Report prepared for the

Australian Energy Regulator

Advice on the NERA Report: *Estimating Distribution and Redemption Rates from Taxation Statistics*

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PREAMBLE

The Australian Energy Regulator (AER) is currently undertaking a regulatory determination for Jemena Gas Networks (JGN). The AER published the draft decision in late November 2014. Following the receipt of JGN's revised regulatory proposal in late February 2015, the AER now seeks further expert advice on a number of matters in relation to the value of imputation credits to inform its assessment of the rate of return for JGN.

In particular, the AER has asked that I respond to the NERA (2015) report which relates to the estimation of the value of imputation credits.

1. RESPONSE TO THE NERA (2015) REPORT

NERA was asked by a number of service providers, including JGN, to update its estimates of the rate at which imputation credits are distributed and to respond to matters raised by the AER in its draft decision. In this section, I set out one by one the main issues raised by NERA in its report followed by my response.

(a) Gamma represents the value of a dollar of credits created to a representative shareholder and not the proportion of credits created that are redeemed[1]

NERA states: *"While Professor Robert Officer of the University of Melbourne is a natural authority to whom to turn, extracting an interpretation from his 1994 paper is complicated by the fact that in that paper he defines gamma to be two quantities that will in general differ. In his 1994 paper, Officer defines gamma to be both:*

- *the proportion of credits created that are redeemed; and*
- *the value of a dollar of tax credits created to a representative shareholder.*

We emphasise that gamma should be interpreted as the value of a dollar of tax credits created to a representative shareholder and not the proportion of credits created that are redeemed." [2]

and further:

"an estimate of the proportion of credits created that are redeemed is unlikely to provide an unbiased estimate of the value of a dollar of tax credits created to a representative shareholder." [3]

[1] Although NERA refers to gamma, their comments similarly apply to theta.
[2] NERA (2015 p.i)
[3] NERA (2015 p.ii)

Response

The value of distributed credits and the proportion of credits redeemed [4] 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.

We are interested in the value of credits to the market as a whole. Based on the CAPM suggested by Officer (1994), the equilibrium value of a dollar of distributed imputation credits is given by:

$$\theta = \frac{\sum \frac{\omega_i \theta_i}{\lambda_i}}{\sum \frac{\omega_i}{\lambda_i}} \quad (1)$$

where ω_i is the proportion of risky assets in the market held by investor i, λ_i is a measure of investor i's relative risk aversion and the summation is taken over all investors $i = 1, .., m$ in the market. Equation (1) states that in equilibrium, theta represents a weighted average of individual investors' utilisation rates where the weights are based on investors' levels of wealth and risk aversion.

NERA presents a simple equilibrium model to show that a wedge may arise between the value of a dollar of credits to a representative shareholder and the proportion of credits redeemed in aggregate.[5] The reason for the wedge is that different investors may choose to invest in different portfolios of risky assets. In comparison, a key result of the Sharpe-CAPM is that all investors choose to

[4] The proportion of credits redeemed is also referred to as the redemption value or utilisation value of credits.

[5] NERA assumes: (i) there are two types of investor (domestic, who fully value credits and foreign, who place no value on credits); (ii) there are two risky assets – one domestic which distributes credits and one foreign which does not; (iii) a common risk free rate at which investors can freely borrow or lend; (iv) a common currency, and (v) each investor is equally risk averse.

invest in the same portfolio of risky assets – the "market portfolio"[6]. Under the Sharpe-CAPM, the proportion[7] of total risky assets held by an investor and the proportion of any single risky asset held by that investor are the same. For example, if an investor holds 5% of the market portfolio then the investor will hold 5% of each and every asset in the market portfolio. Under NERA's model, the proportion of total risky assets held by an investor and the proportion of any single risky asset held by that investor may differ. For example, if an investor holds 5% of the market portfolio then the investor may hold 5%, less than 5% or more than 5% of any particular asset in the market portfolio.

In NERA's model:

(i) the equilibrium value of a dollar of distributed imputation credits to a representative investor is:

$$\theta = \frac{D}{D+F} \tag{2}$$

where D is the total wealth of domestic investors and F is the total wealth of foreign investors; and

(ii) the redemption rate is given by the ratio of domestic holdings of the domestic risky asset to the total holdings of that asset:

$$R = \frac{D\left(1+{c_1}/{\alpha_{12}}\right)}{D\left(1+{c_1}/{\alpha_{12}}\right)+F} \tag{3}$$

where c_1 is the credit yield on the domestic asset and α_{12} is the "benefit" to a foreign investor of holding the domestic risky asset.

[6] Investors with different levels of risk aversion will still choose to invest different proportions of their total wealth in risky assets with the balance invested in the risk free asset.
[7] By value.

NERA suggests that in general the value of credits given by (2) will differ from the redemption rate given by (3) and in particular, if $\alpha_{12} > 0$ then $R > \theta$.

The extent to which different investors hold different portfolios of risky assets and so the extent to which a wedge, if any, arises between the equilibrium value of a dollar of credits to a representative shareholder and the proportion of credits redeemed in aggregate will depend on several (largely unobservable) factors – investor utilisation rates, firm dividend policies, investor levels of risk aversion and the variance-covariance structure of returns (risk). Even if a wedge arises then it would not necessarily be material or necessarily be positive (upward biased). In NERA's model for example, there is no wedge, $R = \theta$ if $\alpha_{12} = 0$ whereas $R < \theta$ if $\alpha_{12} < 0$.[8]

The underlying issue here concerns the use of tax statistics to estimate theta. There is no dispute concerning the equilibrium definition of theta – as a complex weighted average of investor utilisation rates. The suggestion by NERA is that aggregate redemption rates should not be used to estimate theta:

"In a small open economy – like Australia – the proportion of credits created that are redeemed is likely to exceed by a substantial margin the value of a dollar of tax credits created to a representative shareholder." [9]

The problem with the NERA model is that it is an international asset pricing model – along the lines of the Black (1974) International CAPM – whereas the current framework is based within a domestic market setting. This means that domestic investors have only a small market weighting by definition. Clearly, the value of imputation credits in an international asset pricing model will be substantially different from the value of imputation credits in a domestic asset pricing model. In addition, NERA's numerical example assumes there is only a relatively small benefit to foreign investors from holding the domestic risky asset. Specifically, NERA assumes domestic investors hold a small proportion

[8] NERA notes that its model is not well equipped to handle the latter case. It is not clear how one can substitute $\alpha_{12} = 0$ into (3).
[9] NERA (2015 p.ii)

of total wealth (2%) and a relatively small benefit to foreign investors from holding the domestic risky asset ($\alpha_{12} = 0.02\%$) which gives a theta of 0.02 compared to a redemption rate of 0.67 – indicating a large wedge. But if instead, one assumes there is a relatively large benefit to foreign investors from holding the domestic risky asset ($\alpha_{12} = 8\%$) then this gives a theta of 0.02 compared to a redemption rate of 0.025 – thereby substantially reducing the wedge.[10] It is also noted that the definition of theta (2) in NERA's model differs from the definition of theta in (1).

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In my opinion, NERA's analysis does not establish the presence of a wedge between theta and the redemption rate and so does not invalidate the use of tax statistics to estimate theta.

(b) The approach to estimating theta can be independent of the approach to estimating the distribution rate

NERA states: *"There will only be a single value for theta – the value that a representative investor places on a dollar of tax credits distributed … Thus theta is not a firm specific parameter. The distribution rate, on the other hand, is a firm specific parameter … As theta should not vary from firm to firm, however, there should be no link between how one estimates theta and how one estimates the distribution rate"*. [11]

Response

It is correct to say that theta is not firm-specific and the distribution rate is firm-specific. But 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.

[10] If one assumes domestic investors hold a larger proportion of total wealth (say 60%) and there is a relatively large benefit to foreign investors from holding the domestic risky asset ($\alpha_{12} = 8\%$) then this gives a theta of 0.60 compared to a redemption rate of 0.65.
[11] NERA (2015 p.ii)

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.

(c) The distribution rate should be estimated across both public and private companies

NERA states: *"The most natural way of estimating a market-wide distribution rate is by using tax statistics aggregated across both private and public companies provided by the Australian Taxation Office (ATO)."* [12]

Response

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 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.

[12] NERA (2015 p.iii)

(d) Updated estimates of the distribution rate

Based on an analysis of the data contained in the 2011-12 edition of the ATO Taxation Statistics, NERA states:

"Thus 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."[13]

In relation to the distribution rate for public companies only, NERA states:

"Using tax statistics, we estimate the distribution rate for a public company over this period [2000-01 to 2011-12] to be 0.75. This evidence indicates, in light of the estimate of 0.80 that Handley (2014) reports for the period 1987-88 to 2010-11, that the distribution rate for public companies has fallen through time." [14]

Response

In my earlier report, I provided separate estimates of the cumulative payout ratio for public companies only and for private companies only, based on data appearing in the 2010-11 edition of the ATO Taxation Statistics. Specifically, I estimated the cumulative payout ratio for public companies, for the twenty-four year period from the start of the imputation tax system in 1987 to 2011, to be 0.8 and the cumulative payout ratio for private companies only, over the twenty-four year period from 1987 to 2011 to be 0.5.

In light of NERA's comments, I now update my analysis to take into account the more recent ATO dataset and also to provide estimates over two other, more recent estimation periods. In addition, I take into account NERA's observation[15] that the ATO definition of net tax for the 2003 to 2011 tax years is prior to

[13] NERA (2015 p.iv)
[14] NERA (2015 p.iv)
[15] NERA (2015 p.33)

deducting the (refundable) R&D tax offset and the ATO definition of net tax for the 2010 to 2012 tax years is prior to deducting refundable tax credits. Specifically, I estimate the total net tax paid each year to be equal to: (i) net tax, for each tax year from 1988 to 2002; (ii) net tax less the R&D tax offset, for each tax year from 2003 to 2009; (iii) net tax less the R&D tax offset and less other refundable credits, for each of the 2010 and 2011 tax years; and (iv) net tax less refundable tax offsets and less remainder of refundable tax offsets for the 2012 tax year. Otherwise, I have followed the same methodology as described in my earlier report.[16]

The total net tax paid by public companies for the twenty-five year period from 1987 to 2012 is estimated to be $465.7 billion. The FAB relating to public companies at the end of the 2012 tax year is $102.8 billion. This suggests a cumulative payout ratio, based on public companies only, of 0.8. In comparison, the total net tax paid by private companies for the twenty-five year period from 1987 to 2012 is estimated to be $287.1 billion. The FAB relating to private companies at the end of the 2012 tax year is $140.6 billion. This suggests a cumulative payout ratio, based on private companies only, of 0.5. I have similarly estimated the cumulative payout ratios for the periods 2001 to 2012 and 2004 to 2012. These estimates are summarized in the following table:

[16] See Handley (2014 p.28-29). I note that the ATO has changed its disclosure of non-membership period returns lodged by subsidiary companies that have consolidated during the year – these are now included in the balances for resident private, resident public, non-resident and other resident companies in Table 3 of the 2011-12 edition of Taxation Statistics.

Estimates of the Cumulative Payout Ratio				
	Handley	*Handley*	*Handley*	*NERA*
Period	*1988-2012*	*2001-2012*	*2004-2012*	*2001-2012*
	(2)	*(3)*	*(4)*	*(5)*
Public Companies				
Net Tax ($bn)	465.7	347.8	293.4	347.3
Change in FAB ($bn)	102.8	83.8	66.6	85.1
Cum Payout Ratio	0.78	0.76	0.77	0.755
Private Companies				
Net Tax ($bn)	287.1	204.3	173.3	204.8
Change in FAB ($bn)	140.6	98.8	77.4	101.4
Cum Payout Ratio	0.51	0.52	0.55	0.505
All Companies				
Net Tax ($bn)	778.2	566.9	479.8	566.9
Change in FAB ($bn)	245.7	184.0	145.6	183.8
Cum Payout Ratio	0.68	0.68	0.70	0.676

Column 5 of the table shows NERA's estimates for the period 2001-2012.[17] A comparison of columns (3) and (5) show the estimates for the period 2001-2012 are reasonably well aligned.[18] Similarly NERA's estimates for all companies for the entire period 1988-2012 are also consistent with those shown in column 2.[19]

One would not expect the payout ratio to remain constant over time. In my opinion, the above differences in the second decimal place of the estimated payout ratios are not material.

[17] See Table 3.4 in NERA (2015 p.23)

[18] It is not clear why NERA's estimate of the change in the FAB for public companies plus the change in the FAB for private companies is greater than the change in the FAB for all companies.

[19] According to Table 3.1 in NERA (2015 p.17), the total net tax paid by all companies for the twenty-five year period from 1987 to 2012 is estimated to be $778.1 billion and the FAB relating to all companies at the end of the 2012 tax year is $245.7 billion, which suggests a cumulative payout ratio, based on all companies, of 0.68.

CONCLUSION

Overall, based on my review of the NERA (2015) report, I do not consider it necessary to change any of the findings in my earlier reports – Handley (2014) and Handley (2015).

REFERENCES

Black, F., 1974, International Capital Market Equilibrium with Investment Barriers, Journal of Financial Economics, 1, 337-352

Handley, J.C., 2014, Advice on the Value of Imputation Credits, Report prepared for the Australian Energy Regulator, 29 September.

Handley, J.C., 2015, Further Advice on the Value of Imputation Credits, Report prepared for the Australian Energy Regulator, 16 April.

National Electricity Rules, Chapter 6 – Economic Regulation of Distribution Services, Version 64.

NERA, 2015, Estimating Distribution and Redemption Rates from Taxation Statistics, Report for Jemena Gas Networks, Jemena Electricity Networks, AusNet Services, Australian Gas Networks, CitiPower, Ergon Energy, Powercor, SA Power Networks, and United Energy, March.

Officer, R.R., 1994, The Cost of Capital under an Imputation Tax System, Accounting and Finance, 34, 1–17.

Expert Witness Compliance Declaration

I have read the Guidelines for Expert Witnesses in proceedings in the Federal Court of Australia and this report has been prepared in accordance with those guidelines. As required by the guidelines I have made all the inquiries that I believe are desirable and appropriate. No matters of significance that I regard as relevant have, to my knowledge, been withheld.

Signed

John Handley

20 May 2015