



# **Estimating Distribution and Redemption Rates: Response to the AER's Final Decisions for the NSW and ACT Electricity Distributors, and for Jemena Gas Networks**

A report for ActewAGL Distribution, AGN, APA, AusNet Services, CitiPower, Ergon Energy, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy

June 2015

## **Project Team**

Simon Wheatley

NERA Economic Consulting  
Darling Park Tower 3  
201 Sussex Street  
Sydney NSW 2000  
Australia  
Tel: 61 2 8864 6500 Fax: 61 2 8864 6549  
[www.nera.com](http://www.nera.com)

# **CONFIDENTIALITY**

We understand that the maintenance of confidentiality with respect to our clients' plans and data is critical to their interests. NERA Economic Consulting rigorously applies internal confidentiality practices to protect the confidentiality of all client information.

Similarly, our approaches and insights are proprietary and so we look to our clients to protect our interests in our proposals, presentations, methodologies and analytical techniques. Under no circumstances should this material be shared with any third party without the prior written consent of NERA Economic Consulting.

© NERA Economic Consulting

## **Contents**

<b>Executive Summary</b>	<b>i</b>
<b>1. Introduction</b>	<b>1</b>
<b>2. The Redemption Rate and Theta</b>	<b>3</b>
2.1. Examples	4
2.2. Solnik (1974)	8
2.3. Summary	11
<b>3. The Distribution Rate and Theta</b>	<b>12</b>
<b>4. The Distribution Rate for a Benchmark Efficient Entity</b>	<b>14</b>
4.1. Analysis	14
4.2. Estimates	15
<b>Appendix A. The Redemption Rate and Theta</b>	<b>19</b>
<b>Appendix B. Terms of Reference</b>	<b>23</b>
<b>Appendix C. Federal Court Guidelines</b>	<b>28</b>
<b>Appendix D. Curriculum Vitae</b>	<b>31</b>

## List of Tables

<b>Table 4.1 Distribution rate by type of company</b>
---

<b>17</b>
-----------

## List of Figures

<b>Figure 4.1 Selection of comparator businesses</b>	<b>16</b>
--	-----------

## Executive Summary

This report has been prepared for ActewAGL Distribution, AGN, APA, AusNet Services, CitiPower, Ergon Energy, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy (the networks) by NERA Economic Consulting (NERA). The networks have asked NERA to respond to issues raised about the rates at which imputation credits are distributed and redeemed by the AER in its recently published *Final decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20* and by Associate Professor John Handley.<sup>1</sup>

In particular, the networks have asked NERA to:

- explain how the redemption rate and the value of a one-dollar credit distributed to a representative investor ( $\theta$ ) are related;
- explain whether a link should exist between how one should estimate the distribution rate and how one estimates  $\theta$ ; and
- assess what the empirical evidence indicates the distribution rate for a benchmark efficient entity will be.

## The Redemption Rate and $\theta$

Imputation credits are of some use to domestic investors but are of little or no use to foreign investors. So the value that the market places on imputation credits distributed will largely depend on the impact that foreign investors have on equity prices.

If equity markets are largely integrated, then foreign investors will have a significant impact on the value that the market places on imputation credits distributed whereas if equity markets are completely segmented, then foreign investors will have no impact on the value that the market places on imputation credits. If equity markets are integrated, foreign investors will have a significant impact because the aggregate wealth of foreign investors far exceeds the aggregate wealth of Australian investors.

Whether equity markets are integrated or segmented is an empirical issue. So, while one may make an assumption about whether equity markets are integrated or segmented, making the assumption will not turn equity markets that are integrated into markets that are segmented or turn equity markets that are segmented into markets that are integrated.

Casual observation suggests that Australian equity markets – aside from an inability of foreign investors to redeem imputation credits – are largely integrated. This implies that foreign investors will play an important role in determining the impact of imputation credits on the cost of equity for domestic firms. Since foreign investors are largely unable to redeem

---

<sup>1</sup> AER, *Final Decision, Jemena Gas Networks (NSW) Ltd Access Arrangement 2015-20 Attachment 4 – Value of imputation credits*, June 2015.

Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015.

any imputation credits that they receive, this in turn implies that the distribution of imputation credits will be unlikely to have much impact on the cost of equity.

Even though Australian equity markets may be largely integrated, since imputation credits are of value to domestic investors, domestic investors will rationally harvest credits up to the point where the costs of harvesting credits match the benefits of doing so. The harvesting of credits by domestic investors will require that they place a larger fraction of their wealth in domestic equities than they would in the absence of an imputation system. Put another way, the harvesting of credits by domestic investors will necessarily require that foreign investors place a smaller fraction of their wealth in domestic equities than they would in the absence of an imputation system. The additional risk that domestic investors will bear by placing a larger fraction of their wealth in domestic equities is one of the costs that they will face in harvesting imputation credits.

This analysis suggests that one can expect the rate at which credits are redeemed to exceed, significantly, the impact of credits on the cost of equity,  $\theta$ . In our March 2015 and April 2015 reports, we illustrate how this can occur using a simple version of the single-period model that Officer (1994) suggests that one might use to compute an estimate of the cost of equity.<sup>2</sup> In his May 2015 report, Handley is critical of our illustration and provides two counterexamples to show that the redemption rate and  $\theta$  can sit close to one another.<sup>3</sup>

We note that in the first example, the redemption rate is just 2.5 per cent while our March 2015 estimate of the redemption rate, based on data from the Australian Taxation Office (ATO), is 45 per cent. In the second example, Handley assumes that Australian aggregate wealth is 60 per cent of world aggregate wealth. We conclude that neither example is of any practical relevance.

In a separate analysis, we also show that the use of a domestic pricing model by the AER does not justify a presumption that the impact of foreign investors is restricted and that  $\theta$ , consequently, take on a non-negligible value – contrary to claims that Handley makes in a September 2014 report.<sup>4</sup> In a world in which markets are integrated – and, again, the evidence indicates that they are largely integrated – it is possible for  $\theta$  to reflect the impact of foreign investors while prices are otherwise set as though markets were completely segmented.

---

<sup>2</sup> NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.

Officer, Robert R., *The cost of capital of a company under an imputation tax system*, Accounting and Finance, 1994, pages 1-17.

<sup>3</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015.

<sup>4</sup> Handley, J., *Advice on the value of imputation credits*, September 2014.



## The Distribution Rate for a Benchmark Efficient Entity

Handley (2015) states that:<sup>5</sup>

‘it is correct to say that theta is not firm-specific and the distribution rate is firm specific.’

We agree with this statement.

There will only be a single value for theta – the value that a representative investor places on a dollar of tax credits distributed. The value that the representative investor places on a dollar of tax credits distributed by one firm will not differ from the value that the investor places on a dollar of tax credits distributed by another firm. Thus theta is not a firm specific parameter.

The distribution rate, on the other hand, is a firm specific parameter.<sup>6</sup> One firm, after weighing up the costs and benefits of distributing credits, may decide to distribute all of the credits that have been created over some period. A second firm may rationally decide to distribute no credits – perhaps because it wishes to use internally generated funds to finance new projects.

As theta should not vary from firm to firm, however, there need be no link between how one estimates theta and how one estimates the distribution rate.

Handley (2015), however, states that:<sup>7</sup>

‘I do not agree with the suggestion that there need be no link between how one estimates theta and how one estimates the distribution rate. We are interested in estimating the value of imputation credits to the market as a whole. In setting prices, investors in the market will take into account the quantity of credits expected to be distributed by all firms in the market. Since gamma is effectively defined as a price (theta) times a quantity (distribution rate) then in my opinion, it is obvious that both components should be based on consistent data sets which relate to the same market.’

This statement would only make sense if there were an error in Handley’s earlier statement that:<sup>8</sup>

‘it is correct to say that theta is not firm-specific and the distribution rate is firm specific.’

In other words, the statement that both components should be based on consistent data would only make sense if both theta and the distribution rate were to be firm specific. Theta would

---

<sup>5</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 7.

<sup>6</sup> The distribution rate is also known as the payout ratio.

<sup>7</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, pages 7-8.

<sup>8</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 7.

be firm specific if the value placed by a representative investor on a dollar of tax credits distributed by one firm were to differ from the value placed by the investor on a dollar of tax credits distributed by another firm.

Again, we, like Handley, believe that  $\theta$  is not a firm-specific variable. Thus we believe that there need be no link between how one estimates  $\theta$  and how one estimates the distribution rate. In other words, we believe that Handley is mistaken in his belief that there should be a link.

## The Distribution Rate and $\theta$

Handley states in his May 2015 report that:<sup>9</sup>

‘I have previously argued that estimating the distribution rate using tax data for public companies is more sensible than estimating the distribution rate using tax data for public and private companies, because public companies and private companies are financed in entirely different ways and it is the former rather than the latter which is more likely to be representative of the Australian domestic market for (public) equity funds.

In fact, this view also follows directly from (sic) requirement that the regulator set prices in accordance with the allowed rate of return objective. Of particular importance is the additional requirement that, in estimating the return on equity, regard must be had to the prevailing conditions in the market for equity funds. In other words, the task is not to estimate  $\gamma$  for the whole of the Australian economy but rather for a subset thereof – the Australian domestic market for (public) equity funds.’

In contrast, the AER, in its 2009 *WACC Review Final Decision*, provides an analysis of what characteristics a benchmark efficient entity will display and states that:<sup>10</sup>

‘The AER has reviewed the Competitive Neutrality Principles Agreement and notes that this Agreement does not explicitly state that a private sector organisation is a stock market listed business. Nor does the Agreement define the nature of private ownership.’

‘the AER does not agree that a benchmark efficient NSP be defined as a large, stock market listed NSP and is a settled concept.’

Handley’s argument is that while there is a physical market (exchange) for publicly listed equities, there is no physical market (exchange) for private equity and so Rule 6.5.2 and Rule 6A 6.2 of the National Electricity Rules and Rule 87 of the National Gas Rules cannot refer to the returns required on private equity. The relevant sections of Rule 6.5.2 of the National Electricity Rules state that:

---

<sup>9</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 8.

<sup>10</sup> AER, *Final decision Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, May 2009, pages 80 and 105.

## Rule 6.5.2

- (c) The *allowed rate of return objective* is that the rate of return for a *Distribution Network Service Provider* is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the *Distribution Network Service Provider* in respect of the provision of *standard control services* (the *allowed rate of return objective*).
- (f) The return on equity for a *regulatory control period* must be estimated such that it contributes to the achievement of the *allowed rate of return objective*.
- (g) In estimating the return on equity under paragraph (f), regard must be had to the prevailing conditions in the market for equity funds.

We do not believe that the expression ‘the market for equity funds’ in Rule 6.5.2 (g) requires that the market be a physical market. Moreover, a search of the National Electricity Rules and National Gas Rules for the keyword ‘private’ reveals no rule that excludes private equity.

As the AER makes clear in its 2009 *WACC Review*, it may be that the regulator is forced to rely on data for publicly listed equity to estimate some of the parameters that it uses to estimate the cost of equity, but this does not mean that the AER believes that a benchmark efficient entity is necessarily a listed company.<sup>11</sup>

Since the AER is clear that a benchmark efficient entity need not be a large stock-market-listed firm, in our March 2015 report, we construct estimates of the distribution rate for private companies and for public companies that are not top-20 ASX-listed companies and we use data, drawn from company reports, on top-20 ASX-listed companies that Lally (2014) provides.<sup>12</sup> Recall that an estimate of the distribution rate over a number of years can be computed by subtracting from one the ratio of the change in the franking balance over the period to net tax over the period. We construct an estimate of the distribution rate for a public company that is not a top-20 ASX-listed company using the data that Lally provides and an estimate of the rate for a public company that we compute using data from 2000-01 to 2011-12, approximately the same period that Lally examines. Using tax statistics, we estimate the distribution rate for a public company over this period to be 0.755. We estimate the distribution rate for public companies that are not top-20 ASX-listed companies to be 0.701. Finally, again using tax statistics, we estimate the distribution rate for private companies to be 0.505. Table 1 below illustrates how we compute these statistics.

We conclude in our March 2015 report that it follows that if significant weight is to be placed on estimates of the distribution rate for companies that are not large ASX-listed companies, an

---

<sup>11</sup> AER, *Final decision Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, May 2009, pages 101-110.

<sup>12</sup> Lally, M., *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, Victoria University, Wellington, March 2014.

NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

estimate of the rate for a benchmark efficient entity will not sit far from 0.70 – the estimate of the distribution rate for the market as a whole that the AER has in the past adopted.<sup>13</sup>

**Table 1**  
**Distribution rate by type of company**

Firm type	Tax years	Net tax	Change in franking account balance	Distribution rate
Top-20 ASX-listed	2000-01 to 2012-13	146,279	23,345	0.840
Public but not top-20 ASX-listed	2000-01 to 2011-12	212,278	63,549	0.701
Public	2000-01 to 2011-12	347,304	85,099	0.755
Private	2000-01 to 2011-12	204,812	101,441	0.505
All	2000-01 to 2011-12	566,887	183,846	0.676

*Notes: Data for top-20 ASX-listed companies are from Lally (2014). Net tax and franking account balances are in billions of dollars. The change in the franking account balance is the difference between the end-of-period and start-of-period franking account balances. Data for public and private companies are: for net tax, from Company Table 2E (2000-01 to 2009-10), Table 3E (2010-11) and Table 3 (2011-12); for franking account balances, from Company Table 2E (1999-2000) and Table 3 (2011-12) of the ATO's Taxation Statistics. Data for all companies together are from the ATO's Taxation Statistics 2010-11, Company Tax: Table 1 and Taxation Statistics 2011-12, Company Tax: Table 1. An estimate of net tax for public but not top-20 ASX-listed companies from 2000-01 to 2011-12 is computed by subtracting 12/13 of net tax for top-20 ASX-listed companies from 2000-01 to 2012-13 (a 13-year period) from net tax for public companies from 2000-01 to 2011-12 (a 12-year period). An estimate of the change in the franking account balance for public but not top-20 ASX-listed companies is computed in a similar way.*

*Lally, M., Review of submissions to the QCA on the MRP, risk-free rate and gamma, Victoria University, Wellington, March 2014.*

In his May 2015 report, Handley provides estimates of the distribution rate for public companies and for private companies for the period 2003-04 to 2011-12 of 0.773 and 0.553.<sup>14</sup>

<sup>13</sup> Suppose, for example, that there is a probability of 20 per cent that the benchmark efficient entity is privately owned, a probability of 60 per cent that the benchmark is a public company that is not a top-20 ASX-listed company and a probability of 20 per cent that the benchmark is a top-20 ASX-listed company. Then an estimate of the distribution rate for the benchmark using our estimates and the estimate that Lally (2014) provides would be  $0.20 \times 0.505 + 0.60 \times 0.701 + 0.20 \times 0.840 = 0.690$ .

Lally, M., *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, Victoria University, Wellington, March 2014.

NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

<sup>14</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 11.

Lally does not report a distribution rate for the top-20 ASX-listed companies for the period 2003-04 to 2011-12 and neither we nor Handley have attempted to reproduce Lally's data. So it is difficult to say what the small changes in the distribution rates of public and private companies that Handley reports for the period 2003-04 to 2011-12, relative to those that we compute for the period 2000-01 to 2011-12, will imply about the distribution rate for ASX-listed companies that are not in the top 20 by market capitalisation. If the distribution rate for all public companies rose from 0.755, from 2000-01 to 2011-12, to 0.773, from 2003-04 to 2011-12, then it is reasonable to predict that the distribution rate for a public company that is not a top-20 ASX-listed company will have risen from 0.701 to  $0.701 + 0.773 - 0.755 = 0.719$ .

Thus there is little in Handley's May 2015 report to alter the view we that expressed in our March 2015 report.<sup>15</sup> We believe that the AER's 2009 statement that a benchmark network service provider need be neither large and publicly listed nor publicly listed is correct. Thus we believe that Handley is wrong to advocate the use of a distribution rate that places a large weight on large publicly listed firms and no weight on private firms. It is difficult to see that there is a case for setting the distribution rate to be any different than the value accepted by the Australian Competition Tribunal in its 2010 decision and the *market-wide* value chosen in the AER's *Rate of Return Guideline* of 0.70.<sup>16</sup> This value is based on a cumulative distribution rate computed using tax statistics aggregated across all companies – both private and public.

---

<sup>15</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015.

NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

<sup>16</sup> ACT, *Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompt9*.

AER, *Explanatory Statement Rate of Return Guideline (Appendices)*, December 2013, pages 136-180.

## 1. Introduction

This report has been prepared for ActewAGL Distribution, AGN, APA, AusNet Services, CitiPower, Ergon Energy, Jemena Electricity Networks, Powercor, SA Power Networks and United Energy (the networks) by NERA Economic Consulting (NERA). The networks have asked NERA to respond to issues raised about the rates at which imputation credits are distributed and redeemed by the AER in its recently published *Final decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015-20* and by Associate Professor John Handley.<sup>17</sup>

In particular, the networks have asked NERA to:

- explain how the redemption rate and the value of a one-dollar credit distributed to a representative investor ( $\theta$ ) are related;
- explain whether a link should exist between how one should estimate the distribution rate and how one estimates  $\theta$ ; and
- assess what the empirical evidence indicates the distribution rate for a benchmark efficient entity will be.

The remainder of this report is structured as follows:

- section 2 explains how the redemption rate and the value of a one-dollar credit distributed to a representative investor ( $\theta$ ) are related;
- section 3 explains whether a link should exist between how one should estimate the distribution rate and how one estimates  $\theta$ ; and
- section 4 assesses what the empirical evidence indicates the distribution rate for a benchmark efficient entity will be.

In addition:

- Appendix A uses a simple theoretical model to examine the relation between the redemption rate and  $\theta$ ;
- Appendix B provides the terms of reference for this report;
- Appendix C provides a copy of the Federal Court of Australia's *Guidelines for Expert Witnesses in Proceeding in the Federal Court of Australia*; and
- Appendix D provides the curriculum vitae of the author of the report.

---

<sup>17</sup> AER, *Final Decision, Jemena Gas Networks (NSW) Ltd Access Arrangement 2015-20 Attachment 4 – Value of imputation credits*, June 2015.

Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015.

## Statement of Credentials

This report has been prepared by **Simon Wheatley**.

**Simon Wheatley** is an Affiliated Industry Expert with NERA, and was until 2008 a Professor of Finance at the University of Melbourne. Since 2008, Simon has applied his finance expertise in investment management and consulting outside the university sector. Simon's interests and expertise are in individual portfolio choice theory, testing asset-pricing models and determining the extent to which returns are predictable. Prior to joining the University of Melbourne, Simon taught finance at the Universities of British Columbia, Chicago, New South Wales, Rochester and Washington.

In preparing this report, the author (herein after referred to as 'I' or 'my' or 'me') confirms that I have made all the inquiries that I believe are desirable and appropriate and that no matters of significance that I regard as relevant have, to my knowledge, been withheld from this report. I acknowledge that I have read, understood and complied with the Federal Court of Australia's *Practice Note CM 7, Expert Witnesses in Proceedings in the Federal Court of Australia*. I have been provided with a copy of the Federal Court of Australia's *Practice Note CM 7, Expert Witnesses in Proceedings in the Federal Court of Australia*, dated 4 June 2013, and my report has been prepared in accordance with those guidelines.

I have undertaken consultancy assignments for the networks in the past. However, I remain at arm's length, and as an independent consultant.

## 2. The Redemption Rate and Theta

Imputation credits are of some use to domestic investors but are of little or no use to foreign investors. So the value that the market places on imputation credits distributed will largely depend on the impact that foreign investors have on equity prices.

If equity markets are largely integrated, then foreign investors will have a significant impact on the value that the market places on imputation credits distributed whereas if equity markets are completely segmented, then foreign investors will have no impact on the value that the market places on imputation credits. If equity markets are integrated, foreign investors will have a significant impact because the aggregate wealth of foreign investors far exceeds the aggregate wealth of Australian investors.

Whether equity markets are integrated or segmented is an empirical issue. So, while one may make an assumption about whether equity markets are integrated or segmented, making the assumption will not turn equity markets that are integrated into markets that are segmented or turn equity markets that are segmented into markets that are integrated. In the same way, one may choose to make an assumption about the weather, but making the assumption will not change the weather.

Casual observation suggests that Australian equity markets – aside from an inability of foreign investors to redeem imputation credits – are largely integrated. This implies that foreign investors will play an important role in determining the impact of imputation credits on the cost of equity for domestic firms. Since foreign investors are largely unable to redeem any imputation credits that they receive, this in turn implies that the distribution of imputation credits will be unlikely to have much impact on the cost of equity.

As the Henry Tax Review states:<sup>18</sup>

‘In general, a company will only make an investment where the expected return on that investment at least covers the rate of return required by the providers of the company's capital, both debt and equity. In a closed economy, it could be expected that imputation would reduce the cost of capital, at least for new equity. However, where an economy is open to foreign capital and such capital is readily available, the cost of capital will be influenced by international capital markets.

Imputation is likely to have a more positive effect in reducing the cost of capital for smaller and unlisted Australian companies, particularly when they are starting up or raising new equity. These companies typically have more limited or indirect access to international capital and, therefore, a higher reliance on residents' savings. However, although they may not have direct access to foreign capital, the cost of capital for larger firms that do have access will also influence that of smaller firms. Hence, even for smaller and unlisted Australian companies, international capital markets matter.’

---

<sup>18</sup> Commonwealth of Australia, *Australia's future tax system: Report to the Treasurer Part 2 detailed analysis*, December 2009, page 193.

Available at:

[http://taxreview.treasury.gov.au/content/FinalReport.aspx?doc=html/publications/Papers/Final\\_Report\\_Part\\_2/chapter\\_b2-3.htm](http://taxreview.treasury.gov.au/content/FinalReport.aspx?doc=html/publications/Papers/Final_Report_Part_2/chapter_b2-3.htm)



Even though Australian equity markets may be largely integrated, since imputation credits are of value to domestic investors, domestic investors will rationally harvest credits up to the point where the costs of harvesting credits match the benefits of doing so. The Australian Taxation Office (ATO) places limits on the extent to which domestic investors can harvest imputation credits without being exposed to the risks associated with holding domestic equities. So harvesting credits will necessarily require domestic investors place a larger fraction of their wealth in domestic equities than they would in the absence of an imputation system. Put another way, the harvesting of credits by domestic investors necessarily will require that foreign investors place a smaller fraction of their wealth in domestic equities than they would in the absence of an imputation system. The additional risk that domestic investors will bear by placing a larger fraction of their wealth in domestic equities is one of the costs that they will face in harvesting imputation credits.

This analysis suggests that one can expect the rate at which credits are redeemed to exceed, significantly, the impact of credits on the cost of equity. We illustrate how this can occur, in our March 2015 and April 2015 submissions, using a simple version of the single-period model that Officer (1994) suggests that one might use to compute an estimate of the cost of equity.<sup>19</sup> Handley (2015) is critical of the illustration that we provide and so we respond here to the issues that he raises.<sup>20</sup> A detailed analysis of the model appears in Appendix A.

## 2.1. Examples

As Handley (2015) notes, while Officer (1994) is not explicit about the assumptions underpinning the model that he suggests that one use, the assumptions imply that the value of a one-dollar imputation credit distributed will be:<sup>21</sup>

$$\theta = \left( \sum_j \frac{W_{0j}}{\lambda_j} \right)^{-1} \sum_j \frac{W_{0j}\theta_j}{\lambda_j} \quad (1)$$

where

$W_{0j}$  = the start-of-period wealth of investor  $j$ ;

---

<sup>19</sup> NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.

Officer, Robert R., *The cost of capital of a company under an imputation tax system*, Accounting and Finance, 1994, pages 1-17.

<sup>20</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015.

<sup>21</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015.

Officer, Robert R., *The cost of capital of a company under an imputation tax system*, Accounting and Finance, 1994, pages 1-17.

- $\lambda_j$  = the relative risk aversion of investor  $j$ ; and
- $\theta_j$  = the value placed by investor  $j$  on a one-dollar tax credit.

In our March 2015 and April 2015 submissions, we note that if  $W_{0j} = 1$  for all  $j$ ,  $\lambda_j = \lambda_k$  for all  $j \neq k$ , there are  $D$  domestic investors for whom  $\theta_j = 1$  and  $F$  foreign investors for whom  $\theta_j = 0$ , then the expression (1) will collapse to the simpler expression:<sup>22</sup>

$$\theta = \frac{D}{D + F} \quad (2)$$

Equation (1) above is equation (1) on page 4 of Handley's report and equation (2) above is equation (2) on page 5 of Handley's report.<sup>23</sup> Again, note that with the auxiliary assumptions that we make, equation (2) is implied by equation (1). In other words, equation (2) is a special case of equation (1). Thus Handley's statement that:

'the definition of theta (2) in NERA's model differs from the definition of theta in (1)'

can, at best, be described as misleading. His statement is akin to stating that a salmon differs from a fish.

Equation (2) says, consistent with intuition, that if there are a lot more foreign investors than there are domestic investors, so that the aggregate wealth of foreign investors far exceeds the aggregate wealth of domestic investors, then the impact of imputation credits distributed on the cost of equity will be negligible. An absence of a detectable inverse relation between the rate at which credits are distributed, appropriately adjusted for risk, and the cost of equity, appropriately adjusted for risk, is, as NERA shows in its April 2015 report, what one observes.<sup>24</sup>

The simple version of the model that Officer (1994) suggests that one might use, that we describe in our March 2015 and April 2015 reports, also makes a prediction about the proportion of domestic equities that will be held by domestic investors – identically, the fraction of imputation credits redeemed by domestic investors.<sup>25</sup> We show that this proportion or fraction will be:<sup>26</sup>

---

<sup>22</sup> NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.

<sup>23</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, pages 4-5.

<sup>24</sup> NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.

<sup>25</sup> NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.

$$\frac{\alpha_{12}D + Dc_1}{\alpha_{12}(D + F) + Dc_1} \quad (3)$$

where

- $c_1$  = the credit yield, assumed known at the start of the period, attached to the domestic risky asset, asset 1; and
- $\alpha_{12}$  = the alpha (exclusive of credits) of the domestic risky asset, risky asset 1, relative to the foreign risky asset, risky asset 2, which measures the benefit to a foreign investor of holding the domestic risky asset.

We also show that with reasonable choices for  $\alpha_{12}, c_1$  and the ratio  $D / (D + F)$  the redemption rate given by (3) can lie far above the value for theta given by (1).

Handley (2015) provides two alternative examples in which the redemption rate and theta lie close to each other.<sup>27</sup> We will take a close look at these examples. In the first example, Handley assumes that  $\alpha_{12} = 0.08$ ,  $c_1 = 0.02$ ,  $D = 2$  and  $F = 98$ . In other words, in the example, Handley assumes that there is a very large benefit to foreign investors to investing in domestic equities. With these assumptions, theta will be 0.02 and the redemption rate will be:

$$\frac{0.08 \times 2 + 2 \times 0.02}{0.08 \times (2 + 98) + 2 \times 0.02} = 0.025 \quad (4)$$

In our March 2015 report, we estimate the rate at which imputation credits distributed are redeemed to be 0.45.<sup>28</sup> This estimate uses ATO data on net tax, franking account balances and other variables from 2003-04 to 2011-12. Our estimate of the redemption rate of 0.45 lies far above the redemption rate that Handley provides in his example of 0.025 and so we conclude that his first example is of no practical relevance.

Officer, Robert R., *The cost of capital of a company under an imputation tax system*, Accounting and Finance, 1994, pages 1-17.

<sup>26</sup> In our March 2015 report, we express (3) as:

$$\frac{D + D\alpha_{12}^{-1}c_1}{D + F + D\alpha_{12}^{-1}c_1}$$

Doing so is inappropriate, however, as it is possible that  $\alpha_{12} = 0$  and so in our April 2015 report we choose to use the representation given by (3). From (3), if  $\alpha_{12} = 0$ , then, so long as  $c_1 > 0$ , the redemption rate will be one.

<sup>27</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 7.

<sup>28</sup> NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

In his second example, Handley (2105) assumes that  $\alpha_{12} = 0.08$ ,  $c_1 = 0.02$  and  $D / (D + F) = 0.60$ .<sup>29</sup> In other words, in the example, Handley assumes that there is a very large benefit to foreign investors to investing in domestic equities and that Australian aggregate wealth makes up 60 per cent of world wealth. With these assumptions, theta will be 0.60 and the redemption rate will be:

$$\frac{0.08 \times 0.60 + 0.60 \times 0.02}{0.08 \times (0.60 + 0.40) + 0.60 \times 0.02} = 0.65 \quad (5)$$

The assumption that Australian aggregate wealth makes up 60 per cent of world wealth is also very clearly at odds with the evidence and so we conclude that Handley's second example is similarly of no practical relevance.

To ensure that we are not accused of hypocrisy, we note that the example that we provide in our March 2015 and April 2015 reports assumes that  $\alpha_{12} = 0.0002$ ,  $c_1 = 0.02$ ,  $D = 2$  and  $F = 98$  and predicts that theta will be 0.02 while the redemption rate will be 0.67 – that is, larger than our March 2015 estimate of 0.45.<sup>30</sup> The example is easily altered, however, to produce a redemption rate that matches our estimate of 0.45 while retaining reasonable values for the parameters of the model. If, for example, one assumes that  $\alpha_{12} = 5.116 \times 10^{-4}$ ,  $c_1 = 0.02$ ,  $D = 2$  and  $F = 98$ , then theta will again be 0.02 while the redemption rate will be precisely 0.45. The examples that Handley (2015) provides are not as easily altered to generate a value for the redemption rate that matches our value of 0.45 and a value for theta that comes close to matching the redemption rate, while retaining reasonable values for the other parameters of the model.<sup>31</sup>

We note here, as we do in our April 2015 report, that if  $\alpha_{12} > 0$ , then, from (3), the redemption rate will exceed theta.<sup>32</sup> If  $\alpha_{12} = 0$ , then, from (3), the redemption rate will be one and so will also exceed theta. In Appendix A of our March 2015 report we inadvertently stated that if  $\alpha_{12} = 0$ , then the redemption rate will match theta. The redemption rate will match theta not as  $\alpha_{12} \rightarrow 0$ , but as  $\alpha_{12}^{-1} \rightarrow 0$ , that is, as  $\alpha_{12} \rightarrow \infty$ ; although even as  $\alpha_{12} \rightarrow \infty$ , the redemption rate will still provide an upper bound for theta.<sup>33</sup> While we corrected this error in our April 2015 report, Handley also states that if  $\alpha_{12} = 0$ , the

<sup>29</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 7.

<sup>30</sup> NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.

<sup>31</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 7.

<sup>32</sup> NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.

<sup>33</sup> NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

redemption rate will match theta.<sup>34</sup> Handley, in addition, states that when  $\alpha_{12} < 0$ , the redemption rate will fall below theta, which will not be true. If  $\alpha_{12} < 0$ , there are two possibilities. If  $\alpha_{12} < 0$  and  $\alpha_{12} + c_1 > 0$ , then foreign investors will go short the domestic risky asset and domestic investors will go long the domestic risky asset. So the redemption rate will exceed one and will also exceed theta. If  $\alpha_{12} < 0$  and  $\alpha_{12} + c_1 \leq 0$ , then foreign investors will attempt to short the domestic risky asset and domestic investors will either not hold the domestic risky asset or will attempt to short it. In this case, markets will not clear.<sup>35</sup> The model that we use here, which, again, we emphasise is merely a simple version of the model that Officer (1994) suggests that one use and so a simple version of the model that the AER uses to compute an estimate of the cost of equity, is not well suited to a situation where foreign investors try to short the domestic risky asset.<sup>36</sup> This is because the model assumes, counterfactually, that foreign investors who try to short the domestic risky asset will not have to provide domestic investors who are long the domestic risky asset with imputation credits.

## 2.2. Solnik (1974)

Bruno Solnik, Professor at HEC, Paris and founding president of the European Finance Association, is widely regarded as the father of modern international asset pricing. His PhD dissertation, written at M.I.T, developed an international mean-variance asset pricing model and this work was subsequently published, in 1974, in the *Journal of Economic Theory*.<sup>37</sup> In the same year he also published, in the *Journal of Finance*, tests of the model.<sup>38</sup> In these tests, he makes a set of assumptions about the behaviour of returns that implies that simultaneously a form of the Sharpe-Lintner Capital Asset Pricing Model (SL CAPM) will hold in each country and for the world as a whole. In what follows, we examine the impact of making a similar set of assumptions on how one should go about estimating theta.

We will assume, for simplicity, that there is a single currency and that capital markets are integrated internationally so that, among other things, there is a single risk-free rate. Define the partially franked return to asset  $i$  in excess of the risk-free rate to be:

$$z_i = r_i + \theta c_i - r_f, \quad (6)$$

---

<sup>34</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 6.

<sup>35</sup> Similarly, markets will not clear within the Sharpe-Lintner Capital Asset Pricing Model unless restrictions are placed on the mean vector and covariance matrix of returns. As Green (1986) shows, if restrictions are not placed on the mean vector and covariance matrix of returns, there will be no portfolio that is mean-variance efficient that has strictly positive weights and so the market portfolio, which has positive weights, will not be efficient.

Green, R.C., *Positively weighted portfolios on the minimum-variance frontier*, *Journal of Finance*, 1986, pages 1051-1068.

<sup>36</sup> Officer, Robert R., *The cost of capital of a company under an imputation tax system*, *Accounting and Finance*, 1994, pages 1-17.

<sup>37</sup> Solnik, B.H., *An equilibrium model of the international capital market*, *Journal of Economic Theory*, 1974, pages 500-524.

<sup>38</sup> Solnik, B.H., *The international pricing of risk: An empirical investigation of the world capital market structure*, *Journal of Finance*, 1974, pages 365-378.

where

$$\begin{aligned} r_i &= \text{the return to asset } i; \\ c_i &= \text{the credit yield, assumed known at the start of the period, attached to asset } i; \text{ and} \\ r_f &= \text{the risk-free rate.} \end{aligned}$$

Again,  $\theta$  is the value placed by a representative investor a one-dollar credit and is given by (1). Importantly, if the domestic market is small and capital markets, as we assume, are integrated internationally, then  $\theta$  will be largely determined by foreign investors and its value will be negligible.

Solnik (1974), in his empirical work, uses a ‘nationalistic model’ that assumes that:<sup>39</sup>

‘on each market place, security prices have in common a national factor which is in turn dependent on a single common world factor. In other words, all securities are affected by the international factor through their national index.’

We make a similar set of assumptions. We assume that:

$$\begin{aligned} z_k &= E(z_k) + \delta_k (z_d - E(z_d)) + \varepsilon_k, \quad \delta_k = \frac{\text{Cov}(z_k, z_d)}{\sigma^2(z_d)}, \\ z_d &= E(z_d) + \beta_d (z_m - E(z_m)) + \eta_d, \quad \beta_d = \frac{\text{Cov}(z_d, z_m)}{\sigma^2(z_m)}, \\ \text{Cov}(\varepsilon_k, z_d) &= \text{Cov}(\varepsilon_k, z_m) = \text{Cov}(\eta_d, z_m) = 0, \end{aligned} \quad (7)$$

where  $\varepsilon_k$  and  $\eta_d$  are regression disturbances,  $k$  is a domestic risky asset,  $d$  is the domestic market portfolio and  $m$  is the world market portfolio.  $E(z_d)$  and  $E(z_m)$  are the domestic and world market risk premiums inclusive of a value assigned to imputation credits.

If the usual assumptions underlying the SL CAPM are true and capital markets are integrated, then:

$$E(z_k) = \beta_k E(z_m), \quad \beta_k = \frac{\text{Cov}(z_k, z_m)}{\sigma^2(z_m)} \quad (8)$$

In other words the mean partially franked excess return to a domestic risky asset will equal the product of the asset’s beta relative to the world market portfolio and the world market risk premium. It will also be true that:

---

<sup>39</sup> Solnik, B.H., *The international pricing of risk: An empirical investigation of the world capital market structure*, Journal of Finance, 1974, pages 370-372.

$$E(z_d) = \beta_d E(z_m), \quad \beta_d = \frac{\text{Cov}(z_d, z_m)}{\sigma^2(z_m)} \quad (9)$$

In other words the mean partially franked excess return to the domestic market portfolio will equal the product of the portfolio's beta relative to the world market portfolio and the world market risk premium.

Using (7), (8) and (9) yields:

$$\begin{aligned} E(z_k) &= \frac{\text{Cov}(E(z_k) + \delta_k(z_d - E(z_d)) + \varepsilon_k, z_m)}{\sigma^2(z_m)} E(z_m) \\ &= \delta_k \beta_d E(z_m) = \delta_k E(z_d) \end{aligned} \quad (10)$$

In other words, with the assumptions made, the mean partially franked excess return to the domestic market portfolio will also equal the product of the portfolio's beta relative to the domestic market portfolio and the domestic market risk premium. In other words, in addition to an international version of the SL CAPM holding, a domestic version of the model will hold. Importantly, however, the value for theta, which is given by (1), that (10) uses, is one that is based on the characteristics of all investors and not just those that happen to hold large quantities of domestic shares. The restrictions imposed by (7) are on the behaviour of returns and not on the characteristics of investors and (1) uses only the characteristics of investors to determine theta. So our prediction that theta is negligible will not be affected by the restrictions imposed.

In his September 2014 report, Handley states that:<sup>40</sup>

'The CAPM makes no explicit assumption about any other assets or any other investors but if there are other assets or investors then it is implicitly assumed that these do not matter for the purposes of determining the prices of the  $n$  assets under consideration (otherwise they should be in the model). This means that other assets held by other investors do not matter. It also means that other assets held by the  $m$  investors do not matter. This is just a form of market segmentation. By definition the system is closed because what matters for pricing purposes – the  $n$  assets and  $m$  investors – are in the model and any other assets or investors being outside the model are ignored.

This is precisely the assumption that one implicitly makes when using the CAPM in practice. Once you choose a benchmark market then you define the set of assets and investors that are relevant for pricing purposes – in other words, by choosing a particular proxy for the market, one is saying that this is the best model for estimating expected returns on assets within this market. The model is closed in the sense that it is implicitly assumed to be segmented. If one disagrees with this assumption then the solution is to bring the other assets and investors into the model.'

---

<sup>40</sup> Handley, J., *Advice on the value of imputation credits*, September 2014, page 22.

Our analysis here indicates that an implicit assumption that other investors do not matter for the purposes of determining the prices of domestic assets is arbitrary. In particular, the analysis shows that the use of a domestic pricing model by the AER does not justify a presumption that the impact of foreign investors is restricted and that theta, consequently, take on a non-negligible value.

The pricing model (10), which is the model that the AER employs to estimate the cost of equity, implies that there will be an inverse relation between excess returns, appropriately adjusted for risk, and credit yields, appropriately adjusted for risk. Testing for a relation of this kind is, therefore, a direct way of examining whether credits distributed have an impact on the cost of equity. Our April 2015 report, which uses tests like these, finds, consistent with intuition, no evidence of a relation.<sup>41</sup> In other words, the evidence that we report in April 2015 is consistent with the idea that theta takes on a negligible value or is zero.

## 2.3. Summary

The question that a regulator must answer is what impact the distribution of credits by a benchmark efficient entity will have on the entity's cost of equity. To answer this question necessitates that one compare the cost of equity that will prevail when credits are distributed to the cost of equity that would prevail were no credits to be distributed. Determining the difference between these two costs of equity is not a straightforward task because the shareholdings of domestic and foreign investors will depend on whether credits are distributed. One cannot, for example, determine the difference between the cost of equity that will prevail when credits are distributed and the cost of equity that would prevail were no credits to be distributed simply by measuring the fraction of credits that are redeemed from tax statistics. This is because domestic investors who redeem credits would be likely to place a smaller fraction of their wealth in domestic equities were no credits to be distributed and because foreign investors would be likely to place a larger fraction of their wealth in domestic equities.

Even if all credits were currently redeemed by domestic investors, one could still not determine the difference between the cost of equity that will prevail when credits are distributed to the cost of equity that would prevail were no credits to be distributed by measuring the fraction of credits that are redeemed from tax statistics. This is because foreign investors who may not hold domestic equities when credits are distributed might well hold domestic equities were no credits to be distributed. The tax statistics compiled by the ATO cannot, by construction, provide information about the characteristics of potential holders of domestic equities. These potential holders of domestic equities, however, can play an important role in determining what impact the distribution of credits will have on the cost of equity as the simple example that we employ shows.

---

<sup>41</sup> NERA, *Do imputation credits lower the cost of equity? Cross-sectional tests: A report for United Energy*, April 2015.



### 3. The Distribution Rate and Theta

Handley (2015) states that:<sup>42</sup>

‘it is correct to say that theta is not firm-specific and the distribution rate is firm specific.’

We agree with this statement.

There will only be a single value for theta – the value that a representative investor places on a dollar of tax credits distributed. The value that the representative investor places on a dollar of tax credits distributed by one firm will not differ from the value that the investor places on a dollar of tax credits distributed by another firm. Thus theta is not a firm specific parameter.

The distribution rate, on the other hand, is a firm specific parameter.<sup>43</sup> One firm, after weighing up the costs and benefits of distributing credits, may decide to distribute all of the credits that have been created over some period. A second firm may rationally decide to distribute no credits – perhaps because it wishes to use internally generated funds to finance new projects.

As theta should not vary from firm to firm, however, there need be no link between how one estimates theta and how one estimates the distribution rate.

Handley (2015), however, states that:<sup>44</sup>

‘I do not agree with the suggestion that there need be no link between how one estimates theta and how one estimates the distribution rate. We are interested in estimating the value of imputation credits to the market as a whole. In setting prices, investors in the market will take into account the quantity of credits expected to be distributed by all firms in the market. Since gamma is effectively defined as a price (theta) times a quantity (distribution rate) then in my opinion, it is obvious that both components should be based on consistent data sets which relate to the same market.’

As an analogy, suppose that we were interested in USD sales of gold by a small jewellery store in the Shetlands that we know always uses London Bullion Market Association (LBMA) 10:30 USD gold prices. What Handley is saying is that one cannot determine the USD sales of the shop by multiplying the quantity of gold the shop sells by the LBMA gold price, one will need to separately record the gold price used in the shop – even though it is known that this is the LBMA price. This argument makes no sense. The argument would only make sense if one suspected that the shop were not using the LBMA gold price – in other words, if one did not know that the shop always used the LBMA price.

---

<sup>42</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 7.

<sup>43</sup> The distribution rate is also known as the payout ratio.

<sup>44</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, pages 7-8.

Similarly, Handley's statement in his May 2015 report that:<sup>45</sup>

'both components (theta and the distribution rate) should be based on consistent data sets which relate to the same market'

would only make sense if there were an error in Handley's earlier statement that:<sup>46</sup>

'it is correct to say that theta is not firm-specific and the distribution rate is firm specific.'

In other words, the statement that both components should be based on consistent data would only make sense if both theta and the distribution rate were to be firm specific. Theta would be firm specific if the value placed by a representative investor on a dollar of tax credits distributed by one firm were to differ from the value placed by the investor on a dollar of tax credits distributed by another firm.

Again, we, like Handley, believe that theta is not a firm-specific variable. Thus we believe that there need be no link between how one estimates theta and how one estimates the distribution rate. In other words, we believe that Handley is mistaken in his belief that there should be a link.

---

<sup>45</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 8.

<sup>46</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 7.

## 4. The Distribution Rate for a Benchmark Efficient Entity

Handley states in his May 2015 report that:<sup>47</sup>

‘I have previously argued that estimating the distribution rate using tax data for public companies is more sensible than estimating the distribution rate using tax data for public and private companies, because public companies and private companies are financed in entirely different ways and it is the former rather than the latter which is more likely to be representative of the Australian domestic market for (public) equity funds.

In fact, this view also follows directly from (sic) requirement that the regulator set prices in accordance with the allowed rate of return objective. Of particular importance is the additional requirement that, in estimating the return on equity, regard must be had to the prevailing conditions in the market for equity funds. In other words, the task is not to estimate gamma for the whole of the Australian economy but rather for a subset thereof – the Australian domestic market for (public) equity funds.’

In contrast, the AER in its 2009 *WACC Review Final Decision* provides an analysis of what characteristics a benchmark efficient entity will display and states that:<sup>48</sup>

‘The AER has reviewed the Competitive Neutrality Principles Agreement and notes that this Agreement does not explicitly state that a private sector organisation is a stock market listed business. Nor does the Agreement define the nature of private ownership.’

‘the AER does not agree that a benchmark efficient NSP be defined as a large, stock market listed NSP and is a settled concept.’

This statement indicates that when determining the distribution rate for a benchmark efficient entity significant weight should be placed on estimates of the rate for companies that are not large ASX-listed companies. Companies that are not large ASX-listed companies fall into two categories:

- companies that are public companies but are not large ASX-listed companies; and
- companies that are privately owned.

### 4.1. Analysis

Handley’s argument is that while there is a physical market (exchange) for publicly listed equities, there is no physical market (exchange) for private equity and so Rule 6.5.2 and Rule 6A 6.2 of the National Electricity Rules and Rule 87 of the National Gas Rules cannot refer to the returns required on private equity. The relevant sections of Rule 6.5.2 of the National Electricity Rules state that:

---

<sup>47</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 8.

<sup>48</sup> AER, *Final decision Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, May 2009, pages 80 and 105.

## Rule 6.5.2

- (c) The *allowed rate of return objective* is that the rate of return for a *Distribution Network Service Provider* is to be commensurate with the efficient financing costs of a benchmark efficient entity with a similar degree of risk as that which applies to the *Distribution Network Service Provider* in respect of the provision of *standard control services* (the *allowed rate of return objective*).
- (f) The return on equity for a *regulatory control period* must be estimated such that it contributes to the achievement of the *allowed rate of return objective*.
- (g) In estimating the return on equity under paragraph (f), regard must be had to the prevailing conditions in the market for equity funds.

We do not believe that the expression ‘the market for equity funds’ in Rule 6.5.2 (g) requires that the market be a physical market. Moreover, a search of the National Electricity Rules and National Gas Rules for the keyword ‘private’ reveals no rule that excludes private equity.

The idea that there is no market for private equity is not one that has widespread acceptance in the academic community. As evidence of the acceptance of the idea that there *is* a market for private equity, we note that in 2007 the Swedish Institute for Financial Research held a conference on ‘The Economics of the Private Equity Market’ in Stockholm at which the keynote speakers were: Tim Jenkinson (Oxford), Michael Jensen (Harvard), Steve Kaplan (Chicago), and Josh Lerner (Harvard).<sup>49</sup>

As the AER makes clear in its 2009 *WACC Review*, it may be that the regulator is forced to rely on data for publicly listed equity to estimate some of the parameters that it uses to estimate the cost of equity, but this does not mean that the AER believes that a benchmark efficient entity is necessarily a listed company.<sup>50</sup> Figure 4.1 from the *WACC Review*, reproduced here also as Figure 4.1, shows that the AER does not intend a benchmark efficient entity to necessarily be a listed firm.

## 4.2. Estimates

Since the AER is clear that a benchmark efficient entity need not be a large stock-market-listed firm, in our March 2015 report, we construct estimates of the distribution rate for private companies and for public companies that are not top-20 ASX-listed companies and we use data, drawn from company reports, on top-20 ASX-listed companies that Lally (2014) provides.<sup>51</sup> Recall that an estimate of the distribution rate over a number of years can be

<sup>49</sup> <http://www.sifr.org/PDFs/ConferenceProgramPEM.pdf>

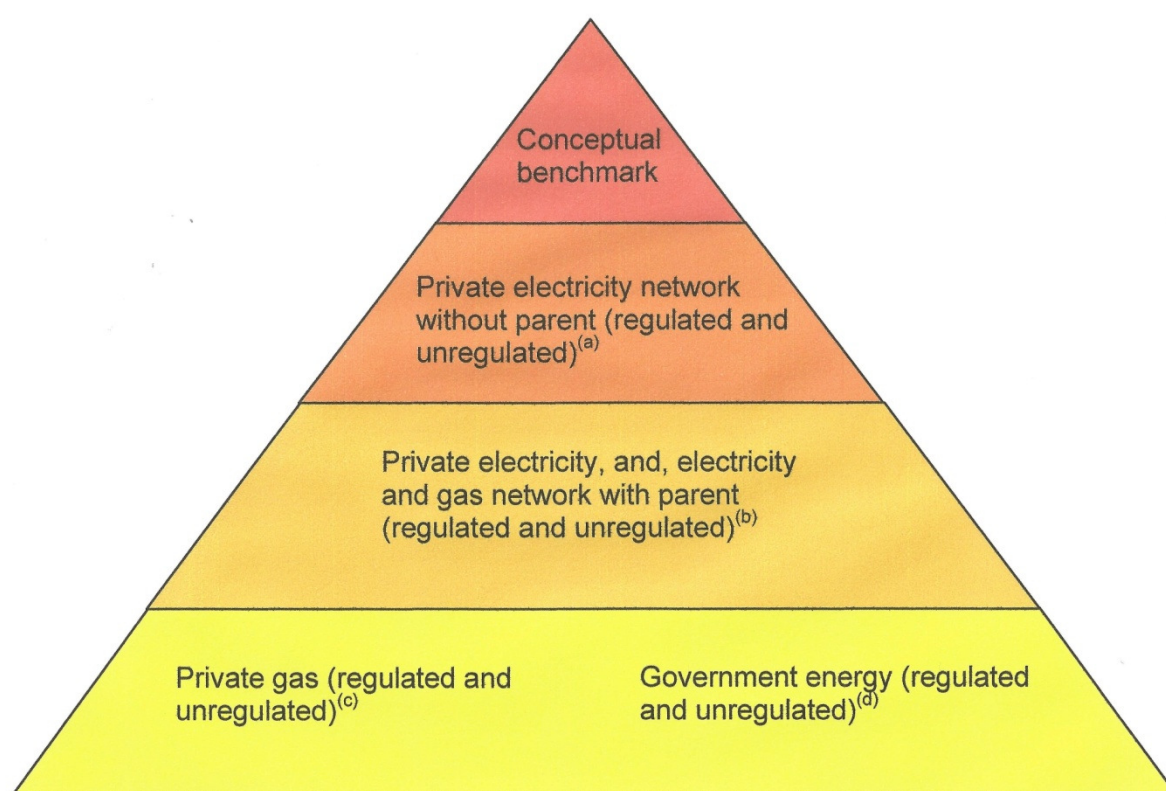
<sup>50</sup> AER, *Final decision Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters*, May 2009, pages 101-110.

<sup>51</sup> Lally, M., *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, Victoria University, Wellington, March 2014.

NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

computed by subtracting from one the ratio of the change in the franking balance over the period to net tax over the period. We construct an estimate of the distribution rate for a public company that is not a top-20 ASX-listed company using the data that Lally provides and an estimate of the rate for a public company that we compute using data from 2000-01 to 2011-12, approximately the same period that Lally examines. Using tax statistics, we estimate the distribution rate for a public company over this period to be 0.755. We estimate the distribution rate for public companies that are not top-20 ASX-listed companies to be 0.701. Finally, again using tax statistics, we estimate the distribution rate for private companies to be 0.505. Table 4.1 below illustrates how we compute these statistics.

**Figure 4.1**  
**Selection of comparator businesses**



**Notes:**

- (a) Private ownership includes businesses that provide regulated and unregulated electricity network services and can be unlisted (i.e. ElectraNet) or listed on the stock exchange).
- (b) Same as (a) except businesses are influenced by parent owners (i.e. Spark Infrastructure) and may operate and/or own gas networks in conjunction with the electricity network.
- (c) A privately owned (listed or unlisted) business that operates and/or own gas networks.
- (d) A government owned business that operates and/or own a gas and/or electricity network.

*Source: AER, Final decision Electricity transmission and distribution network service providers: Review of the weighted average cost of capital (WACC) parameters, May 2009, page 106.*

**Table 4.1**  
**Distribution rate by type of company**

Firm type	Tax years	Net tax	Change in franking account balance	Distribution rate
Top-20 ASX-listed	2000-01 to 2012-13	146,279	23,345	0.840
Public but not top-20 ASX-listed	2000-01 to 2011-12	212,278	63,549	0.701
Public	2000-01 to 2011-12	347,304	85,099	0.755
Private	2000-01 to 2011-12	204,812	101,441	0.505
All	2000-01 to 2011-12	566,887	183,846	0.676

*Notes: Data for top-20 ASX-listed companies are from Lally (2014). Net tax and franking account balances are in billions of dollars. The change in the franking account balance is the difference between the end-of-period and start-of-period franking account balances. Data for public and private companies are: for net tax, from Company Table 2E (2000-01 to 2009-10), Table 3E (2010-11) and Table 3 (2011-12); for franking account balances, from Company Table 2E (1999-2000) and Table 3 (2011-12) of the ATO's Taxation Statistics. Data for all companies together are from the ATO's Taxation Statistics 2010-11, Company Tax: Table 1 and Taxation Statistics 2011-12, Company Tax: Table 1. An estimate of net tax for public but not top-20 ASX-listed companies from 2000-01 to 2011-12 is computed by subtracting 12/13 of net tax for top-20 ASX-listed companies from 2000-01 to 2012-13 (a 13-year period) from net tax for public companies from 2000-01 to 2011-12 (a 12-year period). An estimate of the change in the franking account balance for public but not top-20 ASX-listed companies is computed in a similar way.*

*Lally, M., Review of submissions to the QCA on the MRP, risk-free rate and gamma, Victoria University, Wellington, March 2014.*

We conclude in our March 2015 report that it follows, from the estimates of the distribution rates for various types of firms that we provide in Table 4.1, that if significant weight is to be placed on estimates of the distribution rate for companies that are not large ASX-listed companies, an estimate of the rate for a benchmark efficient entity will not sit far from 0.70 – the estimate of the distribution rate for the market as a whole that the AER has in the past adopted.<sup>52</sup>

<sup>52</sup> Suppose, for example, that there is a probability of 20 per cent that the benchmark efficient entity is privately owned, a probability of 60 per cent that the benchmark is a public company that is not a top-20 ASX-listed company and a probability of 20 per cent that the benchmark is a top-20 ASX-listed company. Then an estimate of the distribution rate for the benchmark using our estimates and the estimate that Lally (2014) provides would be  $0.20 \times 0.505 + 0.60 \times 0.701 + 0.20 \times 0.840 = 0.690$ .

Lally, M., *Review of submissions to the QCA on the MRP, risk-free rate and gamma*, Victoria University, Wellington, March 2014.

NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

In his May 2015 report, Handley provides estimates of the distribution rate for public companies and for private companies for the period 2003-04 to 2011-12 of 0.773 and 0.553.<sup>53</sup> Lally does not report a distribution rate for the top-20 ASX-listed companies for the period 2003-04 to 2011-12 and neither we nor Handley have attempted to reproduce Lally's data. So it is difficult to say what the small changes in the distribution rates of public and private companies that Handley reports for the period 2003-04 to 2011-12, relative to those that we compute for the period 2000-01 to 2011-12, will imply about the distribution rate for ASX-listed companies that are not in the top 20 by market capitalisation. If the distribution rate for all public companies rose from 0.755, from 2000-01 to 2011-12, to 0.773, from 2003-04 to 2011-12, then it is reasonable to predict that the distribution rate for a public company that is not a top-20 ASX-listed company will have risen from 0.701 to  $0.701 + 0.773 - 0.755 = 0.719$ .

Thus there is little in Handley's May 2015 report to alter the view that we expressed in our March 2015 report.<sup>54</sup> We believe that the AER's 2009 statement that a benchmark network service provider need be neither large and publicly listed nor publicly listed is correct. Thus we believe that Handley is wrong to advocate the use of a distribution rate that places a large weight on large publicly listed firms and no weight on private firms. It is difficult to see that there is a case for setting the distribution rate to be any different than the value accepted by the Australian Competition Tribunal in its 2010 decision and the *market-wide* value chosen in the AER's *Rate of Return Guideline* of 0.70.<sup>55</sup> This value is based on a cumulative distribution rate computed using tax statistics aggregated across all companies – both private and public.

---

<sup>53</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015, page 11.

<sup>54</sup> Handley, J., *Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics*, May 2015.

NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015.

<sup>55</sup> ACT, *Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompt9*.

AER, *Explanatory Statement Rate of Return Guideline (Appendices)*, December 2013, pages 136-180.

## Appendix A. The Redemption Rate and Theta

This appendix provides a derivation of a simple version of the model that Officer suggests that one can use to compute the return required on equity.

We assume that there are two risky assets – one domestic and one foreign – and that each investor seeks to minimise:<sup>56</sup>

$$\frac{\varphi}{2} \sigma^2(W_{1j}) - E(W_{1j}) \quad (\text{A.1})$$

where  $\varphi$  is a measure of the risk aversion of each investor and the end-of-period wealth of investor  $j$  is given by:

$$W_{1j} = 1 + x_{1j}(r_1 + \theta_j c_1) + x_{2j}r_2 + (1 - x_{1j} - x_{2j})r_f \quad (\text{A.2})$$

where

- $x_{ij}$  = the weight placed by investor  $j$  in the risky asset  $i$ ;
- $r_i$  = the return to risky asset  $i$ ;
- $\theta_j$  = the value placed by investor  $j$  on a one-dollar tax credit;
- $c_1$  = the credit yield attached to asset 1 – assumed to be known at the start of the period; and
- $r_f$  = the risk-free rate.

Asset 1 is the domestic risky asset, which we assume delivers imputation credits, while asset 2 is the foreign risky asset which delivers no credits.

We assume that imputation credits can be redeemed immediately and so for domestic investors  $\theta_j = 1$  while for foreign investors  $\theta_j = 0$ .

There are  $D$  domestic investors and  $F$  foreign investors and start-of-period wealth for each investor is one dollar.

### A.1. Interpretation of Theta

The first-order conditions for each domestic investor are:

$$E(r_i) + c_i - r_f = \varphi \text{Cov}(r_i, W_{1j}), \quad i = 1, 2 \quad (\text{A.3})$$

while the first-order conditions for each foreign investor are:

---

<sup>56</sup> Ingersoll (1987) shows that if the returns to the two risky assets are bivariate normal, then an investor who displays constant absolute risk aversion of  $\varphi$  will seek to minimise the quantity (A.1).

Ingersoll, J., 1987, *Theory of financial decision making*, Rowman and Littlefield, page 98.



$$E(r_i) - r_f = \phi \text{Cov}(r_i, W_{1j}), \quad i = 1, 2 \quad (\text{A.4})$$

Using (A.3) and (A.4) and aggregating over all investors yields:

$$(D + F)(E(r_1) - r_f) + Dc_1 = \phi \text{Cov}(r_1, W_{1m}) \quad (\text{A.5})$$

and

$$(D + F)(E(r_2) - r_f) = \phi \text{Cov}(r_2, W_{1m}) \quad (\text{A.6})$$

where end-of-period world wealth is given by:

$$W_{1m} = \sum_j W_{1j} = (D + F) + \sum_j x_{1j}(r_1 + \theta_j c_1) + \sum_j x_{2j}r_2 + \sum_j (1 - x_{1j} - x_{2j})r_f \quad (\text{A.7})$$

Define the credit yield of the world market portfolio of risky assets to be:

$$c_m = \left( \sum_j (x_{1j} + x_{2j}) \right)^{-1} \sum_j x_{1j} c_1 \quad (\text{A.8})$$

and the return on the world market portfolio of risky assets to be:

$$r_m = \left( \sum_j (x_{1j} + x_{2j}) \right)^{-1} \sum_j (x_{1j} r_1 + x_{2j} r_2) \quad (\text{A.9})$$

Then from (A.5), (A.6), (A.7) and (A.9):

$$E(r_i) + \theta c_i - r_f = \beta_i (E(r_m) + \theta c_m - r_f), \quad i = 1, 2, \quad (\text{A.10})$$

where  $c_i$  is the credit yield of risky asset  $i$  and:

$$\theta = \frac{D}{D + F} \quad (\text{A.11})$$

measures the impact of imputation credits distributed on the return required on domestic equity.  $\theta$  is the value placed on a dollar of tax credits by a representative investor. If there are few domestic investors relative to foreign investors, the representative investor will most closely resemble a foreign investor and the impact of imputation credits distributed on the return required on domestic equity will be negligible as, in the model, a foreign investor places no value on credits received.

## A.2. Relation between Redemption Rate and Theta

Solving the first-order conditions (A.3) for the weights placed by each domestic investor in each risky asset yields:

$$\begin{aligned}
\begin{pmatrix} x_{1j} \\ x_{2j} \end{pmatrix} &= \varphi^{-1} \begin{pmatrix} \sigma^2(r_1) & \text{Cov}(r_1, r_2) \\ \text{Cov}(r_1, r_2) & \sigma^2(r_2) \end{pmatrix}^{-1} \begin{pmatrix} E(r_1) + c_1 - r_f \\ E(r_2) - r_f \end{pmatrix} \\
&= \varphi^{-1} \left( \sigma^2(r_1)\sigma^2(r_2) - (\text{Cov}(r_1, r_2))^2 \right) \begin{pmatrix} \sigma^2(r_2)(\alpha_{12} + c_1) \\ \sigma^2(r_1)\alpha_{21} - \sigma^2(r_1)\beta_{21}c_1 \end{pmatrix}
\end{aligned} \tag{A.12}$$

while solving the first-order conditions (A.4) for the weights placed by each foreign investor in each risky asset yields:

$$\begin{aligned}
\begin{pmatrix} x_{1j} \\ x_{2j} \end{pmatrix} &= \varphi^{-1} \begin{pmatrix} \sigma^2(r_1) & \text{Cov}(r_1, r_2) \\ \text{Cov}(r_1, r_2) & \sigma^2(r_2) \end{pmatrix}^{-1} \begin{pmatrix} E(r_1) - r_f \\ E(r_2) - r_f \end{pmatrix} \\
&= \varphi^{-1} \left( \sigma^2(r_1)\sigma^2(r_2) - (\text{Cov}(r_1, r_2))^2 \right) \begin{pmatrix} \sigma^2(r_2)\alpha_{12} \\ \sigma^2(r_1)\alpha_{21} \end{pmatrix},
\end{aligned} \tag{A.13}$$

where:

$$\begin{aligned}
\alpha_{12} &= E(r_1) - r_f - \beta_{12} (E(r_2) - r_f), & \beta_{12} &= \frac{\text{Cov}(r_1, r_2)}{\sigma^2(r_2)}, \\
\alpha_{21} &= E(r_2) - r_f - \beta_{21} (E(r_1) - r_f), & \beta_{21} &= \frac{\text{Cov}(r_1, r_2)}{\sigma^2(r_1)}
\end{aligned} \tag{A.14}$$

$\alpha_{12}$  is the alpha (exclusive of credits) of the domestic risky asset (risky asset 1) relative to the foreign risky asset (risky asset 2). This alpha measures the benefit to a foreign investor of holding the domestic risky asset.

$\alpha_{21}$  is the alpha (exclusive of credits) of the foreign risky asset (risky asset 2) relative to the domestic risky asset (risky asset 1). This alpha measures the benefit to a foreign investor of holding the foreign risky asset.

The rate at which credits distributed are redeemed will be given by the ratio of domestic holdings of the domestic risky asset (risky asset 1) to the sum of domestic and foreign holdings of the asset. From (A.12) and (A.13) this ratio will be given by:

$$\frac{\alpha_{12}D + Dc_1}{\alpha_{12}(D + F) + Dc_1}, \tag{A.15}$$

From (A.13), if  $\alpha_{12} > 0$ , then the foreign investor will hold a long position in the domestic risky asset. Under these circumstances, the redemption rate given by (A.15) will lie between  $\theta$  and one and so the redemption rate will provide an upper bound for the parameter  $\theta$ . The gap between the redemption rate and  $\theta$  will be large, however, if the benefit to a foreign

investor of holding the domestic risky asset is small relative to the credit yield of the domestic risky asset.

If  $\alpha_{12} = 0$ , then the foreign investor will not hold a position in the domestic risky asset. Under these circumstances, the redemption rate given by (A.15) will equal one and so the redemption rate will again provide an upper bound for the parameter  $\theta$ .<sup>57</sup>

If  $\alpha_{12} < 0$  and  $\alpha_{12} + c_1 > 0$ , then foreign investors will go short the domestic risky asset and domestic investors will go long the domestic risky asset. So the redemption rate will exceed one and will also exceed theta. If  $\alpha_{12} < 0$  and  $\alpha_{12} + c_1 \leq 0$ , then foreign investors will attempt to short the domestic risky asset and domestic investors will either not hold the domestic risky asset or will attempt to short it. In this case, markets will not clear. The model is not well equipped to analyse a situation in which foreign investors wish to short the domestic risky asset, however, because the model presumes that a foreign investor who shorts the asset does not have to supply credits to the domestic investor who holds the asset long.

---

<sup>57</sup> Our March 2015 report mistakenly stated that if  $\alpha_{12} = 0$ , the redemption rate would match  $\theta$ . This will happen when  $\alpha_{12}^{-1} = 0$ , that is, as  $\alpha_{12} \rightarrow \infty$  and not when  $\alpha_{12} = 0$ . Even as  $\alpha_{12} \rightarrow \infty$ , however, the redemption rate will still provide an upper bound for  $\theta$ .

NERA, *Estimating Distribution and Redemption Rates from Taxation Statistics, A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Powercor, SA PowerNetworks and United Energy*, March 2015., page 32.

## Appendix B. Terms of Reference

### Expert Terms of Reference

#### **Estimating distribution rates and redemption rates from taxation statistics: A response to the critique prepared by Handley (May 2015)**

**United Energy**

**17 June 2015**

### Background

The Australian Energy Regulator (AER) is empowered to make five yearly regulatory determinations that control the aggregate average prices charged by regulated energy network businesses. The National Electricity Rules provide for a Regulated Asset Base (RAB) to be established and updated annually and for an operational expenditure allowance. A further key component of the regulatory determination is the allowed rate of return for debt and equity (or weighted average cost of capital) for funding the business. The principal Rules governing how the AER sets the allowed rate of return on debt for electricity distribution businesses are contained in Rule 6.5.2 of the National Electricity Rules (see attached). The same Rules in essentially the same terms apply to gas distribution businesses.

When the AER exercises the relevant regulatory powers under the National Electricity Rules, it is also required to apply section 16 of the National Electricity Law (see attached). Specifically, section 16 provides that *the AER must, in performing or exercising an AER economic regulatory function or power – (a) perform or exercise that function or power in a manner that will or is likely to contribute to the achievement of the national electricity objective....* That national electricity objective is set out in section 7 of the National Electricity Law as: *‘The objective of this Law 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- (a) price, quality, safety, reliability and security of supply of electricity; and (b) the reliability, safety and security of the national electricity system.’*

Additionally the Rules require the AER to publish a Rate of Return Guideline which explains how the regulator intends to apply the Rules (attached). The AER has recently published final determinations for the NSW and ACT electricity networks, and for Jemena Gas Networks<sup>58</sup>. Preliminary determinations have also been published for the Queensland electricity distributors, and for SA Power Networks<sup>59</sup>.

---

<sup>58</sup> See, for instance:

AER (2015), Ausgrid distribution determination, 2015–16 to 2018–19, Attachment 4 – Value of imputation credits, April 2015.

AER (2015), FINAL DECISION, Jemena Gas Networks (NSW) Ltd, Access Arrangement 2015-20, Attachment 4 – Value of imputation credits, June 2015.

<sup>59</sup> See, for instance:

The National Electricity Rules require that the estimated cost of corporate income tax for a network service provider include a value for imputation credits, gamma.<sup>60</sup> Gamma represents the value that equity investors place on imputation credits created through the payment of company income tax and is generally estimated as the product of two elements:<sup>61</sup>

- The *payout* ratio, being the proportion of created credits distributed by companies to their shareholders; and
- *theta*, the market value of distributed imputation credits as a proportion of their face value.

In the AER's post tax revenue model, the value of gamma is used to determine the proportion of the assumed company income tax that does not need to be included in a regulated firm's annual revenue requirement.

## Engagement

You are engaged by Jones Day on behalf of United Energy and a consortium of other businesses to provide the work (set out below). Specifically, you have been retained by ActewAGL distribution, Australian Gas Networks, APA Group, AusNet Services, Citipower, Ergon Energy, Jemena Electricity Networks, Powercor, SA Power Networks, and United Energy.

## Scope of work

Associate Professor Handley has asserted, with reference to the Officer (1994) paper that<sup>62</sup>:

The value of distributed credits and the proportion of credits redeemed are the same thing when one uses the proper definition of "value" in relation to theta (and gamma). Specifically, theta is equal to the value of a dollar of distributed credits before personal taxes and before personal costs – an amount which corresponds to the proportion of credits redeemed. This is why Officer (1994) uses both descriptions interchangeably when referring to gamma in his seminal paper.

The proportion of credits redeemed is also referred to as the redemption value or utilisation value of credits. The AER appears to have endorsed the Handley report (from May 2015)<sup>63</sup>.

---

AER (2015), PRELIMINARY DECISION, SA Power Networks determination, 2015–16 to 2019–20, Attachment 4 – Value of imputation credits, April 2015

<sup>60</sup> Australian Energy Market Commission, *National Electricity Rules Version 69*, page 661.

<sup>61</sup> More specifically, the PTRM provides an allowance to a benchmark efficient entity for the costs of meeting corporate tax obligations. A higher value of gamma in the PTRM will imply that the model provides a lower allowance for the benchmark entity to satisfy its tax obligations. The "net tax allowance" is a component of the annual revenue requirement.

<sup>62</sup> Handley (2015), Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics, a report prepared for the Australian Energy Regulator by John C. Handley, 20<sup>th</sup> May 2015.

<sup>63</sup> AER (2015), FINAL DECISION, Jemena Gas Networks (NSW) Ltd, Access Arrangement 2015-20, Attachment 4 – Value of imputation credits, June 2015; page 4-63.

NERA is asked to provide and review evidence on the value that the market places on imputation credits distributed. In particular, United Energy has asked NERA to:

- Explain whether and how the redemption rate and the value ( $\theta$ ) to a representative investor of a distributed imputation credit are related.
- Examine whether the methods and data sources used to estimate the distribution rate should be the same as the methods and data sources used to infer a value for  $\theta$ .
- Consider the comments that Handley makes about the algebraic framework presented by NERA to permit an analysis of imputation credit yields, the rate at which credits distributed are redeemed, and the value placed by investors on a distributed imputation credit. The NERA framework is consistent with that presented in the published paper, Lajbcygier and Wheatley (2012)<sup>64</sup>.
- Respond to any other matters raised by the Australian Energy Regulator (AER) in its recently published *Final decision, Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20* and in other recent AER decisions.

## Timeframe

The consultant should provide a final report by no later than 20<sup>th</sup> June, 2015.

## Reporting

Jeremy Rothfield of United Energy and Multinet Gas will serve as the primary contact for the period of the engagement. His contact details are as follows:

Jeremy Rothfield

Economist  
United Energy and Multinet Gas  
Level 1  
Pinewood Corporate Centre  
43-45 Centreway Place  
Mount Waverley VICTORIA 3149  
P.O. Box 449  
Mount Waverley VICTORIA 3149

Email: [Jeremy.Rothfield@ue.com.au](mailto:Jeremy.Rothfield@ue.com.au)

Telephone: (03) 88469854

The consultant will prepare reports showing the work-in-progress on a regular basis. The consultant will make periodic presentations on analysis and advice as appropriate.

---

<sup>64</sup> Lajbcygier, P. and S. M. Wheatley, Imputation credits and equity returns, *Economic Record*, 2012, pages 478.

## Conflicts

The consultant is to identify any current or potential future conflicts.

## Compliance with the Code of Conduct for Expert Witnesses

Attached as **Annexure 1** is a copy of the Federal Court's Practice Note CM 7, entitled "Expert Witnesses in Proceedings in the Federal Court of Australia", which comprises the guidelines for expert witnesses in the Federal Court of Australia (Expert Witness Guidelines).

Please read and familiarise yourself with the Expert Witness Guidelines, and comply with them at all times over the course of your engagement with United Energy and Multinet Gas.

In particular, your report prepared for United Energy and Multinet Gas should contain a statement at the beginning of the report to the effect that the author of the report has read, understood and complied with the Expert Witness Guidelines.

Your report must also:

1. contain particulars of the training, study or experience by which the expert has acquired specialised knowledge;
2. identify the questions that the expert has been asked to address;
3. set out separately each of the factual findings or assumptions on which the expert's opinion is based;
4. set out each of the expert's opinions separately from the factual findings or assumptions;
5. set out the reasons for each of the expert's opinions; and
6. otherwise comply with the Expert Witness Guidelines.

The expert is also required to state that each of the expert's opinions is wholly or substantially based on the expert's specialised knowledge.

The declaration contained within the report should be that "[the expert] has made all the inquiries that [the expert] believes are desirable and appropriate and that no matters of significance that [the expert] regards as relevant have, to [the expert's] knowledge, been withheld from the report".

Please also attach a copy of these terms of reference to the report.

**Fees**

The consultant is requested to submit:

- a fixed total fee for the project and hourly rates for the proposed project team should additional work be required; and
- details of the individuals who will provide the strategic analysis and advice.

**Contacts**

Any questions regarding this terms of reference should be directed to:

Nick Taylor (Jones Day)

Email: [njtaylor@jonesday.com](mailto:njtaylor@jonesday.com)

Phone: 02 8272 0500

Kind regards



## Appendix C. Federal Court Guidelines

### FEDERAL COURT OF AUSTRALIA

#### Practice Note CM 7

### EXPERT WITNESSES IN PROCEEDINGS IN THE FEDERAL COURT OF AUSTRALIA

Practice Note CM 7 issued on 1 August 2011 is revoked with effect from midnight on 3 June 2013 and the following Practice Note is substituted.

#### Commencement

1. This Practice Note commences on 4 June 2013.

#### Introduction

2. Rule 23.12 of the Federal Court Rules 2011 requires a party to give a copy of the following guidelines to any witness they propose to retain for the purpose of preparing a report or giving evidence in a proceeding as to an opinion held by the witness that is wholly or substantially based on the specialised knowledge of the witness (see **Part 3.3 - Opinion** of the *Evidence Act 1995* (Cth)).
3. The guidelines are not intended to address all aspects of an expert witness's duties, but are intended to facilitate the admission of opinion evidence<sup>65</sup>, and to assist experts to understand in general terms what the Court expects of them. Additionally, it is hoped that the guidelines will assist individual expert witnesses to avoid the criticism that is sometimes made (whether rightly or wrongly) that expert witnesses lack objectivity, or have coloured their evidence in favour of the party calling them.

#### Guidelines

##### 1. General Duty to the Court<sup>66</sup>

- 1.1 An expert witness has an overriding duty to assist the Court on matters relevant to the expert's area of expertise.
- 1.2 An expert witness is not an advocate for a party even when giving testimony that is necessarily evaluative rather than inferential.
- 1.3 An expert witness's paramount duty is to the Court and not to the person retaining the expert.

---

<sup>65</sup> As to the distinction between expert opinion evidence and expert assistance see *Evans Deakin Pty Ltd v Sebel Furniture Ltd* [2003] FCA 171 per Allsop J at [676].

<sup>66</sup> The "*Ikarian Reefer*" (1993) 20 FSR 563 at 565-566.

## 2. The Form of the Expert's Report<sup>67</sup>

- 2.1 An expert's written report must comply with Rule 23.13 and therefore must
- (a) be signed by the expert who prepared the report; and
  - (b) contain an acknowledgement at the beginning of the report that the expert has read, understood and complied with the Practice Note; and
  - (c) contain particulars of the training, study or experience by which the expert has acquired specialised knowledge; and
  - (d) identify the questions that the expert was asked to address; and
  - (e) set out separately each of the factual findings or assumptions on which the expert's opinion is based; and
  - (f) set out separately from the factual findings or assumptions each of the expert's opinions; and
  - (g) set out the reasons for each of the expert's opinions; and
  - (ga) contain an acknowledgment that the expert's opinions are based wholly or substantially on the specialised knowledge mentioned in paragraph (c) above<sup>68</sup>; and
  - (h) comply with the Practice Note.
- 2.2 At the end of the report the expert should declare that "[the expert] has *made all the inquiries that [the expert] believes are desirable and appropriate and that no matters of significance that [the expert] regards as relevant have, to [the expert's] knowledge, been withheld from the Court.*"
- 2.3 There should be included in or attached to the report the documents and other materials that the expert has been instructed to consider.
- 2.4 If, after exchange of reports or at any other stage, an expert witness changes the expert's opinion, having read another expert's report or for any other reason, the change should be communicated as soon as practicable (through the party's lawyers) to each party to whom the expert witness's report has been provided and, when appropriate, to the Court<sup>69</sup>.
- 2.5 If an expert's opinion is not fully researched because the expert considers that insufficient data are available, or for any other reason, this must be stated with an indication that the opinion is no more than a provisional one. Where an expert witness who has prepared a report believes that it may be incomplete or inaccurate without some qualification, that qualification must be stated in the report.
- 2.6 The expert should make it clear if a particular question or issue falls outside the relevant field of expertise.

---

<sup>67</sup> Rule 23.13.

<sup>68</sup> See also *Dasreef Pty Limited v Nawaf Hawchar* [2011] HCA 21.

<sup>69</sup> The "*Ikarian Reefer*" [1993] 20 FSR 563 at 565

- 2.7 Where an expert's report refers to photographs, plans, calculations, analyses, measurements, survey reports or other extrinsic matter, these must be provided to the opposite party at the same time as the exchange of reports<sup>70</sup>.

### **3. Experts' Conference**

- 3.1 If experts retained by the parties meet at the direction of the Court, it would be improper for an expert to be given, or to accept, instructions not to reach agreement. If, at a meeting directed by the Court, the experts cannot reach agreement about matters of expert opinion, they should specify their reasons for being unable to do so.

J L B ALLSOP

Chief Justice

4 June 2013

---

<sup>70</sup> The "*Ikarian Reefer*" [1993] 20 FSR 563 at 565-566. See also Ormrod "*Scientific Evidence in Court*" [1968] Crim LR 240

## Appendix D. Curriculum Vitae

### Simon M. Wheatley

5 Maple Street  
Blackburn VIC 3130  
Tel: +61 3 9878 7985  
E-mail: [swhe4155@bigpond.net.au](mailto:swhe4155@bigpond.net.au)



### Overview

Simon is a consultant and was until 2008 a Professor of Finance at the University of Melbourne. Since 2008, Simon has applied his finance expertise in investment management and consulting outside the university sector. Simon's interests and expertise are in individual portfolio choice theory, testing asset-pricing models and determining the extent to which returns are predictable. Prior to joining the University of Melbourne, Simon taught finance at the Universities of British Columbia, Chicago, New South Wales, Rochester and Washington.

### Personal

Nationalities:	U.K. and U.S.
Permanent residency:	Australia

### Employment

- Affiliated Industry Expert, NERA Economic Consulting, 2014-
- Special Consultant, NERA Economic Consulting, 2009-2014
- External Consultant, NERA Economic Consulting, 2008-2009
- Quantitative Analyst, Victorian Funds Management Corporation, 2008-2009
- Adjunct, Melbourne Business School, 2008
- Professor, Department of Finance, University of Melbourne, 2001-2008
- Associate Professor, Department of Finance, University of Melbourne, 1999-2001
- Associate Professor, Australian Graduate School of Management, 1994-1999
- Visiting Assistant Professor, Graduate School of Business, University of Chicago, 1993-1994
- Visiting Assistant Professor, Faculty of Commerce, University of British Columbia, 1986

- Assistant Professor, Graduate School of Business, University of Washington, 1984-1993

## Education

- Ph.D., University of Rochester, USA, 1986; Major area: Finance; Minor area: Applied statistics; Thesis topic: Some tests of international equity market integration; Dissertation committee: Charles I. Plosser (chairman), Peter Garber, Clifford W. Smith, Rene M. Stulz
- M.A., Economics, Simon Fraser University, Canada, 1979
- M.A., Economics, Aberdeen University, Scotland, 1977

## Publicly Available Reports

Review of the Literature in Support of the Sharpe-Lintner CAPM, the Black CAPM and the Fama-French Three-Factor Model A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA PowerNetworks, and United Energy, March 2015, <https://www.aer.gov.au/sites/default/files/United%20Energy%20-%20Submission%20on%20JGN%20draft%20decision%20-%20NERA%20Sharpe-Lintner%20Black%20CAPMs%20-%202027%20March%202015.pdf>

Estimating Distribution and Redemption Rates from Taxation Statistics A report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA PowerNetworks and United Energy, March 2015, <https://www.aer.gov.au/sites/default/files/United%20Energy%20-%20Submission%20on%20JGN%20draft%20decision%20-%20NERA%20Redemption%20rates%20-%202027%20March%202015.pdf>

Empirical performance of Sharpe-Lintner and Black CAPMs: A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, AusNet Services, CitiPower, Energex, Ergon Energy, Powercor, SA Power Networks, and United Energy, February 2015, <http://jemena.com.au/Gas/Jemena/media/jemenagasnetworksmedia/community-engagement-document/our-revised-regulatory-proposal/Appendix%2007.08%20NERA%20Empirical%20performance%20of%20the%200Sharpe-Lintner%20and%20Black%20CAPMs%20-%202026%20Feb%2015.pdf>

Historical estimates of the market risk premium: A report for Jemena Gas Networks, Jemena Electricity Networks, ActewAGL, Ausgrid, AusNet Services, Australian Gas Networks, CitiPower, Endeavour Energy, Energex, Ergon, Essential Energy, Powercor, SA Power Networks and United Energy, February 2015, <http://jemena.com.au/Gas/Jemena/media/jemenagasnetworksmedia/community-engagement-document/our-revised-regulatory-proposal/Appendix%2007.07%20NERA%20Historical%20estimates%20of%20the%20MRP%20-%202013%20Feb%2015.pdf>

Robust regression techniques: A report for DBP, December 2014, <https://www.erawa.com.au/cproot/13287/2/Submission%2012%20-%20Appendix%20F%20-%20Robust%20Regression.PDF>

Imputation Credits and Equity Returns: A report for the Energy Networks Association, October 2013, <http://www.aer.gov.au/sites/default/files/ENA,%20Attachment%204%20-%20NERA%20Report%20-%20Imputation%20Credits%20and%20Equity%20Prices,%20Submission%20to%20draft%20AER%20rate%20of%20return%20guideline%20-%202011%20Oct%202013.pdf>

The Fama-French Three-Factor Model: A report for the Energy Networks Association, October 2013, <http://www.aer.gov.au/sites/default/files/Essential%20Energy%20-%20Attachment%207.9%20NERA%20The%20Fama-French%20Three-Factor%20Model%20-%20202014.pdf>

The Market Risk Premium: Analysis in Response to the AER's Draft Rate of Return Guidelines: A report for the Energy Networks Association, October 2013, <http://www.aer.gov.au/sites/default/files/ENA,%20Attachment%203%20-%20NERA%20Report%20-%20The%20Market%20Risk%20Premium,%20Submission%20to%20draft%20AER%20rate%20of%20return%20guideline%20-%202011%20Oct%202013.pdf>

The Market, Size and Value Premiums: A report for the Energy Networks Association, June 2013, <http://www.aer.gov.au/sites/default/files/Report%2015%20-%20ENAMRPReport28062013%20Final.pdf>

Estimates of the Zero-Beta Premium: A report for the Energy Networks Association, June 2013, [http://www.aer.gov.au/sites/default/files/Report%202%20-%20Black%20CAPM%20Zero%20Beta%20Estimate%20\(Final\)%20-%202027%20June..pdf](http://www.aer.gov.au/sites/default/files/Report%202%20-%20Black%20CAPM%20Zero%20Beta%20Estimate%20(Final)%20-%202027%20June..pdf)

The Payout Ratio: A report for the Energy Networks Association, June 2013, [http://www.aer.gov.au/sites/default/files/Report%2012%20-%20Payout%20Ratio%20\(Final\)%20-%2020June%202013.pdf](http://www.aer.gov.au/sites/default/files/Report%2012%20-%20Payout%20Ratio%20(Final)%20-%2020June%202013.pdf)

Review of Cost of Equity Models: A report for the Energy Networks Association, June 2013, [http://www.aer.gov.au/sites/default/files/Report%201%20-%20Alternative%20Cost%20of%20Equity%20Models%20\(Final\)%20-%202026%20June.pdf](http://www.aer.gov.au/sites/default/files/Report%201%20-%20Alternative%20Cost%20of%20Equity%20Models%20(Final)%20-%202026%20June.pdf)

The Cost of Equity for a Regulated Energy Utility: A Response to the QCA Discussion Paper on the Risk-Free Rate and the MRP: A report for United Energy and Multinet Gas, March 2013, <http://www.qca.org.au/files/CI-UEM-SubNERA-CCR1213-0413.pdf>

The Cost of Equity for a Regulated Energy Utility: A report for Multinet, February 2013, <http://www.erawa.com.au/cproot/11197/2/20130312%20-%20D103642%20-%20Guidelines%20for%20the%20Rate%20of%20Return%20for%20Gas%20Transmission%20and%20Distribution%20Networks%20-%20United%20Energy%20and%20Multinet%20Gas.pdf>

The Black CAPM: A report for APA Group, Envestra, Multinet & SP AusNet, March 2012,

<http://www.aer.gov.au/sites/default/files/Attachment%209.6%20NERA%20-%20Black%20CAPM%20Report%20March%202012.pdf>

Prevailing Conditions and the Market Risk Premium: A report for APA Group, Envestra, Multinet & SP AusNet, March 2012,

<http://www.aer.gov.au/content/item.phtml?itemId=753605&nodeId=418ee68d5b881d58515e4f39d9d3aee3&fn=G-5%20NERA%20%20Prevailing%20Conditions%20and%20the%20Market%20Risk%20Premium%20March%202012.pdf>

The Market Risk Premium: A report for CitiPower, Jemena, Powercor, SP AusNet and United Energy, 20 February 2012,

[http://www.aer.gov.au/content/item.phtml?itemId=752660&nodeId=fe0280e7e2113c467dfc4b3b076e1623&fn=Vic%20DNSPs%20\(NERA\)%20-%2020%20February%202012.pdf](http://www.aer.gov.au/content/item.phtml?itemId=752660&nodeId=fe0280e7e2113c467dfc4b3b076e1623&fn=Vic%20DNSPs%20(NERA)%20-%2020%20February%202012.pdf)

Cost of Equity in the ERA DBNGP Draft Decision: A report for DBNGP, 17 May 2011,

[http://www.erawa.com.au/cproot/9669/2/20110620%20-%20DBNGP%20\(WA\)%20%20-%20Sub%2055%20-%20Att%207%20-%20NERA%20Economic%20Consulting%20Cost%20of%20equity%20in%20the%20draft%20decision.pdf](http://www.erawa.com.au/cproot/9669/2/20110620%20-%20DBNGP%20(WA)%20%20-%20Sub%2055%20-%20Att%207%20-%20NERA%20Economic%20Consulting%20Cost%20of%20equity%20in%20the%20draft%20decision.pdf)

The Market Risk Premium: A report for Multinet Gas and SP AusNet, 29 April 2011,

<http://www.aer.gov.au/content/index.phtml/itemId/745782>

Cost of Capital for Water Infrastructure Company Report for the Queensland Competition Authority, 28 March 2011,

<http://www.qca.org.au/files/W-NERA-EconomicConsulting-FinalReport-WACC-0411.pdf>

The Cost of Equity: A report for Orion, 2 September 2010,

<http://www.comcom.govt.nz/assets/Pan-Industry/Input-Methodologies/Draft-Reasons-Papers/Draft-Reasons-EDBs/Draft-Determination-X-Sub/Orion-Cross-Submission-Attachment-on-EDBs-and-GPBs-Input-Methodologies-Draft-Determination-and-Reasons-Paper-NERA-Report-2-September-2010.pdf>

New Gamma Issues Raised by AER Expert Consultants: A report for JGN, 17 May 2010,

[http://www.aer.gov.au/content/item.phtml?itemId=736652&nodeId=dea014515519350384275dccc6b56018&fn=JGN%20further%20submission%20on%20gamma%20\(18%20May%202010\).pdf](http://www.aer.gov.au/content/item.phtml?itemId=736652&nodeId=dea014515519350384275dccc6b56018&fn=JGN%20further%20submission%20on%20gamma%20(18%20May%202010).pdf)

The Required Rate of Return on Equity for a Gas Transmission Pipeline: A Report for DBP, 31 March 2010,

<http://www.erawa.com.au/cproot/8512/2/20100503%20D29252%20DBNGP%20-%20Submission%208%20-%20Annexure%201%20-%20The%20Required%20Rate%20of%20Return%20on%20Equity%20for%20a%20Gas%20Transmission%20Pipeline.pdf>

Jemena Access Arrangement Proposal for the NSW Gas Networks: AER Draft Decision: A report for Jemena, 19 March 2010,

<http://www.aer.gov.au/content/item.phtml?itemId=735229&nodeId=4dc041cfe6e30a2c2b91e833cad31191&fn=Appendix%205.1%20-%20NERA%20-%20FAMA%20French%20Report.pdf>

Payout Ratio of Regulated Firms: A report for Gilbert + Tobin, 5 January 2010,

[http://www.aer.gov.au/content/item.phtml?itemId=735236&nodeId=10e87413b13d1da23cd55faf20a6918d&fn=Appendix%206.3D%20-%20NERA%20\(4%20Jan%2010,%20ETSA\)%20Payout%20ratio%20of%20regulated%20firms.pdf](http://www.aer.gov.au/content/item.phtml?itemId=735236&nodeId=10e87413b13d1da23cd55faf20a6918d&fn=Appendix%206.3D%20-%20NERA%20(4%20Jan%2010,%20ETSA)%20Payout%20ratio%20of%20regulated%20firms.pdf)

Review of Da, Guo and Jagannathan Empirical Evidence on the CAPM: A report for Jemena Gas Networks, 21 December 2009,

<http://www.ipart.nsw.gov.au/files/Submission%20-%20Alternative%20approaches%20to%20the%20determination%20of%20the%20cost%20of%20equity%20-%20Jemena%20-%20Sandra%20Gamble%20-%2022%20December%202009%20-%20APD%20-%20Website.PDF>

The Value of Imputation Credits for a Regulated Gas Distribution Business: A report for WA Gas Networks, 18 August 2009, summarized in:

<http://www.erawa.com.au/cproot/8357/2/20100215%20WAGN%20-%20Proposed%20Revisions%20to%20the%20AA%20for%20the%20WAGN%20Gas%20Distribution%20Systems%20Submission%20-%20Public%20Version.pdf>

Cost Of Equity - Fama-French Three-Factor Model Jemena Gas Networks (NSW), 12 August 2009,

<http://www.aer.gov.au/content/item.phtml?itemId=730699&nodeId=4fcc57398775fe84685434e0b749d76a&fn=Appendix%209.1%20-%20NERA%20-%20Cost%20of%20equity%20-%20Fama-French%20Model.pdf>

Estimates of the Cost of Equity: A report for WAGN, 22 April 2009, summarized in:

<http://www.erawa.com.au/cproot/8357/2/20100215%20WAGN%20-%20Proposed%20Revisions%20to%20the%20AA%20for%20the%20WAGN%20Gas%20Distribution%20Systems%20Submission%20-%20Public%20Version.pdf>

AER's Proposed WACC Statement – Gamma: A report for the Joint Industry Associations, 30 January 2009,

<http://www.aer.gov.au/content/item.phtml?itemId=726698&nodeId=80cf978278d317e99c34ae1878525573&fn=JIA%20Appendix%20Q%20-%20NERA%20-%20AER's%20proposed%20WACC%20statement-Gamma.pdf>

The Value of Imputation Credits: A report for the ENA, Grid Australia and APIA, 11 September 2008, <http://www.ena.asn.au/udocs/24092008aersub/Appendix%20K%20-%20The%20value%20of%20imputation%20credits%20-%20NERA.pdf>



## Consulting Experience

NERA, 2008-present

Lumina Foundation, Indianapolis, 2009

Industry Funds Management, 2010

## Academic Publications

Imputation credits and equity returns, (with Paul Lajbcygier), 2012, *Economic Record* 88, 476-494.

Do measures of investor sentiment predict returns? (with Robert Neal), 1998, *Journal of Financial and Quantitative Analysis* 33, 523-547.

Adverse selection and bid-ask spreads: Evidence from closed-end funds (with Robert Neal), 1998, *Journal of Financial Markets* 1, 121-149.

Shifts in the interest-rate response to money announcements: What can we say about when they occur? (with V. Vance Roley), 1996, *Journal of Business and Economic Statistics* 14, 135-138.

International investment restrictions and closed-end country fund prices, (with Catherine Bonser-Neal, Gregory Brauer, and Robert Neal), 1990, *Journal of Finance* 45, 523-547 (reprinted in *International Capital Markets Volume III*, 2003, G. Andrew Karolyi and Rene M. Stulz, editors, Edward Elgar Publishing, Cheltenham, Glos).

A critique of latent variable tests of asset pricing models, 1989, *Journal of Financial Economics* 21, 177-212.

Some tests of international equity market integration, 1988, *Journal of Financial Economics* 21, 177-212 (reprinted in *International Capital Markets Volume I*, 2003, G. Andrew Karolyi and Rene M. Stulz, editors, Edward Elgar Publishing, Cheltenham, Glos).

Some tests of the consumption-based asset pricing model, 1988, *Journal of Monetary Economics* 22, 193-215.

## Working Papers

An evaluation of some alternative models for pricing Australian stocks (with Paul Lajbcygier), 2009.

Intertemporal substitution, small-sample bias, and the behaviour of U.S. household consumption (with Kogulakrishnan Maheswaran and Robert Porter), 2007.

Keeping up with the Joneses, human capital, and the home-equity bias (with En Te Chen), 2003.

Evaluating asset pricing models, 1998.

Time-non-separable preferences or artifact of temporal aggregation? (with Robert Porter), 2002.

Testing asset pricing models with infrequently measured factors, 1989.

## **Refereeing Experience**

Referee for Accounting and Finance, the Australian Journal of Management, Economic Letters, Financial Analysts Journal, Financial Management, Journal of Accounting and Economics, Journal of Business, Journal of Empirical Finance, Journal of Finance, Journal of Financial and Quantitative Analysis, Journal of Financial Economics, Journal of Futures Markets, Journal of International Economics, Journal of International Money and Finance, Journal of Money, Credit, and Banking, Journal of Monetary Economics, Management Science, National Science Foundation, Pacific-Basin Finance Journal, and the Review of Financial Studies.

Program Committee for the Western Finance Association in 1989 and 2000.

## **Teaching Experience**

International Finance, Melbourne Business School, 2008

Corporate Finance, International Finance, Investments, University of Melbourne, 1999-2008

Corporate Finance, International Finance, Investments, Australian Graduate School of Management, 1994-1999

Investments, University of Chicago, 1993-1994

Investments, University of British Columbia, 1986

International Finance, Investments, University of Washington, 1984-1993

Investments, Macroeconomics, Statistics, University of Rochester, 1982

Accounting, 1981, Australian Graduate School of Management, 1981

## **Teaching Awards**

MBA Professor of the Quarter, Summer 1991, University of Washington

## **Computing Skills**

User of SAS since 1980. EViews, Excel, EXP, LaTeX, Matlab, Powerpoint, Visual Basic. Familiar with the Australian School of Business, Compustat and CRSP databases. Some familiarity with Bloomberg, FactSet and IRESS.

## **Board Membership**

Anglican Funds Committee, Melbourne, 2008-2011

## **Honours**

Elected a member of Beta Gamma Sigma, June 1986.

## **Fellowships**

Earhart Foundation Award, 1982-1983

University of Rochester Fellowship, 1979-1984

Simon Fraser University Fellowship, 1979

Inner London Education Authority Award, 1973-1977

## **Report qualifications/assumptions and limiting conditions**

This report is for the exclusive use of the NERA Economic Consulting client named herein. This report is not intended for general circulation or publication, nor is it to be reproduced, quoted or distributed for any purpose without the prior written permission of NERA Economic Consulting. There are no third party beneficiaries with respect to this report, and NERA Economic Consulting does not accept any liability to any third party.

Information furnished by others, upon which all or portions of this report are based, is believed to be reliable but has not been independently verified, unless otherwise expressly indicated. Public information and industry and statistical data are from sources we deem to be reliable; however, we make no representation as to the accuracy or completeness of such information. The findings contained in this report may contain predictions based on current data and historical trends. Any such predictions are subject to inherent risks and uncertainties. NERA Economic Consulting accepts no responsibility for actual results or future events.

The opinions expressed in this report are valid only for the purpose stated herein and as of the date of this report. No obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

All decisions in connection with the implementation or use of advice or recommendations contained in this report are the sole responsibility of the client. This report does not represent investment advice nor does it provide an opinion regarding the fairness of any transaction to any and all parties.

# NERA

ECONOMIC CONSULTING

NERA Economic Consulting  
Darling Park Tower 3  
201 Sussex Street  
Sydney NSW 2000  
Australia  
Tel: 61 2 8864 6500 Fax: 61 2 8864 6549  
[www.nera.com](http://www.nera.com)

# JONES DAY

AURORA PLACE • LEVEL 41, 88 PHILLIP STREET • SYDNEY NSW 2000

TELEPHONE: +61.2.8272.0500 • FACSIMILE: +61.2.8272.0599

24 June 2015

**Partner**

Nicolas Taylor

Telephone: +61 2 8272 0715

Email: NJTaylor@JonesDay.com

## TERMS OF REFERENCE

### **Estimating distribution rates and redemption rates from taxation statistics: A response to the critique prepared by Handley (May 2015)**

#### **Background**

The Australian Energy Regulator (AER) is empowered to make five yearly regulatory determinations that control the aggregate average prices charged by regulated energy network businesses. The National Electricity Rules provide for a Regulated Asset Base (RAB) to be established and updated annually and for an operational expenditure allowance. A further key component of the regulatory determination is the allowed rate of return for debt and equity (or weighted average cost of capital) for funding the business. The principal Rules governing how the AER sets the allowed rate of return on debt for electricity distribution businesses are contained in Rule 6.5.2 of the National Electricity Rules (see attached). The same Rules in essentially the same terms apply to gas distribution businesses.

When the AER exercises the relevant regulatory powers under the National Electricity Rules, it is also required to apply section 16 of the National Electricity Law (see attached). Specifically, section 16 provides that *the AER must, in performing or exercising an AER economic regulatory function or power – (a) perform or exercise that function or power in a manner that will or is likely to contribute to the achievement of the national electricity objective....* That national electricity objective is set out in section 7 of the National Electricity Law as: *‘The objective of this Law 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- (a) price, quality, safety, reliability and security of supply of electricity; and (b) the reliability, safety and security of the national electricity system.’*

Additionally the Rules require the AER to publish a Rate of Return Guideline which explains how the regulator intends to apply the Rules (attached). The AER has recently published final determinations for the NSW and ACT electricity networks, and for Jemena Gas Networks<sup>1</sup>.

---

<sup>1</sup> See, for instance:

Preliminary determinations have also been published for the Queensland electricity distributors, and for SA Power Networks<sup>2</sup>.

The National Electricity Rules require that the estimated cost of corporate income tax for a network service provider include a value for imputation credits, gamma.<sup>3</sup> Gamma represents the value that equity investors place on imputation credits created through the payment of company income tax and is generally estimated as the product of two elements:<sup>4</sup>

- The *payout* ratio, being the proportion of created credits distributed by companies to their shareholders; and
- *theta*, the market value of distributed imputation credits as a proportion of their face value.

In the AER's post tax revenue model, the value of gamma is used to determine the proportion of the assumed company income tax that does not need to be included in a regulated firm's annual revenue requirement.

## Engagement

You are engaged by Jones Day on behalf of United Energy and a consortium of other businesses to provide the work (set out below). Specifically, you have been retained by ActewAGL distribution, Australian Gas Networks, APA Group, AusNet Services, Citipower, Ergon Energy, Jemena Electricity Networks, Powercor, SA Power Networks, and United Energy.

## Scope of work

Associate Professor Handley has asserted, with reference to the Officer (1994) paper that<sup>5</sup>:

The value of distributed credits and the proportion of credits redeemed are the same thing when one uses the proper definition of "value" in relation to theta (and gamma). Specifically, theta is equal to the value of a dollar of distributed credits before personal taxes and before personal costs – an amount which corresponds to the

---

(continued...)

AER (2015), Ausgrid distribution determination, 2015–16 to 2018–19, Attachment 4 – Value of imputation credits, April 2015.

AER (2015), FINAL DECISION, Jemena Gas Networks (NSW) Ltd, Access Arrangement 2015-20, Attachment 4 – Value of imputation credits, June 2015.

<sup>2</sup> See, for instance:

AER (2015), PRELIMINARY DECISION, SA Power Networks determination, 2015–16 to 2019–20, Attachment 4 – Value of imputation credits, April 2015

<sup>3</sup> Australian Energy Market Commission, *National Electricity Rules Version 69*, page 661.

<sup>4</sup> More specifically, the PTRM provides an allowance to a benchmark efficient entity for the costs of meeting corporate tax obligations. A higher value of gamma in the PTRM will imply that the model provides a lower allowance for the benchmark entity to satisfy its tax obligations. The "net tax allowance" is a component of the annual revenue requirement.

<sup>5</sup> Handley (2015), Advice on the NERA Report: Estimating Distribution and Redemption Rates from Taxation Statistics, a report prepared for the Australian Energy Regulator by John C. Handley, 20<sup>th</sup> May 2015.

proportion of credits redeemed. This is why Officer (1994) uses both descriptions interchangeably when referring to gamma in his seminal paper.

The proportion of credits redeemed is also referred to as the redemption value or utilisation value of credits. The AER appears to have endorsed the Handley report (from May 2015)<sup>6</sup>.

NERA is asked to provide and review evidence on the value that the market places on imputation credits distributed. In particular, United Energy has asked NERA to:

- Explain whether and how the redemption rate and the value (theta) to a representative investor of a distributed imputation credit are related.
- Examine whether the methods and data sources used to estimate the distribution rate should be the same as the methods and data sources used to infer a value for theta.
- Consider the comments that Handley makes about the algebraic framework presented by NERA to permit an analysis of imputation credit yields, the rate at which credits distributed are redeemed, and the value placed by investors on a distributed imputation credit. The NERA framework is consistent with that presented in the published paper, Lajbcygier and Wheatley (2012)<sup>7</sup>.
- Respond to any other matters raised by the Australian Energy Regulator (AER) in its recently published *Final decision, Jemena Gas Networks (NSW) Ltd, Access arrangement 2015-20* and in other recent AER decisions.

## Reporting

Jeremy Rothfield of United Energy and Multinet Gas will serve as the primary contact for the period of the engagement. His contact details are as follows:

Jeremy Rothfield

Economist  
United Energy and Multinet Gas  
Level 1  
Pinewood Corporate Centre  
43-45 Centreway Place  
Mount Waverley VICTORIA 3149  
P.O. Box 449  
Mount Waverley VICTORIA 3149  
Email: Jeremy.Rothfield@ue.com.au

Telephone: (03) 88469854

The consultant will prepare reports showing the work-in-progress on a regular basis. The consultant will make periodic presentations on analysis and advice as appropriate.

<sup>6</sup> AER (2015), FINAL DECISION, Jemena Gas Networks (NSW) Ltd, Access Arrangement 2015-20, Attachment 4 – Value of imputation credits, June 2015; page 4-63.

<sup>7</sup> Lajbcygier, P. and S. M. Wheatley, Imputation credits and equity returns, Economic Record, 2012, pages 478.



## **Conflicts**

The consultant is to identify any current or potential future conflicts.

## **Compliance with the Code of Conduct for Expert Witnesses**

Attached as **Annexure 1** is a copy of the Federal Court's Practice Note CM 7, entitled "Expert Witnesses in Proceedings in the Federal Court of Australia", which comprises the guidelines for expert witnesses in the Federal Court of Australia (Expert Witness Guidelines).

Please read and familiarise yourself with the Expert Witness Guidelines, and comply with them at all times over the course of your engagement with United Energy and Multinet Gas.

In particular, your report prepared for United Energy and Multinet Gas should contain a statement at the beginning of the report to the effect that the author of the report has read, understood and complied with the Expert Witness Guidelines.

Your report must also:

1. contain particulars of the training, study or experience by which the expert has acquired specialised knowledge;
2. identify the questions that the expert has been asked to address;
3. set out separately each of the factual findings or assumptions on which the expert's opinion is based;
4. set out each of the expert's opinions separately from the factual findings or assumptions;
5. set out the reasons for each of the expert's opinions; and
6. otherwise comply with the Expert Witness Guidelines.

The expert is also required to state that each of the expert's opinions is wholly or substantially based on the expert's specialised knowledge.

The declaration contained within the report should be that "[the expert] has made all the inquiries that [the expert] believes are desirable and appropriate and that no matters of significance that [the expert] regards as relevant have, to [the expert's] knowledge, been withheld from the report".

Please also attach a copy of these terms of reference to the report.

## **Fees**

The consultant is requested to submit:

- a fixed total fee for the project and hourly rates for the proposed project team should additional work be required; and

- details of the individuals who will provide the strategic analysis and advice.

**Contacts**

Any questions regarding this terms of reference should be directed to:

Nick Taylor (Jones Day)

Email: [njtaylor@jonesday.com](mailto:njtaylor@jonesday.com)

Phone: 02 8272 0500

Kind regards

A handwritten signature in black ink that reads "Nicolas Taylor". The signature is written in a cursive, flowing style.

**Nicolas Taylor**

Partner

## Annexure 1

**FEDERAL COURT OF AUSTRALIA**  
**Practice Note CM 7**  
**EXPERT WITNESSES IN PROCEEDINGS IN THE**  
**FEDERAL COURT OF AUSTRALIA**

*Practice Note CM 7 issued on 1 August 2011 is revoked with effect from midnight on 3 June 2013 and the following Practice Note is substituted.*

### Commencement

1. This Practice Note commences on 4 June 2013.

### Introduction

2. Rule 23.12 of the Federal Court Rules 2011 requires a party to give a copy of the following guidelines to any witness they propose to retain for the purpose of preparing a report or giving evidence in a proceeding as to an opinion held by the witness that is wholly or substantially based on the specialised knowledge of the witness (see **Part 3.3 - Opinion** of the Evidence Act 1995 (Cth)).
3. The guidelines are not intended to address all aspects of an expert witness's duties, but are intended to facilitate the admission of opinion evidence<sup>8</sup>, and to assist experts to understand in general terms what the Court expects of them. Additionally, it is hoped that the guidelines will assist individual expert witnesses to avoid the criticism that is sometimes made (whether rightly or wrongly) that expert witnesses lack objectivity, or have coloured their evidence in favour of the party calling them.

### Guidelines

#### **1. General Duty to the Court<sup>9</sup>**

- 1.1 An expert witness has an overriding duty to assist the Court on matters relevant to the expert's area of expertise.
- 1.2 An expert witness is not an advocate for a party even when giving testimony that is necessarily evaluative rather than inferential.
- 1.3 An expert witness's paramount duty is to the Court and not to the person retaining the expert.

#### **2. The Form of the Expert's Report<sup>10</sup>**

---

<sup>8</sup> As to the distinction between expert opinion evidence and expert assistance see *Evans Deakin Pty Ltd v Sebel Furniture Ltd* [2003] FCA 171 per Allsop J at [676].

<sup>9</sup> The *"Ikarian Reefer"* (1993) 20 FSR 563 at 565-566.

<sup>10</sup> Rule 23.13.

- 2.1 An expert's written report must comply with Rule 23.13 and therefore must
- (a) be signed by the expert who prepared the report; and
  - (b) contain an acknowledgement at the beginning of the report that the expert has read, understood and complied with the Practice Note; and
  - (c) contain particulars of the training, study or experience by which the expert has acquired specialised knowledge; and
  - (d) identify the questions that the expert was asked to address; and
  - (e) set out separately each of the factual findings or assumptions on which the expert's opinion is based; and
  - (f) set out separately from the factual findings or assumptions each of the expert's opinions; and
  - (g) set out the reasons for each of the expert's opinions; and
  - (ga) contain an acknowledgment that the expert's opinions are based wholly or substantially on the specialised knowledge mentioned in paragraph (c) above<sup>11</sup>; and
  - (h) comply with the Practice Note.
- 2.2 At the end of the report the expert should declare that "[the expert] has made all the inquiries that [the expert] believes are desirable and appropriate and that no matters of significance that [the expert] regards as relevant have, to [the expert's] knowledge, been withheld from the Court."
- 2.3 There should be included in or attached to the report the documents and other materials that the expert has been instructed to consider.
- 2.4 If, after exchange of reports or at any other stage, an expert witness changes the expert's opinion, having read another expert's report or for any other reason, the change should be communicated as soon as practicable (through the party's lawyers) to each party to whom the expert witness's report has been provided and, when appropriate, to the Court<sup>12</sup>.
- 2.5 If an expert's opinion is not fully researched because the expert considers that insufficient data are available, or for any other reason, this must be stated with an indication that the opinion is no more than a provisional one. Where an expert witness who has prepared a report believes that it may be incomplete or inaccurate without some qualification, that qualification must be stated in the report.
- 2.6 The expert should make it clear if a particular question or issue falls outside the relevant field of expertise.
- 2.7 Where an expert's report refers to photographs, plans, calculations, analyses, measurements, survey reports or other extrinsic matter, these must be provided to the opposite party at the same time as the exchange of reports<sup>13</sup>.

### 3. Experts' Conference

- 3.1 If experts retained by the parties meet at the direction of the Court, it would be improper for an expert to be given, or to accept, instructions not to reach agreement. If, at a meeting directed by the

---

<sup>11</sup> See also *Dasreef Pty Limited v Nawaf Hawchar* [2011] HCA 21.

<sup>12</sup> The "Ikarian Reefer" [1993] 20 FSR 563 at 565

<sup>13</sup> The "Ikarian Reefer" [1993] 20 FSR 563 at 565-566. See also Ormrod "Scientific Evidence in Court" [1968] Crim LR 240

Court, the experts cannot reach agreement about matters of expert opinion, they should specify their reasons for being unable to do so.

J L B ALLSOP  
Chief Justice  
4 June 2013