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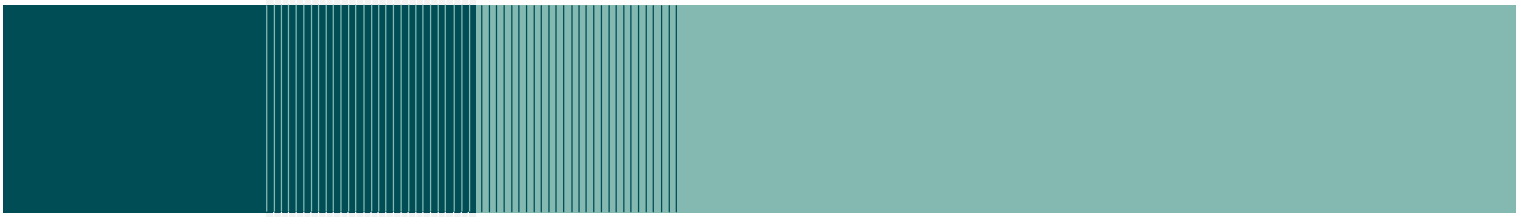
The Value of Imputation Credits for a Regulated Gas Distribution Business

A report for WA Gas Networks



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Executive Summary

Background

WA Gas Networks (WAGN) has asked NERA Economic Consulting (NERA) to provide an expert opinion on the market value of gamma for its access arrangement submission to the Economic Regulation Authority (ERA). WAGN is the owner of the majority of the gas distribution networks in Western Australia.

Gamma is a parameter used to represent the value that equity investors receive from imputation credits created through the payment of company income tax. The imputation tax system was introduced in Australia on 1 July 1987 and allows resident investors to deduct from their taxable income any credits distributed to them by way of franked dividends. Since 1 July 2000 investors that have franking credits in excess of their tax liabilities have received a rebate from the Australia Tax Office (ATO). Australian utility regulators use gamma to determine the proportion of company income tax that does not need to be included in a regulated firm's annual revenue requirement, because of the benefit shareholders receive from the imputation tax system.

Gamma is estimated as the product of two further parameters, namely:

- the fraction of imputation credits created that are assumed to be distributed to shareholders (the payout ratio or '*F*'); and
- the market value of imputation credits distributed as a proportion of their face value (theta or 'θ').

Australian regulators have generally adopted a gamma value of 0.5 in regulatory decisions. However, earlier this year the Australian Energy Regulator (AER) undertook a review of the weighted average cost of capital (*WACC*) parameters for both electricity distribution and transmission businesses. The AER's final report determined that it would adopt a gamma value of 0.65[1] for the forthcoming five year period for which the outcomes of its review are to apply. Consistent with practice elsewhere, the ERA had previously set the value of gamma at 0.5.[2] However, in light of the outcomes of the recent review undertaken by the AER in a recent draft decision the ERA suggested that a plausible range for gamma falls between 0.57 and 0.81.[3]

Notwithstanding, we note that the AER's decision to adopt a value of 0.65 for gamma in future decisions seems unlikely to be settled. Both the Queensland electricity distribution businesses and ETSA Utilities (SA) have submitted price review proposals that adopt values for gamma lower than 0.65, a step that represents the first stage of a potential appeal of the AER's decision.

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1 AER, Electricity transmission and distribution network service providers – review of the weighted average cost of capital (*WACC*) parameters: Final Decision, May 2009.

2 ERA, Final Determination: 2009 Weighted Average Cost of Capital for TPI's Railway, 22 June 2009.

3 ERA, Draft Decision on Proposed Revisions to the Access Arrangement for the South West Interconnected Network, 16 July 2009.

Conclusions

The AER's choice of a value for gamma of 0.65 is not supported by a reasonable interpretation of the evidence. The AER derives an estimate for gamma of 0.65 by:

- assuming that the payout ratio is 1.0 – although the evidence indicates that the ratio is lower;
- using tax statistics to provide an upper bound on theta of 0.74 – although tax statistics are unlikely to provide a reliable guide to the value of theta; and
- using a single study to provide a lower bound on theta of 0.57 – although other studies point to a lower value for theta.

Once these errors are addressed, the value of gamma falls below 0.5. Our review of the evidence indicates that the value of gamma should be set to between zero and 0.4.

Appropriate value for the payout ratio

The payout ratio is a measure of the proportion of franking credits distributed to shareholders. When a company distributes all of its profits in a year as dividends, its shareholders receive a full payout of all imputation credits created in that year. However, companies often do not distribute all of their profits but, rather, reinvest a portion of them. Despite this practice, in its recent review the AER adopts a payout ratio of 1.0.

By way of support for its decision, the AER argues that a payout ratio of 1.0 is consistent with the AER's revenue model and classical valuation frameworks that assume cash flows are fully distributed. However, the AER overstates its consistency argument since certain values in the AER's revenue model assume a payout ratio of 0.71 and, while under a classical tax system the payout policy of a firm will not affect its value, under an imputation tax system the policy can affect its value.

Despite its contention that the payout ratio should be 1.0, the AER measures the value of retained credits since it recognises that some credits are in fact retained. Their value depends on two factors, namely:

- the rate at which retained credits should be discounted (the discount rate); and
- the period over which credits are likely to be retained (the retention period).

The AER contends that the discount rate lies between the risk-free rate and the cost of equity. This is incorrect since retained franking credits can only be distributed with dividends, which are dependent on future equity distributions. The uncertainty that exists about these future equity distributions means that the appropriate discount rate is the cost of equity, otherwise shareholders will not be compensated for the equity-based risk they bear.

The AER assumes that a firm will retain franking credits for a period of between one and five years. With this assumption and a discount rate that lies between the risk-free rate and the cost of equity, the AER shows that the value of a retained credit is between 70 per cent and 90 per cent of an immediately distributed credit. The AER then argues that if 71 per cent of credits are distributed immediately while the remaining 29 per cent are distributed within five

years, the effective payout ratio must lie between 0.91 and 0.98. The AER concludes that this range is not significantly below one.

The AER provides no evidence to indicate that businesses do in fact distribute retained franking credits within a period of five years. We show that the AER assumption that 71 per cent of franking credits are distributed immediately while the remaining 29 per cent are distributed within five years is not consistent with the evidence the Australian Taxation Office (ATO) provides. The AER assumption implies that the ratio of credits distributed to credits created lies, on average, between 89 per cent and 97 per cent. ATO data indicate that the ratio is, on average, 68 per cent.

Problems with the upper bound estimate of theta

The AER suggests that the proportion of distributed imputation credits redeemed with the ATO represents an upper bound for theta. However, an estimate for theta derived from tax statistics is an unreliable guide because:

- while the proportion of credits redeemed provides a guide as to the benefits that some investors realise from investing in stocks that deliver credits, it provides no guide as to the costs the investors bear – domestic investors who hold portfolios that exhibit a home bias because of the credits domestic stocks deliver must bear more risk; and
- whereas the proportion of credits redeemed is a holdings-weighted measure of the value investors place on credits, theta is likely to be a wealth-weighted average of the value that investors place on credits – including investors who have the opportunity to hold stocks that deliver credits but choose not to hold the stocks.

For these reasons, the value the market places on a distributed imputation credit cannot be inferred directly from the fraction of the credits that are redeemed. In our opinion the only way of estimating the value of imputation credits is by examining market prices.

Problems with the lower bound estimate of theta

The AER provides a lower bound on theta from an examination of the evidence provided by dividend drop-off studies. A dividend drop-off study examines the movement in stock prices on the ex-dividend day.[4] Dividend drop-off studies that estimate the market value of distributed imputation credits are conducted in one of two ways:

- the value of theta is estimated by examining the net movement in prices – where the net movement is the sum of the change in price and the amount of the cash dividend; and
- the value of theta and the value the market places on dividends are jointly estimated by examining the gross movement in prices.

For each of these approaches a number of studies were available to the AER. However, the AER relied on a single study even though some of the studies rejected included a broader and

[4] The ex-dividend day is the first day on which purchase of a share does not entitle the buyer to the dividend the issuer of the share has declared. Before the ex-dividend day, the share trades cum-dividend.

more recent data set. Had the AER considered the results of all the relevant studies of the value of theta, it would have adopted a range of between zero and 0.57.

The market value of imputation credits

A company that pays Australian company income tax can distribute imputation credits to its shareholders who, in turn, can use the credits to reduce their personal Australian tax liabilities. Gamma is the product of the fraction of credits distributed (F) and the market value of those distributed credits (θ).

Since the distribution rate is around 70 per cent and the market value of theta ranges between zero and 0.57, a reasonable range for gamma is between zero and 0.4.

1. Introduction

This report has been prepared for WA Gas Networks (WAGN) in preparation for its access arrangement (AA) submission to the Economic Regulation Authority (ERA). WAGN is the owner of the majority of the gas distribution networks in Western Australia. NERA Economic Consulting (NERA) has been asked by WAGN to provide an expert opinion on the market value of gamma for its submission.

Gamma is a parameter used to represent the value that equity investors place on the franking credits created through the payment of company income tax. Australian regulators use gamma to determine the proportion of company income tax that does not need to be included in a regulated firm's annual revenue requirement.

Australian regulators have generally adopted a gamma value of 0.5 in regulatory decisions. However, earlier this year the AER undertook a review of the weighted average cost of capital (*WACC*) parameters for both electricity distribution and transmission. The AER's final report determined that it would adopt a gamma value of 0.65[5] for the forthcoming five year period for which the outcomes of its review are to apply. Consistent with practice elsewhere, the ERA had previously set the value of gamma at 0.5.[6] However, in light of the outcomes of the AER's WACC review the ERA in a recent draft decision suggested that a plausible range for gamma falls between 0.57 and 0.81.[7]

Notwithstanding, its decision, the AER's proposed value for gamma has been challenged by both Ergon[8] and Energex[9] (Queensland electricity distributors); who have proposed a value of 0.2. Further, ETSA Utilities (the South Australian electricity distributor) has proposed a value for gamma of 0.5.[10] The fact of these different proposed values represents the first step in a potential appeal of the AER's decision.

This report sets out the recent evidence that indicates that the value of gamma should be between zero and 0.4, ie, significantly below the range indicated by the ERA in its recent draft decision. The remainder of this report is structured as follows:

- section two defines gamma and describes its importance to regulators and regulated firms;
- section three examines the evidence regarding the value of the distribution ratio, the first component of gamma; and
- section four sets out a detailed review of the value of theta, the second component of gamma.

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5 AER, Electricity transmission and distribution network service providers – review of the weighted average cost of capital (*WACC*) parameters: Final Decision, May 2009.

6 ERA, Final Determination: 2009 Weighted Average Cost of Capital for TPI's Railway, 22 June 2009.

7 ERA, Draft Decision on Proposed Revisions to the Access Arrangement for the South West Interconnected Network, 16 July 2009.

8 Ergon, *Regulatory Proposal to the Australian Energy Regulator: Distribution Services for the period 1 July 2010 to 30 June 2015*, 1 July 2009, page 389.

9 Energex, *Regulatory Proposal for the period July 2010 - June 2015*, July 2009, page 243.

10 ETSA Utilities, *Regulatory Proposal 2010-2015*, 1 July 2009, page 245.

2. Background

2.1. The Imputation Tax System

Since 1 July 1987 Australia has had an imputation tax system. The purpose of an imputation tax system is to avoid corporate profits being taxed twice. Under a classical tax system, profits are taxed at the corporate level and then again as personal income when distributed as dividends. In contrast, interest on corporate debt is a deductible expense at the corporate level and is only taxed at the personal level.

Under Australia's imputation system, franking credits are created when a company pays Australian corporate taxes on its profits. Companies with franking credits are then able to attach these credits to dividends. Under the current company tax rates a fully franked dividend has 30 cents of imputation credits for every 70 cents of cash dividends. Distributed credits may then be used to offset any individual or institutional Australian tax liabilities. In addition, since 1 July 2000 Australian residents that have had credits in excess of their tax liability have been eligible for rebates.

It follows that franking credits essentially represent pre-paid Australian income tax. Consequently, for investors who can use the tax advantage, an imputation tax regime provides a benefit for equity investments that arises in addition to capital gains and dividends. The introduction of an imputation tax system therefore means that equity owners may be prepared to accept a lower return on equity because of the additional benefits that franked dividends provide. These additional benefits are the reason that regulators assume that the imputation tax system reduces the effective company tax on a regulated business. The additional benefits that credits provide are measured by 'gamma'.

2.2. Regulatory Context

Under a pre-tax revenue model the allowable revenues of a regulated business are composed of depreciation, operating costs and a return on assets (in the form of debt and equity returns). The use of a pre-tax WACC means that equity returns are 'grossed up' for the expected net cost of corporate income taxation (ie, gross income tax net the value of imputation credits). The reason that equity returns must be grossed up, is because the return on equity is estimated by reference to the returns received by shareholders, however, shareholders receive the residual revenues of a business (ie, after the payment of company income tax). A higher value for gamma lowers the required compensation for company income tax and so lowers a regulated company's annual revenue requirement.

Regulatory precedent has been for the value of gamma to be 0.5. The initial rationale for this figure appears to be based largely on the results of a study conducted by Hathaway and Officer, which was alluded to in the original National Electricity Code.[11] Hathaway and Officer define the value of created imputation credits (gamma) as the product of:

- the fraction of imputation credits created that are assumed to be distributed to shareholders (the payout ratio or '*F*'); and

[11] National Electricity Code Administrator, *National Electricity Code, Schedule 6.1.5.2.*

- the market value of imputation credits distributed as a proportion of their face value (theta or 'θ').

Hathaway and Officer reviewed tax statistics to determine the average payout ratio of the market and undertook a dividend drop-off study to estimate theta.

In recent years regulatory decisions have varied slightly from 0.5, as shown in the table below; however, the average has been to adopt a value of 0.5.

Table 2.1: Regulatory decisions on the value of gamma

Regulator (year)	Sector	Gamma Range	Final Gamma Value
ESC (2008)	Gas	0.72 – 1.00	0.50
OTTER (2007)	Electricity	-	0.50
ESCOSA (2006)	Gas	0.35 – 0.60	0.48
QCA (2006)	Gas	0.50 – 1.00	0.50
ESC (2006)	Electricity	0.80 – 1.00	0.50
QCA (2005)	Electricity	-	0.50
ESCOSA (2005)	Electricity	-	0.50
IPART (2005)	Gas	0.30 – 0.50	0.30 – 0.50
ICRC (2004)	Gas	0.30 – 0.50	0.30 – 0.50
IPART (2004)	Electricity	0.40 – 0.60	0.50
ICRC (2004)	Electricity	-	0.50
Estimate (low – high)	**Energy**	**0.30 – 1.00**	**0.30 – 0.50**

Source: AER, Electricity transmission and distribution network service providers – review of the weighted average cost of capital (*WACC*) parameters: Final Decision, May 2009.

Earlier this year the AER undertook a review of the *WACC* parameters for both electricity distribution and transmission businesses. The AER stated in its final report that a reasonable estimate of gamma lies between 0.57 and 0.74 and that it considered that the value of gamma is 0.65 for an efficient network service provider. Taking account of the outcomes of the recent review of the AER, in a recent draft decision in relation to Western Power (an electricity lines business) the ERA determined that a plausible range for gamma was between 0.57 and 0.81.

The remainder of this report shows that, following an examination of each component of gamma, its market value should be lower than the ranges determined by the AER and ERA.

3. Payout Ratio (*F*)

The payout ratio is a measure of the proportion of imputation credits distributed to shareholders by way of franked dividends.[12] Imputation credits are created when a company pays Australian tax on profits generated in Australia and are attached to dividends which are then issued to shareholders. When a company distributes all of its profits in a year as dividends to its shareholders, it will have a payout ratio of 1.0. However, generally companies do not fully distribute their profits but rather retain a portion to reinvest in the business.

Notwithstanding this practice, the AER adopted an assumed payout ratio of 1.0. The sections below examine the case for adopting a payout ratio of 1.0 and present evidence regarding an appropriate payout ratio for a regulated gas distribution business.

3.1. Retention of Imputation Credits

The AER contends that a payout ratio of 1.0 is appropriate because it is consistent with the assumptions in its revenue model and the general valuation framework under a classical tax system, both of which assume a full distribution of free cash flows.[13] However, this consistency argument is overstated for two reasons, ie:

- Australian companies operate under an imputation tax system rather than a classical tax system – if distributed credits are valued by shareholders, a firm's choice of payout ratio will affect the value of the firm;
- when calculating equity raising costs the AER's revenue model assumes that 71 per cent of the return on equity is distributed through dividends with the remaining portion is reinvested, which is less than the full distribution the AER assumes.[14]

Under a classical tax regime, profits retained by a business are reinvested to increase the future return to equity owners. It follows that the value of the firm will be independent of whether free cash flows are fully distributed or retained, since the value is eventually returned to shareholders as higher dividends.

Assumptions that make sense under a classical tax system, though, may not make sense under an imputation system. Under an imputation tax system, the payout policy of a firm can affect its value since retained imputation credits cannot be reinvested by the firm. In other words, unlike retained earnings that can be reinvested by a business to increase future equity returns, imputation credits only have value when distributed to shareholders. In fact, despite the AER's statement regarding consistency with other models, the AER acknowledges that firms do retain franking credits and conduct an analysis regarding their value.[15] However, we show below that the AER's analysis is not supported by the empirical evidence. It follows that, in

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[12] We note that terms imputation credits and franking credits are interchangeable, however, for the purposes of this report we will just refer to imputation credits (or "credits").

[13] AER, op cit, page 420.

[14] AER, *New South Wales Distribution Determination 2009-10 to 2013-14: Final Decision*, 28 April 2009, page 576.

[15] AER, op cit, page 416.

the absence of any evidence that retained credits are eventually distributed to shareholders, it would be appropriate for the distribution rate of a benchmark regulated gas business to be the historical market average distribution.

3.2. The Value of Retained Franking Credits

The AER's examination of the value of retained credits involves assessing the value of two parameters:

- the rate at which retained credits should be discounted (the discount rate); and
- the period over which credits are likely to be retained (the retention period).

We discuss each of these in the sections below.

3.2.1. The appropriate discount rate

The AER has acknowledged that the "relevant discount rate should reflect the degree of risk faced by an investor that credits generated are never distributed".[16] However, it contents that the discount rate should fall between the risk-free rate and the cost of equity. This is because retained credits have already been generated and the AER believes that the ATO is certain to issue the rebate. For example, the AER states that:[17]

> Use of a risk-free rate would reflect certainty that credits generated would be distributed to investors eventually. The residual risk appears to arise in the case of bankruptcy (for example), in which case there may be no cash flows with which to distribute retained credits.

This statement appears not to recognise that retained credits need to be attached to future dividends to be distributed and that these are subject to the risk associated with future cash flows. However, the AER states that "although credits need to be attached to cash flows to be paid out, retained credits need not be attached to future dividends in order to be paid out – they may be distributed via alternative methods".[18] However, the AER does not explain exactly how an ongoing company would be able to distribute imputation credits other than by attaching them to future dividends.

In our opinion the AER is incorrect to argue that the discount rate could be anything other than the cost of equity. This is because firms cannot distribute imputation credits in their own right; rather credits must be attached to future dividends. Since future dividends can only be paid out of residual cash flows (ie, cash flows after all tax, operating and debt costs have been paid) the appropriate compensation for the uncertainty (ie, risk) of these cash flows is the cost of equity.

Use of the risk-free rate is only appropriate where the stream of retained imputation credits is certain, such as, for example, the coupons attached to a government bond. In other words, where shareholders know with certainty that retained credits will be paid out and also know

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[16] AER, op cit, page 417.

[17] AER, op cit, page 417.

[18] AER, op cit, page 417.

with certainty when those credits will be distributed. Since future dividends or, for that matter, any equity distribution, are not known with certainty, the use of a risk-free rate to determine their present value is incorrect.

3.2.2. The retention period

The AER states that it is "reasonable to assume a retention period of between one and five years". To be precise, the AER assumes that firms distribute 71 per cent of franking credits immediately and then distribute the remaining 29 per cent after either one year or five years. In making this assumption the AER does not rely on any empirical evidence and explicitly states that it is "not aware of any empirical analysis that specifically explores this issue".[19] Instead, the AER states that:[20]

> …NERA's suggestion [that firms do not distribute some credits] implies that a stock of potentially valuable imputation credits builds up within the firm, never to be released to shareholders. In the AER's view, this suggestion is implausible, as a rational shareholder base would demand that retained credits be paid out.
>
> [T]he average firm in the Australian market will rationally seek to distribute its retained credits as quickly as possible through whatever means are available, so as to meet shareholder demands.

The argument that firms will seek to distribute retained credits as quickly as possible relies on the idea that investors place a value on imputation credits and that retained credits can be distributed at low cost. This is because, if the market were to place a zero value on credits distributed, then firms would face no incentive to distribute retained credits. Further, if the costs of distributing retained credits are sufficiently high, firms will not distribute retained credits even if the market places a value on them. Fortunately, there is no need to choose between theses different perspectives, because data are available to settle the question of what retention policy firms on average follow.

To examine whether the efficacy of the AER assumption, we examine ATO statistics on the creation and distribution of credits for the tax years from 1996/1997 to 2006/2007. Table 3.1 shows the credits created and the credits distributed for these years. The table also shows the credits that would need to have been distributed if companies had acted in accordance with the AER's hypothesis and had distributed 71 per cent of the credits they had created immediately and the remaining 29 per cent after either one year or five years. The actual proportion of credits created that were distributed in the same year (not in other years) on average from 1997 through 2007 is 68 percent. If firms had followed the AER 1-year strategy (ie, distributing 71 per cent of this years credits as well as all the retained credits from the prior year), 97 per cent of all credits created would have been distributed. In other words, on average over the years 1997 through 2007, the ratio of credits distributed in a given year to credits created in that year (not in other years) would have been 97 per cent. If firms had followed the AER 5-year strategy (ie, distributing 71 per cent of this years credits as well as the credits retained from year *t-5*), one would need to observe that 89 per cent of all credits

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[19] AER, op cit, page 418.

[20] AER, op cit, page 418.

created in that year would have been distributed. The ATO data do not support the assumption that firms quickly pass on all of the credits that they generate.

Another way of looking at the ATO data is to ask what proportion of credits would be needed to have been distributed immediately and what proportion of credits would be needed to have been retained for either one or five years to match on average the actual distribution policy one observes. The answer is that there exists no one-year strategy that would match the actual distribution policy that one observes. For a five year retention policy for credits not distributed immediately to match the observed rate of distribution of all credits, firms would need to distribute 17 per cent of credits created immediately and 83 per cent after five years. However, the impact of discounting on the 83 per cent of credits held for five years is to reduce their value substantially. For example, if the cost of equity is 11.04 per cent per annum (consistent with one of the AER's assumptions), the present value of 17 cents of credits distributed immediately, together with 83 cents retained for five years, is just 66 cents.

Table 3.1: ATO Statistics ($'millions)

		Credits distributed		
			AER assumption	
Year	Credits created	Actual	1-year policy[21]	5-year policy[22]
1996-97	18,608	12,470		
1997-98	20,761	15,767	20,137	
1998-99	22,543	17,512	22,026	
1999-00	28,462	18,094	26,746	
2000-01	27,099	24,238	27,495	
2001-02	27,843	12,841	27,627	25,165
2002-03	31,034	10,944	30,108	28,055
2003-04	36,042	28,345	34,589	32,127
2004-05	41,346	28,437	39,808	37,610
2005-06	48,652	35,893	46,533	42,402
2006-07	58,189	42,340	55,423	49,389
Mean proportion distributed		68%	97%	89%

Source: Statistics obtained from the ATO (Taxation Statistics 2006/07 – Table 6). Proportion distributed in any given year is the ratio of credits distributed in the year to credits created in the year.

The application of the AER's assumptions as to different possible retention strategies to ATO statistics of the creation and distribution of imputation credits each year shows that the AER's decision to set the payout ratio to 1.0 is not consistent with empirical evidence.

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[21] Calculated as the current year multiplied by the distribution rate plus the previous year's retained amount, ie: $x_t \times 0.71 + x_{t-1} \times 0.29$. For example, in 1997/98 the AER's 1 year strategy would require that $20.137 billion credits to be distributed (ie, $20.761 \times 0.71 + 18.608 \times 0.29$).

[22] Calculated as the current year multiplied by the distribution rate plus the previous years' retained amounts, ie: $x_t \times 0.71 + x_{t-5} \times 0.29$. For example, in 2001/02 the AER's 5 year strategy would require that $25.165 billion credits to be distributed (ie, $27.843 \times 0.71 + 18.608 \times 0.29$).

ATO statistics show that Australian firms have not quickly distributed retained imputation credits and are holding $148 billion in imputation credits in their franking accounts.[23] The retention of imputation credits reflects a decision by companies to retain and reinvest a portion of their yearly earnings. As discussed in section 4.1.1, the decision not to distribute all imputation credits suggests that market value of imputation credits is low.

3.3. Summary

The AER's adoption of a distribution rate for imputation credits of 1.0 is inappropriate because:

- it does not reflect the current market average payout ratio which the AER acknowledges is 0.71;
- is inconsistent with empirical evidence as to the period over which firms retain franking credits; and
- it does not properly reflect the risks that shareholders bear when franking credits are retained.

In our opinion the appropriate assumption as to the distribution rate of imputation credits for a regulated gas distribution business is 68 per cent. This reflects the average market payout ratio over the 1997 to 2007 period while assuming that values retained credits have no value.

[23] ATO, Taxation Statistics 2006/07 – Table 6.

4. Market Value of Distributed Imputation Credits (θ)

Theta is the market value of distributed imputation credits, which may differ from the face value of such credits. In its Final Decision on the *WACC* parameters for electricity lines businesses, the AER concluded that the market value of theta is between:[24]

- a lower bound estimate of 0.57, being its best estimate inferred from market prices; and
- an upper bound estimate of 0.74, being its best estimate from tax statistics.

In our opinion, the logic for this conclusion is compromised by a number of interrelated errors on the part of the AER and its advisor on these questions Associate Professor John Handley ('Handley'). The mistakes in the logic applied by the AER/Handley are:

- in their theoretical analysis of how imputation credits are likely to be valued and, in particular, in their analysis of the impact of foreign investors on theta;
- in their use of tax statistics to estimate the value of distributed imputation credits; and
- in their reliance on a single dividend drop-off study to provide a lower bound on theta.

Once these concerns are addressed, a more appropriate range for theta would be between zero and 0.57.

4.1. Theoretical Framework for Theta

The AER developed a theoretical framework for estimating the market value of imputation credits (theta) on its assumption that the appropriate version of the CAPM is one that applies to domestic assets alone. This position is articulated explicitly by Handley:[25]

> Once you choose the market, you define the set of assets that are relevant for pricing purposes and you define the set of investors that are relevant for pricing purposes. Non-market assets, including assets held by any of the investors in other markets are outside the model and therefore play no role.

Handley further states that:[26]

> The holdings of foreign assets by foreign investors (and equally the holdings of foreign assets by domestic investors) are outside the model and so should be ignored in determining the weights attributed to each investor.

Following from their assumption that a domestic version of the CAPM is the appropriate frame of reference, Handley and the AER conclude that:

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[24] AER, *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters: Final Decision*, May 2009, page 467.

[25] AER, *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters: Draft Decision*, December 2008, page 305.

[26] John C Handley, *A Note on the Valuation of Imputation Credits: Report for the Australian Energy Regulator*, 12 November 2008, page 21.

- the value of imputation credits should be high since investors who hold domestic stocks are predominately Australian residents who are able to utilise distributed imputation credits fully; and
- therefore tax statistics can be used to determine the market value of imputation credits.

The AER's theoretical presumption that theta should be high causes it to overlook a number of studies that examine the market value of imputation credits. For example:

- the Ickiewicz (2007)[27] study, which considers whether the introduction of imputation credits lowered the cost of capital (ie, that gamma had a substantial positive value). This study hypothesises that, if imputation credits had value, then the introduction of the regime would have coincided with a substantial appreciation of Australian stock market prices. However, after controlling for US stock market movements, exchange rates, interest rates and commodity prices, the author finds no evidence of an unexplained change in stock prices on the introduction of imputation credits. These results suggest that the introduction of the imputation tax regime did not lead to a significant upward adjustment in Australian stock prices and so amounts to is evidence against the hypothesis that gamma has a substantial positive value;
- the Cannavan, Finn and Gray (2004)[28] study which estimates the value of theta by comparing the prices of derivative securities to the prices of shares underlying those derivatives. Cannavan et al found that, since the 1997 tax amendments that effectively prevented non-residents from 'selling' imputation credits to residents; cash dividends are fully valued and theta is close to zero. In other words, the combined value of a dollar of cash dividends and an attached imputation credit is $1.00; and
- the Lajbcygier and Wheatley (2009)[29] study of imputation credit yields and returns, which hypothesised that, if theta had a large positive value (ie, 0.65), one should observe that a zero-investment position that is long a high-credit-yield portfolio and short a low-credit-yield portfolio should deliver on average a negative return. In other words, investors should be willing to accept a lower return (ie, capital gains and dividends) for a portfolio that contains companies that pay a high level of imputation credits compared to a portfolio that does not. However, rather than observing on average a negative return Lajbcygier and Wheatley find the position delivers on average a significant positive return (ie, the capital gains and dividends on the high-credit portfolio are greater on average than on the low-credit portfolio). In light of this analysis these authors also reject the hypothesis that theta has a positive value.

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[27] Ickiewicz J., *Valuing dividend imputation credits in Australia: An alternative approach*, Honours thesis, University of Queensland Business School, 2007.

[28] Cannavan D., Finn F. and Gray S., *The value of dividend imputation tax credits in Australia*, Journal of Financial Economics 73 (2004) 167-197.

[29] NERA, *AER's Proposed WACC Statement – Gamma, A Report for the Joint Industry Associations*, January 2009, pages 24-26.

4.1.1. Retained imputation credits

A low value of theta can also be inferred from the behaviour of market participants. ATO statistics reveal that, in 2007, Australian companies held just under $150 billion of undistributed imputation credits in franking accounts. In addressing such a possibility, the AER states that:

> …NERA's suggestion implies that a stock of potentially valuable imputation credits builds up within the firm, never to be released to shareholders. In the AER's view, this suggestion is implausible, as a rational shareholder base would demand that retained credits be paid out.

If the AER's conclusion that the market value of distributed imputation credits is 0.65, this implies that Australian companies are collectively retaining around $97.5 billion in shareholder value (ie, $97.5 billion = 0.65 × $150 billion). Since undistributed imputation credits only have a value to shareholders when distributed, it follows that if the AER is correct and the value of theta is 0.65, one would expect to observe shareholders demanding that such retained imputation credits be distributed.[30]

Of course, businesses normally retain a portion of their annual profits to reinvest in the growth of their business. However, if the value foregone by firms retaining imputation credits were to outweigh the cost of raising new equity, then firms could be expected to distribute credits through special dividends and then raise an equivalent amount of equity from the market. Firms that undertake such actions would be able to distribute 43 cents of imputation credits for every dollar of distributed dividends. This is because, if the value of theta is 0.65 then, for every dollar returned, the value to shareholders would be $1.28 in dividends and imputation credits, which is a return of one dollar in dividends plus 43 cents of imputation credits (ie, 28¢ = 0.65 × 43¢).[31] So long as the cost of raising equity is less than 28 per cent then undertaking an off-market buyback and simultaneously raising equity would provide a net benefit shareholders. To distribute $150 billion in imputation credits, companies would need to issue $350 billion in dividends and raise an equivalent amount from equity markets. Since equity raising costs are generally estimated to be around three to five per cent of funds raised, shareholders would be $80 billion to $87 billion better off if all retained imputation credits were distributed.[32]

In practice, however, one does not observe large numbers of companies returning capital to shareholders whilst simultaneously raising equity. In fact, the quantity of imputation credits retained in company franking accounts continues to rise year on year. This evidence suggests that the value of theta is low.

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[30] Unlike retained earnings, retained imputation credits cannot be reinvested by a company to earn future revenues. Only when attached to dividends can shareholder receive any benefit from imputation credits.

[31] This example assumes, as the AER assumes, that investors face identical taxes on capital gains and dividends. So the payment of a dividend triggers a tax on the dividend and a matching reduction in the taxes the investor faces on capital gains. If the taxes that investors face on dividends exceed the taxes that investors face on capital gains, then the Officer (1994) version of the CAPM that the AER uses will not be true and the benefit from distributing retained credits will be lower.

[32] The cost of raising $350 billion in new equity would be between $10.5 billion and $17.5 billion (ie, 3% (or 5%) multiplied by $350 billion).

4.1.2. Foreign investors

In a recent submission to the AER, we[33] set out a theoretical framework that showed the influence of foreign investors on *WACC* parameters is not limited by the extent to which they currently invest in the Australian equities market. Rather, the potential for foreign investors to enter the Australian equities market means that this group can exert a large influence on prices in the market, even if their current holdings of Australian equities are low.

However, since the AER uses a pricing model in which foreign investors are not permitted to hold domestic assets, it deemed our analysis to be irrelevant. Notwithstanding, we continue to believe that our analysis is helpful in interpreting market evidence on the value of theta. If theta is observed to be high, that would suggest that there are significant barriers in the Australian market to international investment and the offshore wealth held by foreign investors is unable to influence the price domestic equity prices. However, if theta is observed to be low, it suggests that barriers to international investment in Australian equities are low and the ability of foreign investors to shift their wealth between domestic and offshore assets has a substantial influence on the price of domestic equities. Of these two scenarios, it is more likely that the market value of theta will be low because evidence indicates that Australian equity markets are to a large extent integrated with world equity markets.

The assumption that domestic and foreign investors face constraints in moving funds into and out of the Australian equities market is not consistent with market observations. The substantial number of Australian shares owned by non-residents suggests that the Australian equities market is integrated with world markets. The Australian Bureau of Statistics (ABS) estimates that the total value of equity on issue by Australian enterprise groups as of 30 June 2007 was AUD 2,195 billion, of which non-resident holdings were AUD 632 billion.[34] In other words, using ABS data, non-residents held 29 per cent of the total value of equity on issue by Australian enterprise groups as of 30 June 2007. Of course, it is no surprise that foreign investors hold such a large share of the Australian equity market. Over the last 30 years Australia has run a current account deficit every quarter, and so has been borrowing throughout this period from the rest of the world. It would therefore be expected that part of the substantial amounts that Australia has borrowed during this period would be in the form of equity, and the evidence confirms this to be true.

Handley (2004) relies to a large extent on imputation utilisation rates derived from tax statistics to determine the market value of imputation credits. The problem with this approach is outlined in the next section.

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[33] NERA, *AER's Proposed WACC Statement – Gamma, A Report for the Joint Industry Associations*, January 2009, pages 12-15.

[34] ABS, *Yearbook Australia 2008*, page 724 and Table 31.15 page 725.

4.2. Use of Tax Statistics

In its Final Decision, the AER determined that an upper bound for theta was 0.74. This figure was derived using an estimate of the rate at which imputation credits are redeemed. The redemption rate of imputation credits was in turn inferred by Handley and Maheswaran (2008) from statistics published by the ATO.[35]

Handley explains that the measure that he constructs with Maheswaran is:[36]

> … a simple average of utilisation rates across investors rather than a (complex) weighted average [but] assuming the set of investors is indicative of the set of investors in the domestic market portfolio, this estimate may be interpreted as a reasonable upper bound on the value of gamma [**and theta**].

In our opinion, there are at least two problems with using data on the rate at which imputation credits are redeemed to estimate the *market* value of distributed imputation credits, ie:

- the value the market places on imputation credits is not a holdings-weighted average of the values that investors place on credits, but rather is more likely to be a wealth-weighted average; and
- investors incur costs in accruing imputation credits and these affect their value to investors, but redemption rates do not reflect these costs.

We discuss these problems in more detail below.

4.2.1. Allocation of imputation credits

The rate at which imputation credits are 'redeemed' is the proportion of the distributed imputation credits used by investors in their tax returns. Redemption rates therefore represent a holdings-weighted average of the rates at which investors redeem and so value credits. However, Handley acknowledges that the equilibrium value of gamma will depend on all investors in the market – with the weights based on individual wealth.[37]

Handley interprets redemption rates as a "simple average" of all investors in the domestic market.[38] Notwithstanding our differences on the definition of the market, even on Handley's domestic market definition the wealth that resident and non-resident shareholders have in the domestic equities market may be very different than the rate at which credits are redeemed.

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[35] John C Handley, A Note on the Valuation of Imputation Credits: Report for the Australian Energy Regulator, 12 November 2008.

[36] John C Handley, A Note on the Valuation of Imputation Credits: Report for the Australian Energy Regulator, 12 November 2008, page 8.

[37] John C Handley, A Note on the Valuation of Imputation Credits: Report for the Australian Energy Regulator, 12 November 2008, page 7.

[38] Handley argued that the domestic market by definition should only consider the wealth that investors' currently hold in the domestic equities market. On the other hand we argued that the domestic market should include the wealth that investors could potentially invest in the domestic market and would therefore include offshore wealth held by residents and non residents alike. The logic for this conclusion arises from the intuitive preposition that investors who do not currently hold a set of shares, nevertheless have the potential to purchase the shares, and so can have a substantial effect on the price of shares.

For example, consider two investors: one invests $10,000 in Commonwealth bank shares (CBA), and the other invests $10,000 in BHP Billiton (BHP) shares on 1 January 2008. In 2008 the CBA investor would have received $193.88 in imputation credits.[39] On the other hand, in 2008 the BHP investor would have received $82.26 in imputation credits.[40] Handley's redemption measurement would place a greater weight on the value the CBA investor places on credits since they received $193.88 in imputation credits than on the value the BHP investor places on credits since they received $82.26 in imputation credits, even though both invested $10,000. In this example, if the CBA investor was a domestic investor and the BHP investor was a non-resident investor, redemption rates would estimate a theta value of 0.70 - ie, 0.70 = $193.88 ÷ ($193.88 + $82.26). However, a domestic wealth weighted value for theta, which Handley argues is appropriate, would lead to a 0.5 value for theta – ie, 0.50 = $10,000 ÷ ($10,000 + $10,000). Moreover, redemption rates would place no weight on the wealth of a third investor, who invests in Fortescue Metals (FMG), since FMG failed to pay a dividend in 2008.

Neither Handley nor the AER provide any evidence that the proportion of imputation credits received by resident shareholders actually reflects the proportion of Australian equities these same investors hold. It is reasonable to expect that resident shareholders that benefit from imputation credits will tilt their portfolios towards shares providing a high imputation credit yield. This would result in resident shareholders receiving a greater proportion of distributed imputation credits than implied by their share of domestic equities. It follows that even if one ignores the impact that investors who do not currently hold Australian assets have on prices, the use of redemption rates will lead to an upward bias in the value of theta.

Nevertheless, in our opinion, a greater source of bias is likely to arise from ignoring the effect that investors who do not currently hold Australian equities have on prices. There is little evidence to suggest that investors are unable to shift wealth held offshore into Australian equities. However, the use of redemption rates ignores the effect that offshore investors who are in a position to alter their asset allocation have on the market value of distributed imputation credits. If a wealth-weighted average of investors' ability to use imputation credits were constructed the resulting estimate of theta would be much lower than that estimated from redemption rates because the aggregate offshore wealth held of foreign investors is substantially greater than that of domestic investors.

4.2.2. Costs of accruing imputation credits

The AER was apparently persuaded by Handley that the costs associated with accessing imputation credits are not relevant if one assumes that a domestic version of the CAPM is true, ie:[41]

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[39] On 2 January 2008, investor A would be able to purchase 170.1 shares in CBA at a price of $58.80 per share. Over 2008, CBA distributed 266 cents of 100% franked dividends. Therefore, investor A would have received $193.88 in imputation credits in 2008.

[40] On 2 January 2008, investor B would be able to purchase 249.4 shares in BHP at a price of $40.10 per share. Over 2008 BHP distributed 78.84 cents of 100% franked dividends. Therefore, investor B would have received $84.26 in imputation credits in 2008.

[41] John C Handley, A Note on the Valuation of Imputation Credits: Report for the Australian Energy Regulator, 12 November 2008, page 21.

> Non-market assets, including assets held by any of the investors in other markets are outside the model and therefore play no role in the pricing of domestic assets.

The cost that domestic investors incur from holding a portfolio heavily weighted with high-credit-yield domestic equities is that they must bear more risk than would otherwise be the case if they were to diversify internationally. A portfolio that is heavily weighted with high-credit-yield domestic equities may have a higher return for a domestic investor who is able to use the imputation tax credits, but such a portfolio will be riskier than one that is internationally diversified.

While the adoption of a model that assumes that the Australian equity market is segmented from international equity markets may provide no formal role for the foreign assets that domestic and foreign investors hold, in practice the existence of non-residents and foreign assets will affect the value of imputation tax credits observed from actual market data. This is because there is ample evidence that the Australian equity market is not segmented from international equity markets.

Although Handley is correct in saying that there is evidence that the explicit barriers to international investment that some countries (typically emerging markets) have erected have segmented their equity markets from international equity markets (see Bonser-Neal, Brauer, Neal and Wheatley (1990)), it is difficult to see any explicit barriers that would segment the Australian equity market from the major international equity markets.[42] Rather, the only material 'barrier' seems to be the discriminatory policy of precluding foreign investors from redeeming franking credits, the pricing effects of which is the focus of this report.

4.2.3. Conclusion

Handley's note on the value of imputation credits asserts that estimates of imputation credit redemption rates may be interpreted as a reasonable upper bound on the value of theta.

In our opinion, the use of redemption rates will overestimate the value of theta because:

- the value the market places on imputation credits is not a holdings-weighted average of the values that investors' place on credits, but rather is more likely to be a wealth-weighted average; and
- redemption rates ignore the cost to investors of accessing imputation credits.

For these reasons, the value the market places on a distributed imputation credit cannot be inferred directly from the fraction of the credits that are redeemed. In our opinion, the most appropriate method for estimating the value of imputation credits is through dividend drop-off studies, the results of which are discussed in the following section.

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[42] Bonser-Neal, Catherine, Gregory Brauer, Robert Neal and Simon Wheatley, International investment restrictions and closed-end country fund prices, Journal of Finance, 1990.

4.3. Dividend Drop-Off Studies

Dividend drop-off studies analyse the movement in stock prices on the ex-dividend date.[43] Such studies can be used to estimate the market value of distributed imputation credits in one of two ways:

- the value of theta is estimated by considering the net movement in prices – where the net movement is the sum of the cash dividend and change in price; and
- the value of theta and the value the market places on dividends are jointly estimated by considering the gross movement in prices – this explicitly allows the market to value cash dividends at less than 100 per cent of their face value.

Each of these approaches is discussed below.

4.3.1. Theta when cash dividends are valued at 100% of their face value

In these types of studies the value of theta is estimated from the net movement in stock prices which attributes a portion of the movement in prices not explained by the cash dividend to the market value of distributed imputation credits. Implicit in this analysis is that the value of cash dividends to all investors is equal to their face value, ie, one dollar of cash dividends is worth one dollar to investors.

Imposing this restriction is intuitively attractive as it ensures the consistent treatment of dividends:

- when estimating the value of theta;
- within the CAPM; and
- in the revenue models use to calculate allowable revenues.

Within the CAPM, the market risk premium is estimated by reference to the accumulation index for the market. Accumulation indices add dividends to the movement in stock prices thereby deriving the return that an investor would receive if it had invested in the market and reinvested all cash dividends. Accumulation indices and the market risk premium calculated from those indices value dividends at 100 per cent of their face value.

Further, revenue models do not explicitly evaluate dividend payments when calculating the allowable revenues. The reason for not distinguishing the payment of dividends is that revenue models implicitly assume that any dividend paid by a company will be fully valued by equity owners. If dividends are valued at less than their face value, revenue models will need to gross up the required return on equity to take account of the lower value of distributed dividends.

The inconsistency in the treatment of dividends was highlighted by Professor Stephen Gray, who proposed that:[44]

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[43] Again, the ex-dividend day is the first day on which purchase of a share does not entitle the buyer to the dividend the issuer of the share has declared.

> …the inconsistency should be reconciled by:
>
> a. Continuing to use the CAPM to estimate the required return on equity conditional on cash dividends being valued at 100 cents per dollar; and
>
> b. Estimating theta also conditional on cash dividends being valued at 100 cents per dollar – rather than adopting a different estimate of the value of cash dividends when estimating theta.

If the dividend drop-off analysis is calibrated so that cash dividends are valued at 100 per cent of their face value, the resulting value becomes close to zero. For example, SFG found that:[45]

> The combined value of a $1.00 dividend and the attached franking credit is approximately $1.00 (average 97 cents), corroborating this part of the result in Hathaway and Officer and Beggs and Skeels.

Table 1 of Handley's report (reproduced below) summarised the empirical evidence on the value of theta. Handley concludes that:[46]

> the empirical evidence indicates that the drop off associated with the payment of a $1 fully franked dividend is approximately $1.00.

Since the combined value of a $1.00 dividend and the attached franking credits is approximately $1.00, it follows that the implied value of theta is zero if dividends are valued at 100 per cent of their face value.

Table 4.1: Average Estimated Drop-offs from Empirical Studies

	Drop-off Associated with a $1 Cash Dividend	Drop-off Associated with a $1 Fully Franked Dividend
Hathaway and Officer (2004)		
1986 - 2004	0.79	1.08
Beggs and Skeels (2006)		
1986 - 2004 (excluding 2000)	0.72	1.03
1998 - 1999	0.80	1.03
2001 - 2004	0.80	1.05
SFG Consulting (2008)		
1998 - 1999	0.81	0.86
2001 - 2006	0.89	1.03
1998 - 2006 (excluding 2000)	0.85	0.97
Source: Hathaway and Officer (2004) – based on results reported in Table 3 for big and mid cap stocks across three estimation methods. Beggs and Skeels (2006) – based on results reported in Table 5. SFG Consulting (2008) – based on (shaded) results reported in Tables 3 – 8.		

Source: Handley, J., *A Note on the Valuation of Imputation Credits*, 12 November 2008, Table 1, page 12.

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[44] SFG, *The Consistency of Estimates of the Value of Cash Dividends – A report prepared for ENA, APIA and Grid Australia*, 1 February 2009, page 16.

[45] SFG, *The Impact of Franking Credits on the Cost of Capital of Australian Firms – A report prepared for ENA, APIA and Grid Australia*, 16 September 2008, page 28.

[46] Handley, J., *A Note on the Valuation of Imputation Credits*, 12 November 2008, page 12.

The AER acknowledges the inconsistency in the treatment of dividends between the CAPM and the way in which theta is estimated, but has taken the view that no steps should be taken to resolve this inconsistency:[47]

> On the second issue the AER acknowledged that the empirical result from dividend drop-off studies that cash dividends are less than fully valued may suggest that the standard CAPM cannot fully explain the reality of differential taxation. However the AER considered there was no convincing evidence presented that the standard CAPM should be replaced to account for differential taxation.
>
> On this basis the AER considered that it would not impose a theoretical adjustment to the empirical results from dividend drop-off studies for CAPM consistency reasons, nor should the standard (Sharpe) CAPM be replaced.

In our opinion, allowing this inconsistency to remain represents an uncomfortable loose end, and the solution proposed by Professor Gray to estimate theta under the restriction that dividends are fully valued is appropriate.

4.3.2. Jointly estimating the value of dividends and theta

Under the Australian imputation system, dividends from companies can be either:

- unfranked – only a cash dividend is distributed and no imputation credits are attached; or
- partially franked – a portion of the dividends are franked and the remaining portion is solely a cash dividend; or
- fully franked – all dividends have franking credits attached so that, for every 70 cents of cash dividend, 30 cents of imputation credits are distributed.

Dividend drop-off studies can be calibrated so as to use the different franking rates to produce estimates of both the value of dividends and imputation credits. This approach allows dividends to be valued at less than 100 per cent of their face value.

SFG Consulting submitted a report on behalf of the Victorian gas distribution businesses[48] that updated the studies undertaken by Hathaway and Officer, and Beggs and Skeels to include dividend events over the 1998 to 2006 period. In addition, SFG Consulting also updated a report by the Allen Consulting Group (ACG) that was developed in the context of the South Australian Gas Access Arrangement review.

The results of the SFG Consulting study which incorporated a more recent data are set out below.

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[47] AER, *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters: Final Decision*, May 2009, pages 456-457.

[48] The Victorian gas distribution businesses are Envestra, Multinet and SP AusNet.

Table 4.2: Updated Dividend Drop-off Studies (2001-2006)

	Hathaway & Officer	Beggs & Skeels	ACG
Gross drop off	1.17	1.04	0.91
Cash dividend	0.98	0.88	0.82
Franking credit	0.41	0.33	0.20

Source: SFG, *The Impact of Franking Credits on the Cost of Capital of Australian Firms – A report prepared for ENA, APIA and Grid Australia*, 16 September 2008

Notwithstanding the availability of the range of studies indicated above, the AER reviewed only two drop-off studies, the results of which are reproduced below.[49]

Table 4.3: SFG – comparison of results from Beggs and Skeels (2006) with SFG (2008) over the post July 2008 period

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

Source: SFG, Table 1 (extract), pg8. Notes: (a) Cash: Regression coefficient for the cash dividend drop off; (b) FC: Regression coefficient for the franking credit drop off; and (c) N: Number of observations in the sample. Numbers in parentheses are standard errors.

However, the AER placed limited weight on the estimates produced by the SFG study because:[50]

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

On the other hand, the AER relies exclusively on the Beggs and Skeels estimates when it considers dividend drop-off studies, even though:

> The AER acknowledges that it is not possible to conclusively identify whether the Beggs and Skeels study is subject to the same or similar data issues as those identified in the SFG study. However given that the study is published in an academic journal and has been subject to the

[49] AER, *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters: Final Decision*, May 2009, page 432.

[50] AER, *Electricity transmission and distribution network service providers – Review of the weighted average cost of capital (WACC) parameters: Final Decision*, May 2009, pages 440-441.

> scrutiny of an academic refereeing process, the AER considers it reasonable to assume that these issues are likely to have been addressed or to be less prevalent.

We note that differences in the estimates calculated by SFG and Beggs and Skeels are not material. Over the 1 July 2000 to 10 May 2004 period, both estimates of theta are within are standard deviation of each other. Therefore, the data issues identified by the AER are either common to both studies or do not materially change the results of the study. It follows that both studies should be considered when estimating the value of theta. However, in our opinion, greater weight should be placed on the SFG study in light of the substantially longer period that is used, ie, the SFG study covers a period of 339 weeks while the Beggs and Skeels study covers 201 weeks.

It follows that, if one allows dividends to be valued at less than their face value, the estimated value of theta falls to between 0.37 (SFG) and 0.57 (Beggs and Skeels). In our opinion, greater weight should be placed on the lower estimate by SFG since it is based on more data.

4.4. Summary

The AER concludes that the market value of distributed imputation credits (theta) lies between 0.57 and 0.74. However, in reaching that conclusion the AER makes a number of material errors, including:

- the AER overlooks a number of studies that indicate that the market value of theta is low;
- the AER relies on tax statistics that overstate the value of theta; and
- the AER relies on a single dividend drop-off study when other studies are available.

We demonstrate that a low value of theta is consistent with a theoretical framework that recognises the effect that foreign investors have on domestic asset prices – including foreign investors that do not currently hold domestic equities. In our opinion, Australia is an open economy and so one should not dismiss empirical studies that indicate that the value of theta is low.

Furthermore, as a matter of principle studies that focus on movement in market prices are the only reliable methods for estimating the value that investors' place on distributed imputation credits. Dividend drop-off studies represent the most robust use of market data for estimating the value of theta. When these studies are calibrated to ensure that dividends are consistently treated, empirical studies uniformly estimate that the value of theta is zero. However, if one allows dividends to be valued at less than their face value, the estimated value of theta falls to between 0.37 (SFG) and 0.57 (Beggs and Skeels). In our opinion, the value of theta is likely to be closer to that estimated by SFG as its study considers a substantially greater, and more recent, sample of market data.

5. Conclusion

A company that pays Australian company income tax can distribute imputation credits to its shareholders who, in turn, can use the credits to reduce their personal Australian tax liabilities. Gamma is the product of the fraction of credits distributed (F) and the market value of those distributed credits (θ).

The AER's reasonable range for gamma of between 0.57 and 0.74 is not supported by a reasonable interpretation of the evidence. The AER derives a reasonable range for gamma by:

- assuming that the payout ratio is 1.0 – although the evidence indicates that the ratio is lower;
- using tax statistics to provide an upper bound on theta of 0.74 – although tax statistics are unlikely to provide a reliable guide to the value of theta; and
- using a single study to provide a lower bound on theta of 0.57 – although other studies point to a lower value for theta.

Once these errors are addressed, the value of gamma falls below 0.5. Our review of the evidence indicates that the distribution rate is around 70 per cent and the market value of theta ranges between zero and 0.57. Therefore, a reasonable range for gamma is between zero and 0.4.

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