- This revealed that hedging is a well-established practice amongst the larger companies. 60% of firms use at least one derivative instrument.
- A number hedged expected transactions:
  - 46.2% hedged future transactions of 12 months or les more than 50% of the time; 22% hedged these less than 50% of the time;
  - a smaller number hedged transactions of greater than 12 months;
- The main reason cited for hedging was to manage variations in accounting earnings.
- Of those who don't use derivatives, 72% cited a lack of significant exposure to financial risk as one of their top three reasons. 51.6% said this was their main reason.

S. Mian (1996), "Evidence on Corporate Hedging Policy", The Journal of Financial and Quantitative Analysis, Vol.31, September, ppp.419-439.

- Mian examined the annual reports of 3.022 firms.
- Found mixed evidence of models of hedging that emphasise the role of contracting costs and capital market imperfections. Also found mixed evidence on the tax savings motivation.
- Found that larger firms more likely to hedge. Hedgers of interest rate risk have more debt and longer debt maturities.
- There was also a positive correlation between dividend yield and payout, and a negative correlation with liquidity.
- Mian did not find that hedging was correlated with higher market to book ratios (which was used to proxy growth opportunities).

D. Nance, C. Smith & C. Smithson (1993), "On the Determinants of Corporate Hedging", The Journal of Finanace, Vol.48 (1), March, pp.267-284.

- They surveyed 169 US firms – 104 used hedging instruments.
- Their study found:

- consistency with the proposition that firms with more convex tax schedules hedge more;
- firms that hedge have significantly higher research and development expenditures;
- firms that hedge have more growth options;
- firms that hedge have less liquid assets and higher dividend payouts.

E.Sheedy (2002), "Corporate Use of Derivatives in Hong Kong & Singapore: A Survey" Macquarie University.

- Surveyed 131 non-financial firms in Hong Kong and Singapore.
- Overall, Sheedy found that more firms here use derivatives than in the US, and with more intensity. They are also more likely to implement strategies based on market views.
- Also found a higher rate of usage amongst small to medium sized firms (relative to the US), although usage still increased with size.
- The primary motivation is to reduce market risk. The management of interest rate exposures is more likely to be view based.
- Of those who don't hedge, it is mainly due to limited exposures or the use of operational strategies.
- The use of derivatives is concentrated in fx risk, although 55% use interest rate derivatives. It was suggested that this lower use may reflect a lower preference for debt finance in these jurisdictions.

C. Smithson & B. Simkins (2005), "Does Risk Management Add Value? A Survey of the Evidence", Journal of Applied Corporate Finance, Vol.17, No.3, Summer.

- This study reviewed the relevant research on this topic.
- Overall, while not all of the research is equally supportive of derivative use by corporates, "the bulk of the evidence reinforces the idea that corporate risk management is a value-adding activity."
- They addressed four questions:
    1. Is financial risk reduction reflected in stock price movements?

- Most studies examined this based on the market model, and then added factors, for example, to proxy for interest rate exposure.
- The evidence was mixed for industrials, however larger multinationals are more likely to have natural hedges.

2. Is the use of risk management tools (derivatives) associated with reduced risk?
   - 8 of the 9 studies examined showed this was the case for industrials.
3. Is cashflow volatility related to firm value?
   - Only 3 studies reviewed addressed this, and found a relationship between volatility and lower investment.
4. Is there are relationship between derivatives and firm value?
   - For interest rates and fx, found a positive relationship between risk management and firm value. This holds for financial and non-financial firms (using Tobin's Q to approximate firm value).
   - They acknowledged that the evidence on this is limited so far, with the evidence to date being more supportive of this for fx and interest rate exposures.

B Curricula vitae

Synergies ECONOMIC CONSULTING

Staff Curriculum Vitae

Name of Staff: JO BLADES

Position: Director

In Brief:

Jo joined Synergies in early 2005 from Queensland Treasury Corporation, where she worked in a number of different capacities including structured finance, customer account management, financial risk management advice and the development and delivery of customer training courses in corporate finance and financial risk management. She has also lectured and tutored at undergraduate level in finance and foundation economics at the Queensland University of Technology.

Skills and Capabilities:

- Corporate finance
- Economic regulation
- Financial analysis and risk management
- Strategic and commercial analysis
- Microeconomic analysis
- Public finance

Recent Related Projects:

- assisted Ergon Energy and ENERGEX in developing their cost of capital proposals to the AER as part of the current review;
- prepared a cost of capital submission for the Gladstone Area Water Board as part of their forthcoming review by the QCA;
- prepared a cost of capital submission to the QCA for Queensland Rail as part of the second review of their access undertaking;
- prepared a submission to the QCA reviewing the cost of equity that should apply to QR as part of the third review of its access undertaking;
- preparation of a cost of capital submission for GasNet as part of its regulatory review by the AER;
- undertook a review of the cost of capital to apply to Perth Airport
- undertook a review of the cost of capital to apply to Darwin Airport;
- undertook an assessment of an appropriate beta for a regulated airport facility in New Zealand (as part of a cost of capital review);
- prepared two cost of capital submissions for ARTC as part of regulatory reviews, one for the Hunter Valley coal network and the other for its interstate rail network;
- reviewed the cost of capital to apply to The Pilbara Infrastructure as part of its review by the ERA;
- undertook a cost of capital review for Cooperative Bulk Handling Limited;
- provided advice to a number of clients in relation to the implications of the form of regulation for the cost of capital;
- undertook an extensive review of SEQ Water Corporation's cost of capital, for both regulatory and commercial purposes.

Staff Curriculum Vitae

Name of Staff: MARK CHRISTENSEN

Position: Associate

In Brief:

Mark is an Associate at Synergies, and more recently was a senior lecturer in finance at QUT, where he spent several years in the Accounting and Economics & Finance faculties. He is also co-author of Australia's leading corporate finance text and developed the methodology used by the AGSM for the estimation of betas. He has extensive experience in advising regulated entities on the cost of capital.

Qualifications:

Bachleor of Business
Master of Financial Management
Fellow – Securities Institute of Australia
CPA

Appointments:

Member of the Queensland Competition Authority Board

Relevant Experience:

- Calculated an appropriate discount rate for SEQWater to use for analysing both bulk water storage and wastewater using a WACC methodology. Provided comments to Sunwater regarding the value of the asset beta, the value of gamma and the appropriate formula to use when undertaking asset impairment decisions.
- Provided an analysis to GAWB of what constitutes systematic risk and non systematic risk.
- Development of a financial model to access the impairment of water assets applying AASB136.
- Reviewed the cost of capital to apply to WestNet Rail as part of its review by the ERA.
- Reviewed the cost of capital to apply to The Pilbara Infrastructure as part of its review by the ERA.
-
- Provision of advice regarding the appropriate discount rate to use to value impaired water assets.
- Provided Brisbane Water a valuation of waste water plant to calculate lease payments to the end user of waste water. The model required calculation of the WACC, the effect of risk sharing and the calculation of the lease payment itself.
- Reviewed a number of submissions received by the QCA and have seen many suggestions regarding the calculation of WACC and the effects of regulatory decisions.
- Provided a valuation to Brisbane Water of a stand alone replication of water assets to supply a major end user.
- Provision of advice to Royal Dutch Shell. The advice was designed to improve the scoping of new explorations so that the final investment decision was undertaken with greater certainly this having the opportunity to add greater value to the organisation. The two year contract focused of the final investment decision and included a number of assignments.

Appendix 6

Consistency of regulatory assumptions in relation to debt hedging costs

Consistency of regulatory assumptions in relation to debt hedging costs

Report prepared for ENERGEX and Ergon Energy

28 August 2009

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Contents

1. Executive Summary

Context

1. The cost of debt is one of the key components in determining a regulated entity's allowable return on capital. At present, the approach of Australian regulators is to set the benchmark cost of debt equal to an estimate of the risk-free rate plus a debt margin. The risk-free rate is usually estimated as the yield-to-maturity on 10-year Commonwealth Government bonds, taken as an average over the 10 to 40 trading days prior to the determination date. Similarly, the debt margin is commonly calculated as the difference between the yield-to-maturity on 10-year BBB+ corporate bonds and the yield-to-maturity on 10-year Commonwealth Government bonds, taken as an average over the same 10 to 40 trading day period prior to the determination date. Both of these estimates are then held constant for the entire regulatory period, which is commonly five years. Effectively, prices are then set to enable the regulated entity to recover this assumed cost of debt financing. This is the approach that has been adopted by the Australian Energy Regulator (AER) in its recent review of weighted-average cost of capital (WACC) parameters.[1]

Current engagement

2. The Strategic Finance Group: SFG Consulting (SFG) has been engaged by ENERGEX Ltd and Ergon Energy Corporation Ltd to assist in examining the issue of consistency among assumptions in relation to the allowed cost of debt and debt hedging costs. In particular, the key issue is whether it is commercially realistic for the benchmark regulated entity to *simultaneously* maintain the assumptions that the firm can have:

   a. 60% gearing, which is approximately twice that of the average Australian listed firm;

   b. remain unhedged against potential future interest rate movements,[2] and

   c. maintain a strong investment grade credit rating of BBB+.

3. This is a particularly important consideration in the case where a regulated entity has large CAPEX requirements (relative to its regulatory asset base) over the regulatory period. In this case, the borrowing rate is effectively locked in (via the WACC) at the beginning of the regulatory period, whereas the actual borrowing will not (and cannot) occur until the expenditure is required. This is the circumstance currently facing both ENERGEX and Ergon.

4. If the maintenance of these three joint assumptions is considered to be commercially unrealistic, the inconsistency could be removed by either:

   a. reducing the assumed level of gearing;

   b. compensating regulated entities for the reasonable costs of hedging their interest rate exposure; or

   c. lowering the assumed credit rating.

[1] Australian Energy Regulator, 2009, Electricity transmission and distribution network service providers: Review of the weighted-average cost of capital (WACC) parameters – Final Decision, 1 May 2009.

[2] Due to the fact that regulated entities are currently not compensated for the cost of entering into hedging contracts, Australian regulators implicitly assume that regulated entities remain unhedged against interest rate movements.

Summary of key findings

5. As a result of our analysis, we conclude that there is a strong argument to suggest that the three joint assumptions as to gearing (60%), credit rating (BBB+) and hedging policy (no compensation for interest rate hedging costs) made in the AER's *Final Decision* is unlikely to hold in commercial practice, particularly in light of the current volatile credit market conditions.

6. The key contribution of this report is a scenario analysis that examines the impact that an increase in future interest rates might have on the key credit rating metrics of a number of firms. We show that a temporary shock to interest rates can have a substantial impact on a number of key financial ratios – substantial enough to affect the credit ratings of regulated firms.

7. We also examine the Post-Tax revenue Models (PTRM) for ENERGEX and Ergon in some detail. We show that for both firms an unhedged shock to interest rates during the regulatory period would have a substantial impact on financial ratios and ultimately the stand-alone credit rating. We compare the resulting financial ratios against indicative benchmarks and conclude that an unhedged interest rate shock could lead to a deterioration in financial ratios to the extent that they would no longer support an investment grade credit rating.

8. We also make the following observations and conclusions:

   a. In justifying the assumed BBB+ credit rating of the "benchmark" electricity distribution or transmission firm, the AER (and Australian regulators generally) rely on the actual credit ratings of a sample of regulated entities. We also note that the sample set selected for this purpose usually includes a high proportion of government-owned or government-backed firms, which have explicit or implicit support from government;

   b. Based on the indicative ratings methodology adopted by global ratings agency Standard & Poor's and information contained in the AER's final decision and other recent Australian regulatory determinations, a number of Australian regulated entities would be unlikely to sustain a BBB+ credit rating with 60% gearing and no hedging of interest rate risk unless their obligations were backed by the government or the firm's ultimate parent company;

   c. Due to the fact that the profits of regulated entities, as well as their solvency ratios, are highly sensitive to interest rate movements (arising because of the high level of debt these businesses are assumed to carry), a prudent regulated entity is extremely unlikely to remain completely unhedged over the regulatory period. We note that the vast majority of Australian firms subject to regulated revenue caps engage in substantial hedging arrangements to mitigate the consequences of adverse interest rate changes. Again, this is especially important where the CAPEX required during the regulatory period (which is not debt financed until required) is large relative to the regulatory asset base. This is precisely the present situation for both ENERGEX and Ergon;

   d. Compared with the regulated entity's other options for managing interest rate risk, the use of interest rate swaps, forward-start fixed rate loans, and other derivate contracts is both prudent and cost effective, especially when balanced against refinancing risk. We also note that regulated network firms do undertake substantial risk management activities.

9. We conclude that there are sound economic reasons for the benchmark firm to seek to hedge against downside risk arising from adverse changes in interest rates which is consistent with the reasonable costs of an efficient interest rate risk management program being included as an efficient cost in the regulatory process.

2. Regulatory principles and precedent

10. The values assumed by the regulator for the benchmark entity's credit rating and gearing levels are important in estimating the weighted average cost of capital (WACC). The assumed credit rating will impact on the debt margin which in turn affects the calculation of the cost of debt capital. As a general observation, the higher the assumed credit rating, the lower the calculated debt margin. This is due to the lower risk of default on higher rated corporate bonds, meaning a lower differential in risk between the corporate bond and risk-free government bonds. Similarly, in relation to gearing, the higher the company's assumed leverage, the more likely that the entity's WACC will be reduced (primarily due to the tax benefits of debt finance).

Australian regulatory precedent

11. At present, the vast majority of Australian regulators (including the AER) assume that regulated entities have 60% gearing,[3] remain unhedged against interest rate movements and also maintain a BBB+ credit rating. While not explicitly stated, Australian regulators implicitly assume that regulated entities do not engage in interest rate hedging because the regulated entities are not generally compensated for the cost of entering into hedging arrangements, either as an operating cost allowance or as part of the cost of debt capital.

12. The table below outlines the credit ratings and gearing levels assumed by various national and state regulators in their most recent regulatory determination.

Table 1. Regulatory decisions on gearing and credit rating

Regulator	Year	Sector	Gearing	Credit Rating
Australian Energy Regulator (AER)	2009	Electricity	60%	BBB+
Essential Services Commission (ESC)	2008	Gas	60%	BBB+
Office of the Tasmanian Energy Regulator (OTTER)	2007	Electricity	60%	BBB+
Essential Services Commission of South Australia (ESCOSA)	2006	Gas	60%	BBB+
Queensland Competition Authority (QCA)	2006	Gas	60%	BBB+
Independent Pricing and Regulatory Tribunal (IPART)	2005	Gas	60%	BBB/BBB+
Independent Competition and Regulatory Commission (ICRC)	2004	Gas	60%	BBB+/A

Source: AER, 2008. *Issues Paper – Review of the WACC parameters for electricity transmission and distribution,* Australian Energy Regulator, 2009, *Electricity transmission and distribution network service providers: Review of the weighted-average cost of capital (WACC) parameters – Final Decision*, 1 May 2009.

13. We also note that in relation to the assumed credit rating, the National Electricity Code (NEC) deems that the initial method for calculating the debt margin (otherwise called the debt risk premium) for electricity transmission businesses was to take the difference between the yield to maturity on BBB+ corporate bonds and the yield-to-maturity on government bonds with the same maturity.[4]

Criteria for determining the benchmark credit rating

14. Most Australian regulators have converged towards adopting a BBB+ credit rating in determining the debt margin, primarily on the basis that this is consistent with past regulatory practice. For

[3] Australian regulators calculate gearing as total debt ÷ (total debt + total equity).
[4] NEC – Chapter 6, Clause 6A.6.2(e).

those regulators that explicitly attempt to estimate the benchmark credit rating, a set of comparable firms with actual credit ratings is usually chosen and the median value selected in order to derive the benchmark credit rating.[5] This is the approach that has been adopted by the AER in its recent WACC Review. By way of illustration, all Australian regulated electricity distribution and transmission entities with credit ratings from Standard & Poor's are listed in the following table. We have also included credit ratings from Fitch where available (which uses a similar ratings scale to S&P)

Table 2. Credit ratings of regulated Australian electricity businesses

Entity	Ownership	Credit Rating (S&P)	Credit Rating (Fitch)
Ergon Energy	Government	AA	N/A
Energy Australia	Government	AA	AA
Integral Energy	Government	AA	AA
Country Energy	Government	AA	AA
SP AusNet	Private/Government[1]	A–	BBB+
CitiPower Trust	Private	A–	N/A
ETSA Utilities	Private	A–	N/A
Powercor Australia	Private	A–	N/A
ElectraNet	Private	BBB+	N/A
United Energy	Private	BBB	N/A
	Median	**A–**	

[1] SP AusNet is 51% owned by Singapore Power Ltd (AA–) which itself has government support

15. In its recent WACC Review, the AER considered that the firms listed below are sufficiently close comparators to a benchmark efficient network service provider: Citipower Trust, Country Energy, Dampier Bunbury Natural Gas Pipeline Trust, Diversified Utility and Energy Trusts, ElectraNet Pty Ltd, Energy Australia, Energy Partnership (Gas) Pty Ltd (EPG), Envestra Ltd, Ergon Energy Corporation, ETSA Utilities, GasNet Australia (Operations) Pty Ltd, Integral Energy, Powercor Australia, Rowville Transmission Facility Pty Ltd, SPI PowerNet Pty Ltd, and United Energy.[6]

16. There are a number of difficulties that arise in using observed credit ratings of comparable entities to estimate an appropriate credit rating for the benchmark firm. As can be seen from the above table and list, a number of entities in the sample set are government-owned or government-backed entities. It is generally acknowledged that this introduces an upward bias in the median credit rating as those firms with government support will have higher credit ratings than they otherwise would if they were only a private-owned stand-alone entity.[7]

17. For example, Standard & Poor's have stated that "the stronger AA credit rating is predominantly given to a government-owned utility."[8] In relation to the four firms in Table 1 that have credit ratings of AA or above, ratings agencies Standard & Poor's and Fitch have explicitly stated that government support is the primary factor underpinning their respective credit ratings. For example, Fitch has stated that its AA credit rating of Integral Energy reflects "the strong and

[5] For example, see ACCC, 2005. *NSW and ACT Transmission Network Revenue Cap: Transgrid 2004/5 to 2008/9 Decision*, p. 141.
[6] Australian Energy Regulator, 2009, Electricity transmission and distribution network service providers: Review of the weighted-average cost of capital (WACC) parameters – Final Decision, 1 May 2009, pp. 361-362.
[7] AER, 2008. *Issues Paper – Review of the WACC parameters for electricity transmission and distribution*, p. 67.
[8] S&P, 2002. *Australian and New Zealand Electric and Gas Utilities Ripe for Rationalisation*, p. 1. This statement was acknowledged by the ACCC in its final 2005 Transgrid determination, p. 142.

continuing implicit support from the State of New South Wales."[9] More importantly, Fitch has stated that:

> Although Integral is not explicitly guaranteed by the NSW government, the links are so close that, under its Public Sector Entities (PSE) methodology, Fitch regards it as a dependent PSE. Therefore, Integral's rating is based on the rating of the state of NSW and the strength of the links between Integral and the government, rather than on its stand-alone credit profile.[10]

18. A further example is Ergon Energy (AA), with S&P stating that this credit rating "principally reflects the strong support of the company's owner, the State of Queensland."[11] S&P further noted that Ergon Energy's stand-alone business profile was only "satisfactory." These comments from ratings agencies indicate that, in assessing the credit-worthiness of government-backed firms, ratings agencies often focus on the financial strength of their government owner rather than the stand-alone characteristics of the regulated entity.

19. Moreover, the recent change in credit rating for Powerdirect Australia Pty Ltd as a result of its change from government to private ownership highlights the very strong influence of ownership on corporate credit ratings. In early 2007, the Queensland government (rated AAA) agreed to sell Powerdirect to AGL Energy (then rated BBB). Prior to the transaction, Powerdirect was assigned a AA+ rating by S&P. However, immediately after the transaction was completed, Powerdirect's credit rating was lowered a full *seven* notches from AA+ to BBB solely on the basis of its loss of implied government support. S&P stated that "the sale of Powerdirect Australia by the Queensland government will result in a withdrawal of the strong level of implied government support on which the [previous] rating was based." Again this provides strong evidence that government ownership results in a significant upward bias in observed credit ratings which is unlikely to be offset by other factors.

20. A further argument against relying on actual credit ratings in determining the benchmark credit rating is that credit ratings are not only positively influenced by government ownership but are also enhanced by having a stronger-rated parent entity. For example, S&P explicitly recognise that the credit ratings of ETSA Utilities, Powercor Australia and CitiPower Trust are all partially underpinned by the support of their majority owners Cheung Kong Infrastructure Holdings Ltd (rated A–) and CKI's affiliate Hong Kong Electric Holdings Ltd (rated A+).[12] However, the credit rating of a business can also be adversely affected by the behaviour of their parent company. For example, S&P noted that one of the weaknesses of United Energy Distribution's credit rating was its exposure to the aggressive risk appetite of its parent, DUET Group.[13]

21. In this report we do not directly address the issue of an appropriate assumed credit rating for the benchmark firm. Rather, our focus is on the effect that an unhedged shock to interest rates might have on the credit rating. To do this, we need an approach that indicates how the credit rating may change in light of an unhedged shock to interest rates. An examination of actual credit ratings of firms that have all engaged in extensive interest rate hedging activities cannot help in this regard. Also, examining the credit ratings of government-backed entities would not

[9] Fitch, *Credit Analysis on Integral Energy*, published on 16 April 2008.
[10] ACCC, 2008. *Final Decision: GasNet Australia – revised access arrangement 2008-12*, p. 68.
[11] S&P Credit Research, Ergon Energy Corp Ltd, published on 15 April 2008. Note, at this time Ergon Energy had a credit rating of AA+ and the State of Queensland was rated AAA.
[12] S&P Credit Research, ETSA Utilities, published on 30 April 2008; S&P Credit Research, CitiPower Trust, published on 22 May 2008; S&P Credit Research, Powercor Australia, published on 22 May 2008.
[13] S&P Credit Research, United Energy Distribution, published on 19 February 2007.

help in this regard even if the entity had not hedged against interest rate shocks. Consequently, we examine alternative approaches.

Alternative approaches for assessing the benchmark credit rating

22. In its recent WACC review, the AER considers two alternative approaches. The AER effectively rejects the use of an ordered logit regression approach due to the lack of sufficient data to make the results statistically reliable.[14] The AER then considers the best comparators approach, which involves examining a number of financial ratios that have a strong bearing on the firm's credit rating. The AER concludes that:

> the 'best comparators approach' is a satisfactory approach which can be used to inform the credit rating of a benchmark efficient NSP.[15]

23. In this report, we take the indicative credit rating matrix developed by Standard & Poor's in its 2008 publication *Corporate Ratings Criteria* and to apply it to a set of comparator firms in order to derive the likely credit rating. We adopt an expanded set of financial ratios and examine a number of comparable firms. Consequently this may be considered to be an expansion of the "best comparators approach."

24. This methodology appears has the advantage of being based primarily on transparent quantitative ratio analysis rather than more subjective qualitative analysis. Also, unlike actual credit ratings, this method avoids the problems of the effects of ownership structure because the implied credit rating of the firm can be calculated without reference to the firm's actual ownership structure – it is based only on a range of financial ratios and benchmarks provided by Standard and Poor's.

25. Moreover, our ultimate goal is to examine how an unhedged interest rate shock might affect credit metrics and the ultimate credit rating. This obviously cannot be done by examining actual credit ratings – unless we have a sample of firms that have experienced interest rate shocks while being unhedged. But since all of the firms in the set of comparables have extensive interest rate risk management programs in place, we have no observations at all for unhedged comparables. Consequently, we adopt a financial ratio based approach. This allows us to examine how a range of key financial ratios would be affected by an unhedged interest rate shock. That is, we adopt a variation of an approach that the AER considers to be appropriate and which also allows us to address the question of how a lack of interest rate risk management might affect the credit rating of the 60% levered benchmark business.

26. In determining the indicative credit rating for any given firm, S&P considers both the "business risk" and the "financial risk" profile of the firm.[16]

Business Risk Profile

27. In determining the business risk profile of the entity, S&P has regard to the following factors:

a. Country risk – the riskiness of the operating environment in the particular country;

[14] Australian Energy Regulator, 2009, Electricity transmission and distribution network service providers: Review of the weighted-average cost of capital (WACC) parameters – Final Decision, 1 May 2009, p. 357.
[15] Australian Energy Regulator, 2009, Electricity transmission and distribution network service providers: Review of the weighted-average cost of capital (WACC) parameters – Final Decision, 1 May 2009, p. 360.
[16] See Standard & Poor's, 2008. *Corporate Rating Criteria.*

b. Industry factors – assessment of the industry's prospects and the risks facing participants;

c. Competitive position – based on company size and market influence and is used in determining the expected revenue and cash flow stability of the firm;

d. Management evaluation – assessed for its role in determining operational success and also for its risk tolerance; and

e. Profitability/peer group comparisons – the ability of the firm to attract scarce capital due to its out-performance of its competitors

28. By considering all of these indicators, the business will be assigned either an excellent, above average, satisfactory, weak or vulnerable business risk profile rating. Because they have low volatility in future cash flows and face a relatively low level of competitive pressure relative, regulated businesses are likely to be assigned a business risk profile of "above average" or "excellent."

Financial Risk Profile

29. In assessing the financial risk profile of the entity, S&P will consider the following factors:

a. Governance, risk tolerance and financial policies – focuses on management's policies towards managing financial risk;

b. Accounting characteristics and information risk – reviews whether ratios and statistics derived from the company's financial statements are reliable;

c. Cash flow adequacy – the ability to service debt;

d. Capital structure and/or asset protection – the financial flexibility and the amount of leverage in the company's financial structure; and

e. Liquidity and other short-term factors – sundry considerations and contingencies.

30. In addition to these factors, S&P provides a matrix for determining indicative financial risk profiles:

Table 3. S&P Corporate Ratings Criteria – Financial risk indicative profile

Financial risk profile	Minimal	Modest	Intermediate	Aggressive	Highly Leveraged
FFO/Debt[1] (%)	AAA	AA	A	BBB	BB
Gearing (%)	BBB	BBB–	BB+	BB–	B
Debt[1]/EBITDA (x)	BB	B+	B+	B	B–

[1] Where debt includes both short-term and long-term debt and is not netted off against cash. See S&P, 2008. *Corporate Ratings Criteria*, p. 43 – 44.

31. After making an individual assessment of these two risk factors, S&P will then combine these separate assessments to derive an indicative corporate credit rating as follows:

Table 4. S&P Corporate Ratings Criteria – Business Risk/Financial Risk

	Financial risk profile				
Business risk profile	**Minimal**	**Modest**	**Intermediate**	**Aggressive**	**Highly Leveraged**
Excellent	AAA	AA	A	BBB	BB
Above Average	AA	A	A–	BBB–	BB–
Satisfactory	A	BBB+	BBB	BB+	B+
Weak	BBB	BBB–	BB+	BB–	B
Vulnerable	BB	B+	B+	B	B–

32. Obviously these indicative ratings are not the sole factors taken into account by S&P. However, these criteria at least provide a transparent framework within which to assess the reasonableness of the joint assumptions that the regulated entity has 60% gearing, is unhedged against interest rate movements and maintains a BBB+ credit rating.

33. Standard and Poor's have provided a number of useful benchmarks to determine the likely credit rating for a given set of key financial ratios. Their Corporate Ratings Criteria sets out the median values of various key ratios for all of the utilities that they have rated by each class. This is set out below. Standard and Poor's does not undertake that a particular firm with a particular set of ratios will be awarded a particular rating. Rather, the values set out below are simply the median ratios for all utilities that have a particular rating.

Table 2—**Key Utility Financial Ratios, Long-Term Debt**

Three-year (2002 to 2004) medians

	AA	A	BBB	BB	B
EBIT interest coverage (x)	4.4	3.1	2.5	1.5	1.3
FFO interest coverage (x)	5.4	4.0	3.8	2.6	1.6
Net cash flow/capital expenditures (%)	86.9	76.2	100.2	80.3	32.5
FFO/average total debt (%)	30.6	18.2	18.1	11.5	21.6
Total debt/Total debt + equity (%)	47.4	53.8	58.1	70.6	47.2
Common dividend payout (%)	78.2	72.3	64.2	68.7	(4.8)
Return on common equity (%)	11.3	10.8	9.8	4.4	6.0

Source: Standard and Poor's, Corporate Ratings Criteria, p.43.

34. As well as reporting median ratings, Standard and Poor's also set out ranges within which the majority of rated firms fall. Again, a firm is not guaranteed a particular rating by producing a set of ratios within a particular range, but these ranges from S&P are clearly very useful in any consideration of a firm's likely credit rating based on a set of financial ratios.

Table 2

Ratio Ranges for Distribution Utilities

	'AA'	'A'	'BBB'
Pretax* interest coverage (x)	4.0 to 5.5	2.0 to 4.0	1.3 to 2.5
FFO interest coverage (x)	5.0 to 7.0	3.0 to 5.0	2.0 to 3.0
FFO to total debt (%)	30 to 40	13 to 25	8 to 16
Total debt to total capital (%)	20 to 40	40 to 60	55 to 80

*Earnings before interest and tax. FFO-funds from operations.

Source: Standard and Poor's, Utilities: International utility ratings and ratios, via S&P Ratings Direct.

35. Finally, in its recent WACC Review Final Decision, the AER notes that Standard and Poor's have defined the two most important credit metrics that it applies to the relevant comparator firms as follows:

> Based on the current business profile of ElectraNet, where unregulated business represents less than 15% of total revenue, credit metrics of 2.3x-2.5x FFO interest cover and 9%-10% FFO to total debt would be expected for the 'BBB+' rating.[17]

3. Credit analysis based on past regulatory determinations

36. Irrespective of whether the comparable firm sample set used in determining the credit rating of the benchmark electricity distribution and transmission firm should focus solely on stand-alone privately-owned businesses, we will, for the purposes of our analysis, consider *all* electricity distribution and transmission businesses (for which we can obtain the required data) that have a credit rating from Standard & Poor's, *regardless* of their ownership structure. This means that our sample set comprises of Energy Australia, Integral Energy, Country Energy, SP AusNet, CitiPower Trust, ETSA Utilities, Powercor Australia, United Energy and ElectraNet. In the subsequent section, we apply a similar analysis to the PTRM for ENERGEX and Ergon Energy in the context of the current AER determination.

37. We conclude from our ratio analysis that it would be improbable that regulated entities would have 60% gearing, remain unhedged against interest rate movements *and* maintain a BBB+ credit rating. It is far more likely that regulated entities would, at the very least, enter into extensive hedging agreements in order to mitigate their interest rate exposure.

Methodology

38. In order to test the feasibility of maintaining a BBB+ credit rating while also having 60% gearing and remaining unhedged against interest rate movements, we have used the data contained in the latest regulatory determinations for nine regulated electricity distribution and transmission entities to construct the financial statements and calculate the key financial ratios of these entities over the length of the regulatory period (generally five years). From these ratios, we apply the indicative ratings criteria provided by Standard & Poor's (set out above) to estimate the financial risk profile that these regulated entities would be deemed to possess. Combined with an assumption that these regulated entities have a very favourable business risk profile (of "excellent" or "above average"),[18] we use these two risk profiles to calculate the likely credit rating that would be given to an entity with those business and financial characteristics.

39. We adopt the process described above for a number of reasons.

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[17] Australian Energy Regulator, 2009, Electricity transmission and distribution network service providers: Review of the weighted-average cost of capital (WACC) parameters – Final Decision, 1 May 2009, p. 374.

[18] We emphasise that we have not formally evaluated the appropriateness of assuming that a regulated electricity distribution and transmission business has an "excellent" or "above average" business risk profile. However, we note that the ACCC, in conducting a credit ratio analysis its 2005 TransGrid regulatory determination, made the assumption that TransGrid had an "above average" business risk profile. See ACCC, 2005. *NSW and ACT Transmission Network Revenue Cap: Transgrid 2004/5 to 2008/9 Decision*, p. 199. To maintain a particular credit rating, Standard and Poor's requires distribution firms to maintain superior financial ratios relative to distribution firms. This implies that S&P considers transmission firms to have at least the same business risk profile as distribution firms. Consequently, it may be more appropriate to assume an "above average" business risk profile rather than "excellent." Alternatively and analysis assuming an "excellent" business risk profile is likely to be conservative.

a. By examining the leverage and cash flow adequacy ratios implied by regulatory determinations, we can isolate the inherent level of financial risk that Australian regulators assume that regulated entities can bear. That is, by using numbers taken directly from regulatory determinations, we can highlight the reasonableness of the regulatory assumptions as to credit rating, gearing and hedging policy given the other assumptions as to revenue, rates of return, depreciation, capital expenditure and operating costs.

b. Our methodology controls for the upward bias that would ordinarily be present due to the inclusion of government-owned entities in the sample set. In other words, our method for calculating the implied credit rating does not make any implicit assumptions as to whether the firm is government or privately-owned or whether it is a subsidiary or a stand-alone entity. This is compared to an analysis that is based on the actual credit ratings of regulated firms, which does implicitly assume that the benchmark firm enjoys at least partial government or parent company support.[19] By focusing on objective, quantitative criteria for determining the financial risk profile, we ensure that the assumed credit rating does not depend on who owns the regulated entity.

c. We prefer to calculate credit ratios by relying on the data contained in regulatory determinations rather than relying on the data contained in a regulated entity's audited financial statements. This is because a number of adjustments would need to be made to the figures contained in the audited financial statements of each individual firm in order to identify the appropriate figures that would be used by credit ratings agencies to calculating key financial risk ratios. Using regulatory determinations ensures that figures are comparable across the sample firms, minimises the number of adjustments that need to be made and ensures the transparency of how ratios are calculated. Again, we apply this same methodology to the present PTRM for ENERGEX and Ergon in the subsequent section.

Explanation of the calculation of key financial ratios

40. Based on the input definitions published by Standard & Poor's, we estimate that the following key inputs into the relevant credit ratios are as follows:

[19] In using as a basis for the estimation of the benchmark credit rating the ten regulated electricity distribution and transmission entities with credit ratings from Standard & Poor's, the credit rating derived from this sample set will be positively influenced by the inclusion of government-backed firms. We note that Integral Energy is now rated By Fitch Ratings, although we have the S&P rating at the time of its last regulatory determination.

Table 5. Glossary of ratio definitions

Term	Definition
Cost of debt capital (r_d)	Risk-free rate (r_f) *plus* Debt margin
Debt margin	Yield on 10-year BBB+ corporate bonds *less* yield-to-maturity on 10-year government bonds, *excluding* any debt raising costs forming part of weighted average cost of capital (WACC)
Earnings before interest, tax, depreciation & amortisation (EBITDA)	Notional revenue cap *less* operating expenditure allowance
Earnings before interest and tax (EBIT)	EBITDA *less* depreciation
Funds from operations (FFO)	Net income (after tax) *plus* depreciation
Gearing (%)	Total debt *divided by* total capital
Interest cost	Cost of debt capital (r_d) *multiplied by* total debt
Net income (after tax)	EBIT *less* interest cost *less* tax payable
Tax payable	If no specific tax allowance is made in the determination, tax payable equals: (EBIT *less* interest cost) *multiplied by* tax rate
Total capital	Total debt *plus* total equity
Total debt	Opening regulatory asset base *multiplied by* 60% gearing
Total equity	Opening regulatory asset base *multiplied by* (1 – 60% gearing)

Source: Adapted from Standard & Poor's (2006), *Australian Corporate Ratios Explained.*

41. All of these figures, including any underlying assumptions (for example, the regulator's gearing assumption of 60%), have been taken directly from the relevant regulatory determinations without any adjustment being made. We have adopted the 30% statutory corporate tax rate throughout the analysis.

42. Once these input figures have been derived, we estimate the key financial ratios of these regulated entities in the following manner:

Table 6. Financial risk ratios

Ratio	Definition
FFO to Total debt (%)	FFO ÷ Total debt
Total debt to Total capital (%)	Total debt ÷Total capital
Total debt to EBITDA (x)	Total debt ÷ EBITDA
EBITDA interest cover (x)	EBITDA ÷ Interest cost
EBIT interest cover (x)	EBIT ÷ Interest cost
Funds flow debt payback (years)	Total debt ÷ FFO
FFO interest cover (x)	FFO ÷ Interest cost
Internal financing ratio (%)	(Net income + depreciation) ÷ Capital expenditure

Source: Standard & Poor's (2006), Australian Corporate Ratios Explained

43. We note that the two key ratios that are used in the best comparators approach in the AER's recent WACC Review are FFO interest cover and FFO to total debt, both of which are included in Table 6 above.

Scenario analysis

44. In order to test the reasonableness of the assumption that regulated entities would remain unhedged throughout the regulatory period, we calculate credit ratios for sample businesses in a base case scenario and a downside case scenario. We then compare these ratios with the credit

ratings criteria provided by Standard & Poor's to determine the likely credit rating that a firm with these financial characteristics is likely to be given.

Base case scenario

45. In the base-case scenario, we assume that all assumptions made by the relevant regulator as to the various components of the building block methodology are perfectly realised. For example, if the assumed cost of debt capital over the period was 8%, we presume that, for the purposes of this scenario, interest rates remain constant at 8% for the entire regulatory period, and so on.

Downside case scenario

46. In the downside scenario, we make the same assumptions as in the base case scenario except for one important change – an "interest rate shock" occurs. In Year One, we assume that the market interest rate exactly equals the cost of debt assumption in the regulatory determination. However, in Year Two we assume that interest rates increase by 2%. Over Years Three, Four and Five, we assume that interest rates decline by 0.5% per year back toward the original Year One interest rate. We assume that the regulated entity is completely unhedged against these interest rate changes to examine the size of the impact that interest rate changes might have on key financial ratios and ultimately the credit rating. In relation to our assumed interest rate shocks, we note that the size of the shock is conservative relative to the shocks that have occurred over the previous regulatory cycle.

Results

47. Based on the above assumptions, we present a range of credit ratios for the base case and the "downside" case. The metrics reported for the downside case are the average values over the first two years of the interest rate shock (i.e., Years 2 and 3 of the regulatory cycle).

Table 7. Impact of interest rate shock on credit metrics relating to previous regulatory determinations

	Energy Australia		Integral Energy		Country Energy		SP AusNet		CitiPower Trust	
Credit Metric	***Base***	***Down***	***Base***	***Down***	***Base***	***Down***	***Base***	***Down***	***Base***	***Down***
FFO/Total Debt (%)	10%	9%	12%	11%	12%	10%	16%	15%	14%	12%
Debt leverage (Total debt/Total capital) (%)	60%	60%	60%	60%	60%	60%	60%	60%	60%	60%
Total Debt/EBITDA (x)	5.7	5.7	4.9	4.9	5.3	5.3	3.5	3.5	4.6	4.6
EBITDA/Interest Expense (x)	2.6	2.0	2.9	2.3	2.8	2.2	3.4	2.8	3.3	2.6
EBIT/Interest Expense (x)	1.5	1.2	1.5	1.2	1.3	1.0	2.8	2.3	1.8	1.4
Funds Flow Debt Payback (years)	10.2	11.7	8.1	8.9	8.6	9.7	6.4	6.9	7.4	8.1
FFO/Interest Expense (x)	2.4	2.0	2.8	2.3	2.7	2.2	2.9	2.5	3.1	2.5
Internal Financing Ratio (%)	65%	57%	66%	60%	74%	66%	142%	131%	90%	82%

Credit Metric	ETSA Utilities		Powercor		United Energy		ElectraNet	
	Base	*Down*	*Base*	*Down*	*Base*	*Down*	*Base*	*Down*
FFO/Total Debt (%)	13%	12%	14%	13%	17%	15%	9%	8%
Debt leverage (Total debt/Total capital) (%)	60%	60%	60%	60%	60%	60%	60%	60%
Total Debt/EBITDA (x)	4.6	4.6	4.4	4.4	4.0	4.0	4.6	4.6
EBITDA/Interest Expense (x)	3.0	2.4	3.4	2.7	3.8	3.0	2.3	1.9
EBIT/Interest Expense (x)	1.6	1.3	1.9	1.5	1.9	1.5	2.0	1.7
Funds Flow Debt Payback (years)	7.6	8.3	7.0	7.6	6.1	6.6	10.7	12.4
FFO/Interest Expense (x)	2.8	2.3	3.2	2.6	3.5	2.8	2.0	1.7
Internal Financing Ratio (%)	134%	122%	78%	71%	128%	118%	50%	43%

48. In both the base case and the downside case, a strict application of the S&P credit ratio system to the above credit ratios would imply that the median regulated entity would have a "highly leveraged" financial risk profile. That is, a firm with FFO to total debt below 15%, total debt to total capital above 55% and total debt to EBITDA of greater than 4.5 times would prima facie be deemed to have a "highly leveraged" financial risk profile. More importantly, even if the regulated entity was deemed, on the basis of countervailing qualitative factors, to have an "aggressive" financial risk profile, the median regulated entity could not have a credit rating above BBB even with an "excellent" business risk profile. To the extent that the regulated entity was considered to have an "above average" business risk profile, a BBB rating in this scenario would be even more unlikely.

49. We note that one of the key criteria that Standard & Poor's takes into account when determining financial risk profile is the company's financial risk management strategy. For example, S&P states that:

> Tolerance for risk extends beyond leverage. The mixture of fixed-rate and floating-rate debt (*including the use of derivatives to manage that*) offers an example. Generally speaking, long-term assets such as factories are best financed using fixed-rate debt, while short- term working capital financing may be accomplished using floating-rate borrowings. Management should develop an appropriate maturity schedule and liquidity targets[20]

50. It is unlikely that ratings agencies (or debt holders for that matter) would look favourably on a firm that has a high amount of leverage in its capital structure yet remains unhedged against potentially crippling movements in interest rates. As illustrated in the table above, given the sensitivity of firms to changes in interest rates, prudent risk management would suggest that the firm would be actively engaged in swapping its floating-rate interest obligations for fixed-rate ones using a variety of techniques such as interest rate swaps, forward-starting fixed rate loans, and so on.

[20] S&P, 2008. *Corporate Rating Criteria*, p. 36.

51. Another important aspect of these results is that the cash-flow adequacy ratios of the median regulated entity come under significant pressure if the entity decides to remain unhedged and interest rates unexpectedly increase. For example, both the FFO interest cover and the EBIT interest cover ratios decline substantially as a result of the unhedged change in interest rates.

52. We pay particular attention to ElectraNet (which receives attention as the "best comparator" in the AER's Final Decision) and to the two ratios that are shaded in the table above (which the AER recognises as the most important). We note that an unhedged interest rate shock would drive the ElectraNet FFO interest coverage ratio to 1.7 and the FFO to Debt ratio to 8%. These values are unlikely to support an investment grade credit rating in light of the Standard and Poor's benchmarks set out above.

53. It is much more likely that the firm would take precautionary action to prevent cash flow ratios dropping to such low levels, most probably through interest rate hedging. Indeed we do not suggest that any of the firms in the table above are in any danger of being downgraded. This is precisely because they *do* hedge interest rate risk specifically to avoid the types of outcomes that are illustrated above.

54. Moreover, in determining credit ratings, ratings agencies place great weight on the firm's ability to service its debt obligations. For example, S&P states that among all of its factors for determining credit ratings, cash-flow analysis and ratios are "usually the single most critical aspect of credit rating decisions." [21]

55. We also note that we have made the simplifying assumption that all the regulated entities in the sample set do not pay dividends over the regulatory period. Obviously cash reserves would be further pressured if these companies were obliged to make distributions of profit.

56. We also note that the overall profitability of these regulated entities is significantly affected by changes in interest rates. Given the high levels of debt that these entities are assumed to carry, even relatively small changes in interest rates can have a large impact on profitability. The total profitability of these regulated firms is reduced substantially if interest rates were to move to levels assumed in the downside case scenario and the regulated entities remained unhedged.

57. Overall, our analysis indicates that even in benign interest rate environments, it is very difficult for regulated entities to maintain a 60% gearing ratio, possess the key credit ratios as calculated above and still maintain a BBB+ credit rating *unless* the entity has government or parent company support. Moreover, given the already high leverage assumed to be carried by regulated entities, combined with the possibility of firms suffering a severe decline in profitability and having its solvency being tested, we conclude that it is highly unlikely that a prudent risk manager of these entities would remain unhedged against interest rate movements. This is particularly the case in the current volatile interest rate environment.

58. Again, we do not suggest that any of the firms in the table above are in any danger of being downgraded. The firms in our sample do hedge interest rate risk specifically to avoid the types of outcomes that are illustrated above. A summary of the hedging policies of a number of Australian transmission and distribution utilities is set out in the table below.

[21] S&P, 2008. *Corporate Rating Criteria*, p. 24.

Table 8. Hedging policies of transmission and distribution utilities

Company	Reference	Comments
Envestra	*Page 46 of 2006 Annual Report*	The Group manages its cash flow interest-rate risk by using floating-to-fixed interest rate swaps. Such interest rate swaps have the economic effect of converting borrowings from floating rates to fixed rates. Generally, the Group raises long-term borrowings at floating rates and swaps them into fixed rates that match the rates used in the relevant regulatory determination for a term matched to relevant regulatory period. Under the interest-rate swaps, the Group agrees with other parties to exchange, at specified intervals (mainly quarterly), the difference between fixed contract rates and floating-rate interest amounts calculated by reference to the agreed notional principal amounts.
ETSA Utilities	*Page 28 of 2007 Annual Report* *Page 44 of 2007 Annual Report*	The Group hedges a portion of the loans using cross-currency interest rate swaps exchanging US dollar fixed rate interest for Australian dollar variable rate interest and interest rate swaps exchanging variable rate interest for fixed rate interest. [Interest rate] risk is managed by the group maintaining an appropriate mix between fixed and floating rate borrowings and by the use of interest rate swap contracts. If interest rates had been 50 basis points higher or lower and all other variables were held constant, the group's net profit would increase/decrease by $5.058m.
SP AusNet	*Page 44 of 2008 Financial Report*	"The objective of hedging activities carried out by the Stapled Group in relation to these businesses is to minimise the exposure to changes in interest rates by matching the actual cost of debt with the cost of debt assumed by the regulator when setting the rate of return for the relevant business. The exposure is managed by maintaining an appropriate mix of fixed and floating rate borrowings and by the use of interest rate swaps." If interest rates increased/decreased by 0.63% with all other variables held constant, net after tax profit would fall by $2.994m/increase by $3.004m.
Country Energy	*Page 97 & 103 of 2007 Financial Report*	The Corporation enters into contracts to manage cash flow risks associated with the interest rates on borrowings that are floating, or to alter interest rate exposures arising from mismatches in repricing dates between assets and liabilities. Interest rate swap transactions entered into by the Corporation exchange variable and fixed interest payment obligations to protect the fair value of long term borrowings from the risk of fluctuating interest rates. Variable and fixed interest rate debt is held and swap contracts are entered into to receive interest at both variable and fixed rates. Responsibility for management of the debt portfolio and associated derivative instruments has been outsourced to NSW TCorp.
Energy Australia	*Page 60 of 2007 Annual Report* *Page 64 of 2007 Annual Report*	Interest rate risk is managed using futures instruments and interest rate swaps. All derivatives are managed through T-Corp in accordance with Board policies for the purpose of managing interest rate exposure associated with external debt raised. At 30 June 2007, it is estimated that a general increase of one percentage point in interest rates would decrease the consolidated entity's profit before tax by approximately $7.2m (2006: $6.4m). Interest rate swaps have been included in this calculation.
Powercor / CitiPower Trust	*Page 70 of 2007 Annual Report* *Page 71 of 2007 Annual Report*	Consolidated Entity is exposed to interest rate risk as it invests and borrows funds at both fixed and floating interest rates. The risks are managed by maintaining an appropriate mix between fixed and floating rate borrowings and through the use of interest rate swap and forward interest rate contracts. Under interest rate swap contracts, the Consolidated Entity agrees to exchange the difference between fixed and floating interest amounts calculated on agreed notional principal amounts. Such contracts enable the Consolidated Entity to mitigate the risk of changing interest rates on the fair value of issued fixed rate debt held and the cash flow exposures on issued floating rate debt held.

GasNet	*Page 45 of 2005 Annual Report*	GasNet Australia Group's policy for the core transmission business is to hedge between 80% and 100% of its borrowings at fixed rates for the duration of each five year regulatory rest period. To manage this risk in a cost-efficient manner, the Group enters into interest rate swaps, in which the Group agrees to exchange, at specified intervals, the difference between fixed and variable interest amounts. These swaps are designated to hedge underlying debt obligations.
DUET Group	*Page 42 of 2007 Financial Report*	Bank loans and guarantee notes of the group currently bear an average variable interest of 6.25%. It is group policy to protect the loans from exposure to increasing interest rates. Accordingly, the group has entered into interest rate swap contracts under which it is obliged to receive interest at variable rates and to pay interest at fixed rates. Swaps in place cover approximately 80% of the loan principal outstanding and are timed to expire as the loan repayments are due or to coincide with the next prevailing reset.
	Page 84 of 2007 Financial Report	The Group manages its cash flow interest-rate risk by using floating-to-fixed interest rate swaps. Such interest rate swaps have the economic effect of converting borrowings from floating rates to fixed rates. Generally, the Group raises long-term borrowings at floating rates and swaps them into fixed rates that are lower than those available if the Group borrowed them at fixed rates directly.
Alinta	*Page 56 of 2005 Financial Report*	The consolidated entity enters into interest rate swaps…in order to manage interest rate exposures on Australian dollar borrowings (and the currency exposures from its US dollar borrowings in 2004). Interest rate swaps are used to convert a portion of the consolidated entity's floating interest rate exposures to fixed rate exposures, thereby reducing the volatility of interest costs between financial reporting periods.

4. Post-tax Revenue Models for ENERGEX and Ergon

59. In this section, we compute a range of credit metrics for ENERGEX and Ergon using the AER's Post-Tax Revenue Model (PTRM) supplied to us by the companies. For each company, we compute the range of financial ratios that is examined by Standard and Poor's when assessing credit ratings in two scenarios:

a. Assuming that the firm is perfectly hedged against future changes in interest rates, in which case interest expense in future years is based on the assumed cost of debt that is used in the WACC calculation; and

b. Assuming that the firm is unhedged against future changes in interest rates in a scenario in which interest rates remain consistent with the WACC assumption (8.96%) in Year 1 of the regulatory period; increase by 2% in Year 2 and then fall by 0.5% in Years 3, 4, and 5 back towards the starting rate.

60. We note that the increase in interest rates used in our second scenario is not large in light of what has occurred over the last regulatory period.

61. In the table below, we summarise a number of figures from the ENERGEX PTRM and set out the set of financial ratios that Standard and Poor's uses to assess credit ratings. This table assumes that all interest costs (including interest on borrowings related to new CAPEX) are perfectly hedged and that all interest will be at the assumed rate of 8.96%.

Table 8. ENERGEX credit metrics from Post-Tax Revenue Model assuming constant cost of debt

All amounts are stated in millions ($)	2011	2012	2013	2014	2015
Revenue Cap (notional revenue requirement)					
Operating expenditure					
Earnings before interest, tax & depreciation (EBITDA)					
Depreciation					
Earnings before interest and tax (EBIT)					
Interest Cost					
Profit before tax					
Estimated tax paid					
Profit after Tax/Net Income					
Net Capital expenditure					
Funds from Operations (FFO)					
Opening RAB					
Total Debt (60% of total assets)					
Total Equity (40% of total assets)					
Nominal cost of debt	8.96%				
Assumed Level of Gearing	60%				
Estimated Tax Rate	30%				
Ratio analysis					
FFO/Total Debt (%)	8.3%	8.2%	8.2%	8.2%	8.0%
Debt leverage (Total debt/Total capital) (%)	60%	60%	60%	60%	60%
Total Debt/EBITDA (x)	5.2	5.2	5.2	5.2	5.3
EBITDA/Interest Expense (x)	2.2	2.2	2.1	2.1	2.1
EBIT/Interest Expense (x)	1.8	1.8	1.8	1.7	1.7
Funds Flow Debt Payback (years)	12.1	12.2	12.2	12.3	12.5
FFO/Interest Expense (x)	1.9	1.9	1.9	1.9	1.9
Internal Financing Ratio (%)	30%	33%	36%	40%	40%

62. The following table summarises a number of figures from the ENERGEX PTRM and sets out the set of financial ratios that Standard and Poor's uses to assess credit ratings after allowing an interest rate shock. As above, in Year One, we assume that the market interest rate exactly equals the cost of debt assumption in the regulatory determination. However, in Year Two we assume that interest rates increase by 2%. Over Years Three, Four and Five, we assume that interest rates decline by 0.5% per year back toward the original Year One interest rate. We assume that the regulated entity is completely unhedged against these interest rate changes to examine the size of the impact that interest rate changes might have on key financial ratios and ultimately the credit rating.

Table 9. ENERGEX credit metrics from Post-Tax Revenue Model after unhedged interest rate increase

All amounts are stated in millions ($)	2011	2012	2013	2014	2015
Revenue Cap (notional revenue requirement)					
Operating expenditure					
Earnings before interest, tax & depreciation (EBITDA)					
Depreciation					
Earnings before interest and tax (EBIT)					
Interest Cost					
Profit before tax					
Estimated tax paid					
Profit after Tax/Net Income					
Net Capital expenditure					
Funds from Operations (FFO)					
Opening RAB					
Total Debt (60% of total assets)					
Total Equity (40% of total assets)					
Nominal cost of debt	8.96%	10.96%	10.46%	9.96%	9.46%
Assumed Level of Gearing	60%				
Estimated Tax Rate	30%				
Ratio analysis					
FFO/Total Debt (%)	8.3%	6.8%	7.1%	7.5%	7.7%
Debt leverage (Total debt/Total capital) (%)	60%	60%	60%	60%	60%
Total Debt/EBITDA (x)	5.2	5.2	5.2	5.2	5.3
EBITDA/Interest Expense (x)	2.2	1.8	1.8	1.9	2.0
EBIT/Interest Expense (x)	1.8	1.5	1.5	1.6	1.6
Funds Flow Debt Payback (years)	12.1	14.7	14.0	13.4	13.0
FFO/Interest Expense (x)	1.9	1.6	1.7	1.7	1.8
Internal Financing Ratio (%)	30%	27%	31%	36%	38%

63. In the table below, we summarise a number of figures from the Ergon Energy PTRM and set out the set of financial ratios that Standard and Poor's uses to assess credit ratings. This table assumes that all interest costs (including interest on borrowings related to new CAPEX) are perfectly hedged and that all interest will be at the assumed rate of 8.96%.

Table 10. Ergon Energy credit metrics from Post-Tax Revenue Model assuming constant cost of debt

All amounts are stated in millions ($)	2011	2012	2013	2014	2015
Revenue Cap (notional revenue requirement)					
Operating expenditure					
Earnings before interest, tax & depreciation (EBITDA)					
Depreciation					
Earnings before interest and tax (EBIT)					
Interest Cost					
Profit before tax					
Estimated tax paid					
Profit after Tax/Net Income					
Net Capital expenditure					
Funds from Operations (FFO)					
Opening RAB					
Total Debt (60% of total assets)					
Total Equity (40% of total assets)					
Nominal cost of debt	8.96%				
Assumed Level of Gearing	60%				
Estimated Tax Rate	30%				
Ratio analysis					
FFO/Total Debt (%)	9.3%	9.2%	8.6%	8.6%	8.5%
Debt leverage (Total debt/Total capital) (%)	60%	60%	60%	60%	60%
Total Debt/EBITDA (x)	5.5	5.4	5.3	5.2	5.3
EBITDA/Interest Expense (x)	2.0	2.1	2.1	2.1	2.1
EBIT/Interest Expense (x)	1.4	1.5	1.5	1.6	1.5
Funds Flow Debt Payback (years)	10.7	10.9	11.6	11.6	11.8
FFO/Interest Expense (x)	2.0	2.0	2.0	2.0	1.9
Internal Financing Ratio (%)	34%	34%	37%	39%	38%

64. The following table summarises a number of figures from the Ergon Energy PTRM and sets out the set of financial ratios that Standard and Poor's uses to assess credit ratings after allowing an interest rate shock. As above, in Year One, we assume that the market interest rate exactly equals the cost of debt assumption in the regulatory determination. However, in Year Two we assume that interest rates increase by 2%. Over Years Three, Four and Five, we assume that interest rates decline by 0.5% per year back toward the original Year One interest rate. We assume that the regulated entity is completely unhedged against these interest rate changes to examine the size of the impact that interest rate changes might have on key financial ratios and ultimately the credit rating.

Table 11. Ergon Energy credit metrics from Post-Tax Revenue Model after unhedged interest rate increase

All amounts are stated in millions ($)	2011	2012	2013	2014	2015
Revenue Cap (notional revenue requirement)					
Operating expenditure					
Earnings before interest, tax & depreciation (EBITDA)					
Depreciation					
Earnings before interest and tax (EBIT)					
Interest Cost					
Profit before tax					
Estimated tax paid					
Profit after Tax/Net Income					
Net Capital expenditure					
Funds from Operations (FFO)					
Opening RAB					
Total Debt (60% of total assets)					
Total Equity (40% of total assets)					
Nominal cost of debt	8.96%	10.96%	10.46%	9.96%	9.46%
Assumed Level of Gearing	60%				
Estimated Tax Rate	30%				
Ratio analysis					
FFO/Total Debt (%)	9.3%	7.8%	7.6%	7.9%	8.1%
Debt leverage (Total debt/Total capital) (%)	60%	60%	60%	60%	60%
Total Debt/EBITDA (x)	5.5	5.4	5.3	5.2	5.3
EBITDA/Interest Expense (x)	2.0	1.7	1.8	1.9	2.0
EBIT/Interest Expense (x)	1.4	1.2	1.3	1.4	1.5
Funds Flow Debt Payback (years)	10.7	12.8	13.2	12.6	12.3
FFO/Interest Expense (x)	2.0	1.7	1.7	1.8	1.9
Internal Financing Ratio (%)	34%	29%	32%	36%	37%

65. The tables above show that even with perfect interest rate hedging, the key financial ratios are inferior to what would be expected from a stand-alone investment grade utility. In its Final Decision, the AER concludes that FFO to total debt and FFO interest coverage are "likely to be the most relevant for the credit rating decision." [22] Consequently, we focus our discussion on these two metrics.

66. We note that with perfect hedging under the PTRM, the FFO interest coverage ratios range between 1.9 and 2.0. These values are already below the benchmark of 2.3 to 2.5.[23] An unhedged interest rate shock decreases these coverage ratios to 1.6 or 1.7, substantially below the benchmark.

67. Similarly, with perfect hedging under the PTRM, the FFO to debt ratios range between 8-9%. These values are already below the benchmark of 9-10%.[24] An unhedged interest rate shock decreases these coverage ratios to 7-8%, substantially below the benchmark.

[22] Australian Energy Regulator, 2009, Electricity transmission and distribution network service providers: Review of the weighted-average cost of capital (WACC) parameters – Final Decision, 1 May 2009, p. 359.
[23] AER Final Decision, p. 374.
[24] AER Final Decision, p. 374.

68. We conclude from this analysis that a completely unhedged benchmark firm that suffered the type of interest rate shock examined above would be unlikely to maintain a stand-alone investment grade credit rating.

69. In our view, there are many sound economic reasons for the benchmark distribution or transmission firm to seek to maintain an investment grade credit rating. In this report, we establish that the benchmark firm with 60% debt financing is barely able to support an investment grade credit rating on a stand-alone basis (with no express or implied support from government or parent). The two key ratios of FFO interest cover and FFO to debt are already below the benchmarks for an investment grade credit rating in the PTRM for both ENERGEX and Ergon. Moreover, this analysis is based on the PTRM proposed by the firms. If the firms were allowed lower revenues, the ratio would deteriorate further. For example, the firms have proposed a gamma estimate of 0.2. If gamma is set to 0.65 and revenues are reduced, the key financial ratios would decline further.

70. In summary, our conclusion is that:

a. There are sound economic reasons for the benchmark distribution or transmission firm to seek to maintain an investment grade credit rating;

b. The financial ratios for the benchmark firm are presently barely (if at all) able to support an investment grade rating; and

c. Any further unhedged interest rate shock that further deteriorated the key financial ratios for the benchmark firm would put severe pressure on the investment grade rating.

Consequently, there are sound economic reasons for the benchmark firm to seek to hedge against downside risk arising from adverse changes in interest rates. This sort of risk management activity is standard practice among the set of comparator firms. It also comes at a cost. In our view the reasonable costs of an efficient interest rate risk management program should be included as an efficient cost in the regulatory process.

5. References

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Appendix: Author of report

71. This report has been prepared by Professor Stephen Gray, Professor of Finance at the University of Queensland Business School. I have Honours degrees in Commerce and Law from the University of Queensland and a Ph.D. in financial economics from the Graduate School of Business at Stanford University. I am also Managing Director of Strategic Finance Group (SFG Consulting), a corporate finance consultancy specialising in valuation, regulatory and litigation support advice.

72. I have extensive practical experience in advising firms, regulators and government bodies on valuation issues generally and I have written expert valuation reports and appeared as an expert valuation witness in several Court proceedings. A curriculum vitae is appended to this report.

73. For the purposes of preparing this report I was provided with a copy of the Federal Court guidelines *Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia* dated 5 May 2008. I have reviewed those guidelines and this report has been prepared consistently with the form of expert evidence required by those guidelines. In preparing this report, I have made all the inquiries that I believe are desirable and appropriate and no matters of significance that I regard as relevant have, to my knowledge, been withheld.

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Academic Qualifications

1995 Ph.D. (Finance), Graduate School of Business, Stanford University.
Dissertation Title: Essays in Empirical Finance
Committee Chairman: Ken Singleton
1989 LL.B. (Hons), Bachelor of Laws with Honours, University of Queensland.
1986 B.Com. (Hons), Bachelor of Commerce with Honours, University of Queensland.

Employment History

2000-Present	Professor of Finance, UQ Business School, University of Queensland.
1997-2000	Associate Professor of Finance, Department of Commerce, University of Queensland and Research Associate Professor of Finance, Fuqua School of Business, Duke University.
1994-1997	Assistant Professor of Finance, Fuqua School of Business, Duke University.
1990-1993	Research Assistant, Graduate School of Business, Stanford University.
1988-1990	Assistant Professor of Finance, Department of Commerce, University of Queensland.
1987	Specialist Tutor in Finance, Queensland University of Technology.
1986	Teaching Assistant in Finance, Department of Commerce, University of Queensland.

Academic Awards

2006 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.
2002 Journal of Financial Economics, All-Star Paper Award, for Modeling the Conditional Distribution of Interest Rates as a Regime-Switching Process, JFE, 1996, 42, 27-62.
2002 Australian University Teaching Award – Business (a national award for all university instructors in all disciplines).
2000 University of Queensland Award for Excellence in Teaching (a University-wide award).
1999 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.
1999 KPMG Teaching Prize, Department of Commerce, University of Queensland.
1998 Faculty Teaching Prize (Business, Economics, and Law), University of Queensland.
1991 Jaedicke Fellow in Finance, Doctoral Program, Graduate School of Business, Stanford University.
1989 Touche Ross Teaching Prize, Department of Commerce, University of Queensland.
1986 University Medal in Commerce, University of Queensland.

Large Grants (over $100, 000)

- Australian Research Council Linkage Grant, 2008—2010, Managing Asymmetry Risk ($320,000), with T. Brailsford, J.Alcock, and Tactical Global Management.
- Intelligent Grid Cluster, Distributed Energy – CSIRO Energy Transformed Flagship Collaboration Cluster Grant, 2008-2010 ($552,000)
- Australian Research Council Research Infrastructure Block Grant, 2007—2008, Australian Financial Information Database ($279,754).
- Australian Research Council Discovery Grant, 2006—2008, Capital Management in a Stochastic Earnings Environment ($270,000).

- Australian Research Council Discovery Grant, 2005—2007, Australian Cost of Equity.
- Australian Research Council Discovery Grant, 2002—2004, Quantification Issues in Corporate Valuation, the Cost of Capital, and Optimal Capital Structure.
- Australian Research Council Strategic Partnership Grant, 1997—2000, Electricity Contracts and Securities in a Deregulated Market: Valuation and Risk Management for Market Participants.

Current Research Interests

Benchmark returns and the cost of capital. Corporate Finance. Capital structure. Real and strategic options and corporate valuation. Financial and credit risk management. Empirical finance and asset pricing.

Publications

Feuerherdt, C., S. Gray and J. Hall, (2009), "The Value of Imputation Tax Credits on Australian Hybrid Securities," *International Review of Finance*, forthcoming.

Gray, S., J. Hall, D. Klease and A. McCrystal, (2009), "Bias, stability and predictive ability in the measurement of systematic risk," *Accounting Research Journal*, forthcoming.

Treepongkaruna, S. and S. Gray, (2009), "Information volatility links in the foreign exchange market," *Accounting and Finance*, 49, 2, 385-405.

Costello, D., S. Gray, and A. McCrystal, (2008), "The diversification benefits of Australian equities," *JASSA*, December.

Gray, S. and J. Hall, (2008), "The Relationship Between Franking Credits and the Market Risk Premium: A Reply," *Accounting and Finance*, 48, 1, 133-142.

Gray, S., A. Mirkovic and V. Ragunathan, (2006), "The Determinants of Credit Ratings: Australian Evidence," *Australian Journal of Management*, 31(2), 333-354.

Choy, E., S. Gray and V. Ragunathan, (2006), "The Effect of Credit Rating Changes on Australian Stock Returns," *Accounting and Finance*, 46(5), 755-769.

Gray, S. and J. Hall, (2006), "The Relationship Between Franking Credits and the Market Risk Premium," *Accounting and Finance*, 46(3), 405-428.

Gray, S. and S. Treepongkaruna, (2006), "Are there non-linearities in short-term interest rates?" *Accounting and Finance*, 46(1), 149-167.

Gray, P., S. Gray and T. Roche, (2005), "A Note on the Efficiency in Football Betting Markets: The Economic Significance of Trading Strategies," *Accounting and Finance*, 45(2) 269-281.

Duffie, D., S. Gray and P. Hoang, (2004), "Volatility in Energy Prices. In V. Kaminski," (Ed.), *Managing Energy Price Risk: The New Challenges and Solutions* (3rd ed.). London: Risk Books.

Cannavan, D., F. Finn and S. Gray, (2004), "The Value of Dividend Imputation Tax Credits in Australia," *Journal of Financial Economics*, 73, 167-197.

Gray, S. and S. Treepongkaruna, (2003), "Valuing Interest Rate Derivatives Using a Monte-Carlo Approach," *Accounting and Finance*, 43(2), 231-259.

Gray, S., T. Smith and R. Whaley, (2003), "Stock Splits: Implications for Investor Trading Costs," *Journal of Empirical Finance*, 10, 271-303.

Gray, S. and S. Treepongkaruna, (2003), "On the Robustness of Short-term Interest Rate Models," *Accounting and Finance*, 43(1), 87-121.

Gray, S. and S. Treepongkaruna, (2002), "How to Value Interest Rate Derivatives in a No-Arbitrage Setting," *Accounting Research Journal* (15), 1.

Gray, P. and S. Gray, (2001), "A Framework for Valuing Derivative Securities," *Financial Markets Institutions & Instruments*, 10(5), 253-276.

Gray, P. and S. Gray, (2001), "Option Pricing: A Synthesis of Alternate Approaches," *Accounting Research Journal*, 14(1), 75-83.

Dahlquist, M. and S. Gray, (2000), "Regime-Switching and Interest Rates in the European Monetary System," *Journal of International Economics*, 50(2), 399-419.

Bollen, N., S. Gray and R. Whaley, (2000), "Regime-Switching in Foreign Exchange Rates: Evidence from Currency Options," *Journal of Econometrics*, 94, 239-276.

Duffie, D., S. Gray and P. Hoang, (1999), "Volatility in Energy Prices. In R. Jameson," (Ed.), *Managing Energy Price Risk* (2nd ed.). London: Risk Publications.

Gray, S. and R. Whaley, (1999), "Reset Put Options: Valuation, Risk Characteristics, and an Example," *Australian Journal of Management*, 24(1), 1-21.

Bekaert, G. and S. Gray, (1998), "Target Zones and Exchange Rates: An Empirical Investigation," *Journal of International Economics*, 45(1), 1-35.

Gray, S. and R. Whaley, (1997), "Valuing S&P 500 Bear Market Warrants with a Periodic Reset," *Journal of Derivatives*, 5(1), 99-106.

Gray, S. and P. Gray, (1997), "Testing Market Efficiency: Evidence from the NFL Sports Betting Market," *The Journal of Finance*, 52(4), 1725-1737.

Gray, S. (1996), "Modeling the Conditional Distribution of Interest Rates as a Regime- Switching Process," *Journal of Financial Economics*, 42, 27-62.

Gray, S. (1996), "Regime-Switching in Australian Interest Rates," *Accounting and Finance*, 36(1), 65-88.

Brailsford, T., S. Easton, P.Gray and S. Gray, (1995), "The Efficiency of Australian Football Betting Markets," *Australian Journal of Management*, 20(2), 167-196.

Duffie, D. and S. Gray, (1995), "Volatility in Energy Prices," In R. Jameson (Ed.), *Managing Energy Price Risk*, London: Risk Publications.

Gray, S. and A. Lynch, (1990), "An Alternative Explanation of the January Anomaly," *Accounting Research Journal*, 3(1), 19-27.

Gray, S. (1989), "Put Call Parity: An Extension of Boundary Conditions," *Australian Journal of Management*, 14(2), 151-170.

Gray, S. (1988), "The Straddle and the Efficiency of the Australian Exchange Traded Options Market," *Accounting Research Journal*, 1(2), 15-27.

Teaching

Fuqua School of Business, Duke University, Student Evaluations (0-7 scale):

- Financial Management (MBA Core): Average 6.5 over 7 years.
- Advanced Derivatives: Average 6.6 over 4 years.
- Empirical Issues in Asset Pricing: Ph.D. Class

1999, 2006 Outstanding Professor Award, Global Executive MBA, Fuqua School of Business, Duke University.

UQ Business School, University of Queensland, Student Evaluations (0-7 scale):

- Finance (MBA Core): Average 6.6 over 8 years.
- Corporate Finance Honours: Average 6.9 over 8 years.

2002 Australian University Teaching Award – Business (a national award for all university instructors in all disciplines).
2000 University of Queensland Award for Excellence in Teaching.
1999 Department of Commerce KPMG Teaching Prize, University of Queensland.
1998 Faculty Teaching Prize, Faculty of Business Economics and Law, University of Queensland.
1998 Commendation for Excellence in Teaching, University-wide Teaching Awards, University of Queensland.
1989 Touche Ross Teaching Prize, Department of Commerce, University of Queensland.

Board Positions

2002 - Present: Director, Financial Management Association of Australia Ltd.
2003 - Present: Director, Moreton Bay Boys College Ltd. (Chairman since 2007).
2002 - 2007: External Risk Advisor to Board of Enertrade (Queensland Power Trading Corporation Ltd.)

Consulting

Managing Director, Strategic Finance Group: www.sfgconsulting.com.au.

Consulting interests and specialties, with recent examples, include:

- **Corporate finance**
  - ⇒ **Listed multi-business corporation:** Detailed financial modeling of each business unit, analysis of corporate strategy, estimation of effects of alternate strategies, development of capital allocation framework.

- **Capital management and optimal capital structure**
  - ⇒ **State-owned electricity generator:** Built detailed financial model to analyze effects of increased leverage on cost of capital, entity value, credit rating, and stability of dividends. Debt of $500 million issued.

- **Cost of capital**
  - ⇒ **Cost of Capital in the Public Sector:** Provided advice to a government enterprise on how to estimate an appropriate cost of capital and benchmark return for Government-owned enterprises. Appearance as **expert witness** in legal proceedings that followed a regulatory determination.
  - ⇒ **Expert Witness:** Produced a written report and provided court testimony on issues relating to the cost of capital of a cable TV business.
  - ⇒ **Regulatory Cost of Capital:** Extensive work for regulators and regulated entities on all matters relating to estimation of weighted-average cost of capital.

- **Valuation**
  - ⇒ **Expert Witness:** Produced a written report and provided court testimony. The issue was whether, during a takeover offer, the shares of the bidding firm were affected by a liquidity premium due to its incorporation in the major stock market index.
  - ⇒ **Expert Witness:** Produced a written report and provided court testimony in relation to valuation issues involving an integrated mine and refinery.

- **Capital Raising**

⇒ Produced comprehensive valuation models in the context of capital raisings for a range of businesses in a range of industries including manufacturing, film production, and biotechnology.

- **Asset pricing and empirical finance**
  - ⇒ **Expert Witness:** Produced a written report on whether the client's arbitrage-driven trading strategy caused undue movements in the prices of certain shares.

- **Application of econometric techniques to applied problems in finance**
  - ⇒ **Debt Structure Review:** Provided advice to a large City Council on restructuring their debt portfolio. The issues involved optimisation of a range of performance measures for each business unit in the Council while simultaneously minimizing the volatility of the Council's equity in each business unit.
  - ⇒ **Superannuation Fund Performance Benchmarking:** Conducted an analysis of the techniques used by a large superannuation fund to benchmark its performance against competing funds.

- **Valuation of derivative securities**
  - ⇒ **Stochastic Volatility Models in Interest Rate Futures Markets:** Estimated and implemented a number of models designed to predict volatility in interest rate futures markets.

- **Application of option-pricing techniques to real project evaluation**
  - ⇒ **Real Option Valuation:** Developed a framework for valuing an option on a large office building. Acted as arbitrator between the various parties involved and reached a consensus valuation.
  - ⇒ **Real Option Valuation:** Used real options framework in the valuation of a bio-tech company in the context of an M&A transaction.

Appendix 7

Jemena Asset Management Benchmarking report for Jemena Gas Networks

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