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# **Determining the value of imputation credits: Multicollinearity and Reproducibility Issues**

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Report for

The Victorian Electricity Distributors

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## Summary

The Victorian electricity distribution businesses are in the midst of a five-yearly price review process. As part of that review, the Australian Energy Regulator (AER) must determine an appropriate compensation for corporate income tax, which is a function of the valuation of dividend imputation credits, also referred to as gamma. Strictly speaking, gamma is defined as the product of the ‘imputation credit payout ratio’ (F-payout ratio) and the ‘utilisation rate ( $\theta$ -theta), as acknowledged by the AER (page 528 of the draft decision). However, this report concentrates only on theta, the utilisation rate. No consideration has been given to the value of the payout ratio.

The AER has taken account of a limited number of dividend drop-off studies to estimate theta, including Beggs and Skeels (2006) and a number of studies by SFG Consulting. Dividend drop-off studies are subject to debate because of the sensitivity of the final estimates to the inherent multicollinearity in the data, the appropriate filtering of the data, and the impact of a small number of influential observations.

The purpose of this report is to examine the multicollinearity issue for the SFG study. Based on our analysis, we conclude that multicollinearity does not have a serious effect on the precision of the estimates of theta in the SFG study.

## Declaration

We confirm that, in preparing this report, we have made all inquiries that we believe are desirable and appropriate and that no matters of significance that we regard as relevant have, to our knowledge, been withheld. We have been provided with a copy of the Federal Court’s “Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia” and this report has been prepared in accordance with those Guidelines.

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# 1 Introduction

In recent decisions the AER has most relied on the dividend drop-off study conducted by Beggs and Skeels (2006), who fit the model:

$$P_{c,j} - P_{x,j} = \gamma_0 + \sum_{j=1}^7 \gamma_{1,j} d_{i,j} D_i + \sum_{j=1}^7 \gamma_{2,j} d_{i,j} F_i + \varepsilon_i, i = 1, \dots, n \quad (1)$$

where

- $P_{c,i}$  = Cum-dividend share price of  $i$ th share
- $P_{x,i}$  = Ex-dividend share price for  $i$ th share,  
(adjusted for aggregate return on the market)
- $\gamma_{1,j}$  = Cash drop-off ratio for period  $j$
- $\gamma_{2,j}$  = Franking Credit drop off ratio for period  $j$
- $d_{i,j}$  = Dummy variable for  $i$ th share in period  $j$
- $D_i$  = Dividend for  $i$ th share
- $F_i$  = Franking Credit for  $i$ th share
- $\varepsilon_i$  = error

with an auxiliary equation involving company size, gross dividend, and cum-dividend share price as predictor variables to account for the heteroscedasticity in the data. In this model  $\gamma_{2,j}$  refers to the value of theta rather than gamma directly. Beggs and Skeels analysed data over seven tax regimes, but of major interest are the results for the last three periods. Table 1 gives dates of the seven tax regimes, adapted from Table 1 of Beggs and Skeels (2004).

Period No.	Period	Effect of tax change relative to previous regime
1	-30 Jun 88	
2	1 Jul 88-30 Jun 90	Superannuation funds can use franking credits
3	1 Jul 90-30 Jun 91	Provisions to stop dividend streaming
4	1 Jul 91-30 Jun 97	Limits to life assurance funds use of franking credits
5	1 Jul 97-30 Jun 99	Provisions limiting related payments, holding period and delta hedge
6	1 Jul 99-30 Jun 00	Capital gains tax reduced
7	1 Jul 00-30 Jun 04	Tax rebate for unused franking credits

Table 1: Summary of Tax Regime Changes, adapted from Table 1 of Beggs and Skeels (2006)

Period	Parameter	Estimate	Std. Error
1 Jul 97 - 30 Jun 99	$\gamma_{1,5}$	0.795	0.099
1 Jul 99 - 30 Jun 00	$\gamma_{1,6}$	1.168	0.099
1 Jul 00 - 30 Jun 04	$\gamma_{1,7}$	0.800	0.052
1 Jul 97 - 30 Jun 99	$\gamma_{2,5}$	0.418	0.186
1 Jul 99 - 30 Jun 00	$\gamma_{2,6}$	0.128	0.204
1 Jul 00 - 30 Jun 04	$\gamma_{2,7}$	0.572	0.121

Table 2: Beggs and Skeels results

Table 2 gives the results of Beggs and Skeels for the last three periods. The AER has used the  $\hat{\gamma}_{2,7}$  figure of 0.572 in their determination of the appropriate value of theta and therefore gamma.

Unfortunately, the data set used by Beggs and Skeels is now not available and so it is impossible for us to verify their results. We have been supplied with the SAS Code used by SFG Consulting (2010) in their attempt to replicate and further extend the Beggs and Skeels study. We will focus on one of the regression analyses undertaken by SFG. In that analysis an ordinary least squares analysis is initially fitted to Equation 1 and the residuals and the auxiliary regression are used to provide weights for the weighted regression analysis that attempts to replicate the Beggs and Skeels study, although the dataset has been extended to 30 Sep 2006. We have called that analysis Fit1 in this report.

Table 3 gives a summary of Fit1, using the R Statistical Computing Environment (R Core Team, 2010). The results are identical to the results of SFG Consulting (2010, page 18, middle column). Note that the value of  $\hat{\gamma}_{2,7}$  is appreciably smaller than that obtained by Beggs and Skeels (2006) and this also applies to the standard error.

Period	Parameter	Estimate	Std. Error
	$\gamma_0$	-0.0078	0.0023
1 Jul 97 - 30 Jun 99	$\gamma_{1,5}$	0.9419	0.0716
1 Jul 99 - 30 Jun 00	$\gamma_{1,6}$	0.8274	0.1096
1 Jul 00 - 30 Sep 06	$\gamma_{1,7}$	0.9856	0.0306
1 Jul 97 - 30 Jun 99	$\gamma_{2,5}$	0.2144	0.1654
1 Jul 99 - 30 Jun 00	$\gamma_{2,6}$	0.3601	0.242
1 Jul 00 - 30 Sep 06	$\gamma_{2,7}$	0.2274	0.0822

Table 3: Fit1, produced by SFG

## 2 Multicollinearity

Dividend drop off studies aim to separate the differential value of cash dividends and franking credits, and can suffer from multicollinearity. This issue appears to be one of the strongest criticisms of work commissioned by the Victorian businesses and their South Australian counterpart by the AER.

Beggs and Skeels (2006) considered the issue, but concluded (p.245):

... and so we do not believe that multicollinearity is a major concern for this dataset.

However, the AER (2009) stated

SFGs dividend drop off study is prone to the common problem of multicollinearity in the regression model.

SFG conducted studies on the issue and have advocated the use of joint confidence regions. They support the Beggs and Skeels (2006) position. However, McKenzie and Partington (2010) say

We believe that multicollinearity is a serious problem for dividend drop off studies and the results of SFG and Beggs and Skeels (2006) cannot be reliably interpreted in the presence of multicollinearity. Further, until serious consideration is given to this issue, reliable decomposition of the partial effect of cash dividends and franking credits will remain elusive

This section explores the effect of multicollinearity on the SFG study and provides further analysis using two complementary methods.

### 2.1 Variance Inflation Factors

The most direct method of quantifying any effect of multicollinearity is to calculate the Variance Inflation Factors (VIFs) of the regression coefficients. Following Fox (2008, p.308),

The sampling variance of a least squares slope coefficient  $B_j$  is

$$V(B_j) = \frac{1}{1 - R_j^2} \times \frac{\sigma_\epsilon^2}{(n - 1)S_j^2} \quad (2)$$

Period	Parameter	VIF	$\sqrt{\text{VIF}}$
1 Jul 97 - 30 Jun 99	$\gamma_{1,5}$	2.876	1.696
1 Jul 99 - 30 Jun 00	$\gamma_{1,6}$	3.299	1.816
1 Jul 00 - 30 Sep 06	$\gamma_{1,7}$	2.367	1.538
1 Jul 97 - 30 Jun 99	$\gamma_{2,5}$	2.797	1.673
1 Jul 99 - 30 Jun 00	$\gamma_{2,6}$	3.238	1.799
1 Jul 00 - 30 Sep 06	$\gamma_{2,7}$	2.276	1.509

Table 4: VIFs and square roots of the VIFs for the regression coefficients for Fit3

where  $R_j^2$  is the squared multiple correlation for the regression of  $X_j$  on the other  $X$ s, and  $S_j^2 = \sum(X_{ij} - \bar{X})^2 / (n - 1)$  is the variance of  $X_j$ . The term  $1/(1 - R_j^2)$  is called the variance inflation factor.

Equation (2) shows that the precision of a regression coefficient depends on four quantities:

- The variability of the errors around the regression line.
- The spread of the independent variable.
- The number of observations.
- The VIF.

The calculated VIFs for the SFG study are shown in Table 4. The VIF shows the increased variability due to any multicollinearity in the data, relative to orthogonal explanatory variables<sup>1</sup>. The usual criterion for concern is a VIF of 10 (see, for example, Bowerman and O'Connell, 1990, p.447), which suggests that multicollinearity is not a problem. None of the VIFs in the data set are close to this level. The square root of the VIF shows how much the confidence interval for a regression coefficient has increased because of any multicollinearity in the data. Note that the square roots of the VIFs for the most recent  $\gamma$  values are approximately 1.54 and 1.51, indicating only a 54% and 51% increase in the confidence interval widths, respectively. Without the multicollinearity, the standard error for  $\gamma_{1,7}$  would be reduced from 0.031 to 0.020, while the standard error for  $\gamma_{2,7}$  would be reduced from 0.082 to 0.054.

<sup>1</sup>If the regressors are orthogonal, then all the  $R_j^2$  would be zero, and the VIFs would be 1

## 2.2 Eigen-value Decomposition

To examine this further, the data was divided into two groups of observations. In the first group, consisting of 787 observations, none of the dividends were franked. This set supplies no information on the  $\gamma_2$ 's but estimates of the  $\gamma_1$ 's. Fit1a, summarised below, gives a summary of the regression estimates for this group.

Period	Parameter	Estimate	Std. Error
	$\gamma_0$	-0.0086	0.0046
1 Jul 97 - 30 Jun 99	$\gamma_{1,5}$	0.9227	0.1171
1 Jul 99 - 30 Jun 00	$\gamma_{1,6}$	0.7939	0.168
1 Jul 00 - 30 Sep 06	$\gamma_{1,7}$	0.9723	0.0475

Table 5: Fit1a, based on data without Franking Credits

Fit1b, summarised below, fits the model to the remaining 2414 partially or fully franked dividends. Note the high standard errors for the  $\gamma_2$ 's.

Period	Parameter	Estimate	Std. Error
	$\gamma_0$	-0.0063	0.0027
1 Jul 97 - 30 Jun 99	$\gamma_{1,5}$	0.9992	0.1093
1 Jul 99 - 30 Jun 00	$\gamma_{1,6}$	0.9181	0.1775
1 Jul 00 - 30 Sep 06	$\gamma_{1,7}$	1.0506	0.0567
1 Jul 97 - 30 Jun 99	$\gamma_{2,5}$	0.0804	0.2328
1 Jul 99 - 30 Jun 00	$\gamma_{2,6}$	0.1678	0.3543
1 Jul 00 - 30 Sep 06	$\gamma_{2,7}$	0.0509	0.1411

Table 6: Fit1b, based on data with Franking Credits

Consider the estimates of  $\gamma_{1,7}$  and  $\gamma_{2,7}$ . Variances and covariances of estimates of any linear combination of  $\gamma_{1,7}$  and  $\gamma_{2,7}$  can be calculated from the variance-covariance matrix for the parameters of Fit1b; the relevant entries are:

$$V = \begin{pmatrix} 0.0032 & -0.0073 \\ -0.0073 & 0.0200 \end{pmatrix}$$

An eigen-value decomposition<sup>2</sup> of the matrix  $V$  was conducted, and is in Table 7.

This decomposition suggests that multicollinearity is not a serious problem for the SFG study.

<sup>2</sup>An eigen-value decomposition gives, in the  $2 \times 2$  case, the linear combination with the least variance, and the orthogonal linear combination with the greatest variance. The variances of the two linear combinations are given by the respective eigen-values.



	$\sqrt{e_1}$	$\sqrt{e_2}$
	0.1505	0.0218
Parameter	$v_1$	$v_2$
$\gamma_{1,7}$	0.3512	0.9363
$\gamma_{2,7}$	-0.9363	0.3512

Table 7: Eigen-value decomposition of the variance-covariance matrix for Fit1b

In particular, the eigen-value decomposition shows that for  $\gamma_{1,7}$  and  $\gamma_{2,7}$

- From the (fully or partially) franked data:
  - The linear combination  $0.9363\gamma_{1,7} + 0.3512\gamma_{2,7}$  is estimated very well by  $A = 0.9363\hat{\gamma}_{1,7} + 0.3512\hat{\gamma}_{2,7}$ , with a standard error of 0.0218.
  - The linear combination  $0.3512\gamma_{1,7} - 0.9363\gamma_{2,7}$  is estimated much less precisely by  $B = 0.3512\hat{\gamma}_{1,7} - 0.9363\hat{\gamma}_{2,7}$ , with a standard error of 0.1505.
  - Combining the two estimates of the above linear combinations, results in estimates of  $\gamma_{1,7}$  and  $\gamma_{2,7}$  with standard errors of 0.057 and 0.141 respectively:

$$\begin{aligned}\hat{\gamma}_{1,7} &= (0.9363 \times A) + (0.3512 \times B) \\ sd(\hat{\gamma}_{1,7}) &= \sqrt{(0.9363^2 \times 0.0218^2) + (0.3512^2 \times 0.1505^2)} = 0.057 \\ \hat{\gamma}_{2,7} &= (0.3512 \times A) - (0.9363 \times B) \\ sd(\hat{\gamma}_{2,7}) &= \sqrt{(0.3512^2 \times 0.0218^2) + (0.9363^2 \times 0.1505^2)} = 0.141\end{aligned}$$

- Adding the non-franked data<sup>3</sup>:
  - The estimates of  $\gamma_{1,7}$  and  $\gamma_{2,7}$  are substantially improved, with standard errors of 0.031 and 0.083 respectively.

A similar analysis could be done for the  $\gamma$  parameters for the other two periods. The existence of the non-franked data plays a very important role in allowing good estimates of the  $\gamma_2$  parameters.

## 2.3 Conclusions

Our conclusions are that multicollinearity does not seem to be a significant problem in the dataset used by SFG. The standard errors of the parameter estimates for the cash dividend and

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<sup>3</sup>Using weighted least squares, since there are three estimates of varying precision but two unknowns.

for the franking credit, over the most recent time period (from 1st July 2000 to 30th September 2006) are only marginally higher than they would be in the absence of multi-collinearity. The variance inflation factors for the same parameter estimates (2.435 for the estimated coefficient on the cash dividend, and 2.338 for the estimated coefficient on the franking credit) are significantly below 10, the value which would ordinarily signal a level of serious concern. The existence of the non-franked data provides an independent estimate of the  $\gamma_1$  parameters, which when combined with the estimates of the linear combinations of the  $\gamma_1$  and  $\gamma_2$  parameter from the fully and partially franked data, gives a relatively good estimate of the  $\gamma_2$  parameter.

### 3 A Comment on Reproducibility

SFG (2009) was asked by the Joint Industry Association to:

- apply the Beggs and Skeels (2006) methodology to the Beggs and Skeels sub-sample of data post July 2000 and confirm that this process replicated the parameter estimates reported by Beggs and Skeels
- extend the sample to include more recent data, but replicate the Beggs and Skeels methodology, and report the relevant parameter estimates

SFG states that it attempted to match the sample employed by Beggs and Skeels, however noted that

Beggs and Skeels (2006) do not list the observations for which they were unable to obtain all the required data items, so it is impossible to know exactly what sample they use. Having used the same size filter and same time period, I have matched their sample data as closely as is possible.

Beggs and Skeels is published in the *Economic Record*. The Editorial Policy<sup>4</sup> includes the following statement:

It is a policy of the *Economic Record* to foster the replicability of empirical results by other researchers. Accordingly, the *Economic Record* normally publishes papers only where the data used in the analysis are clearly and precisely documented, are available to others to enable replication of results, and where details of the compu-

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<sup>4</sup><http://www.wiley.com/bw/policy.asp?ref=0013-0249&site=1>

tations sufficient for replication are provided. If the data are not available or the above requirements cannot be met, the Editor should be informed at the time of submission.

Despite the unavailability of the dataset, the AER has given much greater weight to the Beggs and Skeels (2006) study than to the studies conducted by SFG. We think the impossibility of exactly replicating the findings of Beggs and Skeels (2006), is a significant limitation.

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## Career History

- 1977-78 Statistician, ICI Explosives Factory, Deer Park
- 1979-86 Research Officer, Research Scientist, Senior Research Scientist And Statistics and Computing Team Leader, ICI Central Research Laboratories, Ascot Vale
- 1987-1989 Lecturer, Department of Mathematics, Computing and Operations Research, Footscray Institute of Technology
- (1989) Visiting Scientist, Center for Quality and Productivity Improvement, University of Wisconsin-Madison, USA.
- 1990-2003 Senior Lecturer, Department of Computer and Mathematical Sciences, Victoria University of Technology
- (1995) Visiting Fellow, Center for Quality and Productivity Improvement, University of Wisconsin-Madison, USA.
- 2003-2004 Senior Statistician, Insureware
- 2004-2006 Senior Lecturer and Deputy Director of Consulting, Department of Econometrics and Business Statistics, Monash University.
- 2007- Senior Lecturer and Director of Consulting, Department of Econometrics and Business Statistics, Monash University.

## Teaching Experience

- Monash University**
- Business Statistics (First Year), Marketing Research Analysis (Second Year), Survey Data Analysis (Third Year-Clayton and Caulfield).
  - Expert Stats Seminars on Software Packages for Statistics, Questionnaire Design, Analysis of Survey Data, and Multivariate Statistics.
  - Introduction to Statistics for Pharmacy-five session course:
    - Data handling, exploration, and graphical summaries
    - An overview of basic statistical methods

- Regression Analysis and extensions
- Designing experiments and power analysis
- An overview of more advanced statistical methods

**Victoria University of Technology** • Applied Statistics (First Year), Linear Statistical Models, Sampling and Data Analysis (Second Year), Experimental Design (Third Year).

- Statistics for Engineers, Statistics for Nurses, Statistics for Occupational Health.
- Forecasting (Graduate Diploma in Business Science)

**Sessional Teaching** • Monash University (1996-2003) Design of Experiments for Masters Students of the Australian Pulp and Paper Institute.

- RMIT (1991, 1996-2002) Design of Experiments for Masters in Quality Management.
- AGSM (1993-1997): Total Quality Management for Graduate Management Qualification.
- Various other: The University of Melbourne, Enterprise Australia, Swinburne Institute of Technology.

## Supervision

### Principal Supervisor

**Gregory Simmons** (1994-1997). M.Sc. completed. “Properties of some minimum run resolution IV designs.”

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**Ewa Sztendur** (1999-2005). Ph.D. completed. “Precision of the path of steepest ascent in response surface methodology.” [As a result of this thesis, Ewa was awarded the 2006 Victoria University Vice-Chancellor’s Peak Award for Research and Research Training-Research Degree Graduate.]

## Co-supervisor

**Keith Hart** (1996-1997). M.Sc. completed. “Mean reversion in asset prices and asset allocations in funds management.”

**Jyoti Behera** (1999-2000). M.Eng. completed. “Simulation of container terminals.”

**Ray Summit** (2001-2004). Ph.D. completed. “Analysis of warranty data for automobile data.”

**Rob Moore** (2001-2007). Ph.D. completed. “Computer recognition of musical instruments.”

## M.Sc. Minor Theses

**Milena Shtifelman** (1999). Completed. (Monash University Accident Research Centre). “Modelling interactions of factors influencing road trauma trends in Victoria.”

**Rohan Weliwita** (2002). Completed. “Modelling road accident trauma data.”

## Theses Examination

One M.Sc. major thesis (University of Melbourne) and one M.Sc minor thesis (Victoria University).

## Industry Projects

Over 30 projects for the following companies and organisations:

Gas and Fuel Corporation	Ford Australia
Mobil Australia	Fibre-makers
ICI Australia	Western General Hospital
Data Sciences	Keilor City Council
AMCOR	Composite Buyers
Davids	Email Westinghouse
Craft Coverings	Australian Wheat Board
CSL	Holding Rubber
Viplas Olympic	Melbourne Water
Federal Airports Corporation	

## Research and Consulting Experience

- Ten years with ICI Australia as an industrial statistician initially with the Explosives group and eventually with the research group.
- A Ph.D. from the University of Melbourne entitled “Two-factor interactions in non-regular foldover designs.”
- Two six month periods at the Center for Quality and Productivity Improvement at the University of Wisconsin-Madison.
- Extensive consulting and training on behalf of the Centre for Applied Computing and Decision Analysis based at VUT for the following companies:

Data Sciences	Initiating Explosives Systems
Analytical Science Consultants	Saftec
Glaxo Australia	Datacraft Australia
Enterprise Australia	ICI Australia
The LEK partnership	Kaolin Australia
BP Australia	AMCOR
Melbourne Water	Kinhill Group
Australian Pulp and Paper Institute	

- Operated the Statistical Consulting Service at Victoria University of Technology from 1992-2002.
- From 2002-2004 worked as a Senior Statistician with Insureware on the analysis of long-tailed liability data.
- From December 2004 to December 2006 Deputy Director of Consulting of Monash University Statistical Consulting Service based in the Department of Econometrics and Business Statistics.
- From January 2007 Director of Consulting of Monash University Statistical Consulting Service based in the Department of Econometrics and Business Statistics.
- Extensive consulting and training on behalf of the Monash University Statistical Consulting Service for the following companies and organisations:



Australian Tax Office	Department of Human Services
J D McDonald	IMI Research
Port of Melbourne Corporation	Incitec Pivot
Agricola, Wunderlich & Associates	Parks Victoria
Australian College of Consultant Physicians	ANZ
Department of Justice	CRF(Colac Otway)

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**Victoria University**

VU1. Diamond, N.T (1990). "Professional Experience Program at the Center for Quality and Productivity Improvement," Footscray Institute of Technology.

VU2. Bisgaard, S. and Diamond, N.T (1991). "A discussion of Taguchi's methods of confirmatory trials," Report No. 60. Center for Quality and Productivity Improvement, University of Wisconsin-Madison.

VU3. Diamond, N.T (1996). "Outside Studies Program at the Center for Quality and Productivity Improvement," Victoria University of Technology.

VU4. Diamond, N.T (1996). "Statistical Analysis of EPA compliance of the western treatment plant," prepared for Melbourne Water on behalf of Kinhill Engineers.

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VU8. Bromley, M. and Diamond, N.T (2002). "The manufacture of Laboratory coreboard using various chip furnishes," prepared for Orica adhesives and resins.

**Monash University**

M1. Hyndman, R.J, Diamond, N.T. and de Silva, A. (2004). "A review of the methodology for identifying potential risky agents," prepared for the Australian Tax Office.

M2. Diamond, N.T. and Hyndman, R.J. (2005). "Sample Size for Maternal and Child Health Service Evaluation," prepared for the Department of Human Services.

M3. Diamond, N.T. (2005). "Analysis of Customer Satisfaction Survey 2005," prepared for JD Macdonald.

M4. Diamond, N.T. (2005). "Analysis of 2005 Orientation Survey," prepared for Monash Orientation.

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- M6. Diamond, N.T. and Hyndman, R.J. (2005). "The Monash Experience Questionnaire 2003: First Year Students," prepared for CHEQ, Monash University.
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- M13. Diamond, N.T. and Hyndman, R.J. (2006). "The Monash Experience Questionnaire 2005: The Best and Worst," prepared for CHEQ, Monash University.
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- M17. Diamond, N.T. (2006). "Agreement of 110/116 and 111/117 items by Consultant Physicians," prepared for the Australian College of Consultant Physicians.
- M18. Diamond, N.T. (2006). "Analysis of Statistical Issues regarding Cornish v Municipal Electoral Tribunal, " prepared for Agricola, Wunderlich & Associates.

- M19. Diamond, N.T. (2006). "Analysis of Parks Victoria Staff Allocation," prepared for Parks Victoria.
- M20. Diamond, N.T. and Hyndman, R.J. (2006). "Summary of Results of IPL Sales Forecasting Improvement Project," prepared for Incitec Pivot.
- M21. Sztendur, E.M. and Diamond, N.T. (2007) "A model for student retention at Monash University", prepared for University retention committee.
- M22. Sztendur, E.M. and Diamond, N.T. (2007) "An extension to a model for student retention at Monash University", prepared for University review of coursework committee.
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- M25. Diamond, N.T. (2008). "Effect of smoking bans on numbers of clients utilising problem gambling counselling and problem gambling financial counselling", prepared for Department of Justice
- M26. Diamond, N.T. (2008). "Development of Indices Based Approach for Forecasting Gambling Expenditure at a Local Government Area Level", prepared for Department of Justice
- M27. Diamond, N.T. (2008). "Orientation 2007- Analysis of Quantitative results", prepared for University Orientation committee.
- M28. Diamond, N.T. (2008). "Orientation 2007- Analysis of Qualitative results, prepared for University Orientation committee.
- M29. Diamond, N.T. (2008). "Analysis of Clients presenting to Problem Gambling Counselling Services-2002/03 to 2005/06", prepared for the Department of Justice.
- M30. Diamond, N.T. (2008). "Analysis of Clients presenting to Problem Gambling Financial Counselling Services-2001/02 to 2005/06", prepared for the Department of Justice.
- M31. Diamond, N.T. (2008). "Analysis of Clients presenting to Problem Gambling Counselling and Problem Gambling Financial Counselling Services-2006/07", prepared for the Department of Justice.

M32. Diamond, N.T. (2008). “The effect of changes to Electronic Gaming Machine numbers on gambling expenditure”, prepared for the Department of Justice.

M33. Diamond, N.T. (2009). “Adjustment of Mark Distributions”, prepared for the Faculty of Law.

M34. Diamond, N.T. (2009). “Summary of Results for Dyno Nobel Sales Forecasting Improvement Project,” prepared for Incitec Pivot.

## R Packages

R1. Diamond, N.T. (2010), VizCompX

## Professional Service

- President, Victorian Branch, Statistical Society of Australia, 2001-2002.
  - Terms as Council Member, Vice-President, and Past President.
- Referee: *Australian and New Zealand Journal of Statistics*, *Biometrika*

**Short CV**

Professor Robert Brooks  
Associate Dean (Undergraduate)  
Faculty of Business and Economics  
Monash University

**Qualifications:** B.Ec. (Hons.), PhD (Monash)

**Employment History****Current**

Associate Dean (Undergraduate), Faculty of Business and Economics, Monash University, February 2009 to present

Course Director, Bachelor of Business and Commerce, Faculty of Business and Economics, Monash University, February 2008 to present

Professor, Department of Econometrics and Business Statistics, Monash University, February 2005 to present

**Previous**

Associate Dean (Research Quality), Faculty of Business and Economics, Monash University, May 2006 to January 2008

Head of Faculty (Berwick and Peninsula campuses), Faculty of Business and Economics, Monash University, July 2006 to January 2008

Acting Deputy Dean (Research), Faculty of Business and Economics, Monash University, January 2006 to May 2006

Deputy Head, Department of Econometrics and Business Statistics, Monash University, June 2005 to December 2005

Acting PVC (Design and Social Context), RMIT, July 2004 to August 2004

Dean (Research & Innovation), RMIT Business, March 2004 to June 2004, January 2005

Associate Dean, RMIT Business, August 2003 to December 2003

Acting PVC (Business), RMIT, April 2003 to August 2003, September 2004 to December 2004

Associate Dean (Research), RMIT Business, August 2000 to April 2003 and January 2004 to March 2004



Professor of Financial Econometrics, RMIT Business, January 1999 to January 2005

Head, Research Development Unit, RMIT Business, August 1998 to August 2000

Director, Postgraduate Programs, Economics and Finance, RMIT, August 1998 to August 2000

Associate Professor, Economics and Finance, RMIT, June 1997 to December 1998

Senior Lecturer, Economics and Finance, RMIT, January 1995 to June 1997

Lecturer, Economics and Finance, RMIT, December 1991 to December 1994

Tutor, Economics, Monash University, July 1989 to November 1991

Research Assistant, Economics, Monash University, November 1987 to June 1989

**PUBLICATIONS (as at September 2008):****Books**

Brooks, R. and Fausten, D. (1998), *Macroeconomics In the Open Economy*, Longman.

Brooks, R., Morley, C., Kam, B., Stewart, M., Diggle, J. and Gangemi, M. (2003), *Benefits of Road Investment to Assist Tourism*, Austroads Publication AP-R225/03, Austroads Incorporated.

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Woodward, G. and Brooks, R. (2009), The Market Timing Ability of Australian Superannuation Funds: Nonlinearities and Smooth Transition Models, in C.Hoppe, G.Gregoriou and C.Wehn (eds.), Handbook of Model Risk, McGraw-Hill.

### **Conference Papers**

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Brooks, R. (2004), Benchmarking University Research Performance Using RRTMR Data, paper presented to the 2004 Quality in Postgraduate Research Conference, Adelaide.

Dimovski, W. and Brooks, R. (2006), Stakeholder and Gender Characteristics of Mining and Energy IPO Boards of Directors, Enhancing Corporate Accountability Prospects and Challenges Conference Proceedings.

Leeprechanon, N., Moorthy, S., Brooks, R. and David, A.K. (2000), A Review of Major Factors in Restructuring Power Markets in Developing Countries, 5<sup>th</sup> International Conference on Advances in Power System Control, Operation and Management.

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Leeprechanon, N., Moorthy, S., Brooks, R., Ellis, M. and Sappakitkamjorn, J. (2002), A Systems Decision Modelling Approach to Electrical Generation Capacity Planning, 12<sup>th</sup> Annual Symposium International Council on Systems Engineering (INCOSE2002).

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### 1992:1(2)

Brooks, R., Faff, R.W. and Lee, J. (1992), The Form of Time Variation of Systematic Risk: Some Australian Evidence, *Applied Financial Economics* 2, 191-198.

### 1993:2(4)

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Ragunathan, V., Faff, R.W. and Brooks, R., (1999) Correlations, Business Cycles and Integration, *Journal of International Financial Markets, Institutions and Money* 9, 75-95.

Trivedi, A. and Brooks, R. (1999), Autocorrelations, Returns and Australian Stock Indices, *Applied Economics Letters* 6, 581-584.

**2000: 9(55)**

Berman, G., Brooks, R., and Davidson, S. (2000), The Sydney Olympic Games Announcement and Australian Stock Market Reaction, *Applied Economics Letters* 7, 781-784.

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Brooks, R., Faff, R.W., McKenzie, M. and Mitchell, H. (2000), A Multi-Country Study of Power ARCH Models and National Stock Market Returns, *Journal of International Money and Finance* 19, 377-397.

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Lie, F., Brooks, R. and Faff, R. (2000), Modelling the Equity Beta Risk of Australian Financial Sector Companies, *Australian Economic Papers* 39, 301-311.

McKenzie, M., Brooks, R. and Faff, R.W. (2000), The Use of Domestic and World Market Indexes in the Estimation of Time Varying Betas, *Journal of Multinational Financial Management* 10, 91-106.

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Yong, L., Brooks, R. and Faff, R.W. (2000), A Test of Beta Instability for Hong Kong Industry Portfolios, *International Journal of Finance*, 12, 1653-1663.

**2001: 9 (64)**

Bollen, B., Brooks, R. and Faff, R.W. (2001), An Empirical Examination of the Required Number of Leading and Lagged Terms in Estimating The Dimson Beta: An Updated Analysis *Accounting, Accountability and Performance* 7, 23-30.

Brooks, R., Faff, R. and Fry, T (2001), GARCH Modelling of Individual Stock Data: The Impact of Censoring, Firm Size and Trading Volume, *Journal of International Financial Markets, Institutions and Money* 11, 215-222.

Brooks, R., Faff, R.W., and Josev, T. (2001), An Empirical Investigation of The Cross – Industry Variation in Mean Reversion of Australian Stock Returns, *Pacific Accounting Review* 13, 1-16.

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Josev, T., Brooks, R. and Faff, R.W. (2001), Testing a Two Factor APT Model on Australian Industry Equity Portfolios: The Effect of Intervaling, *Applied Financial Economics* 11, 157-163.

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- Irawan, B. and Brooks, R. (2009), Determinants of Bond Market Size: Developed vs. Emerging Markets.
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- Nguyen, H., Dimovski, W. and Brooks, R. (2007), Underpricing, Risk Management, Hot Issue and Crowding Out Effects: Evidence from the Australian Resources Sector Initial Public Offerings.
- Parkatt, G., Davidson, S. and Brooks, R. (2006), Testing the CAPM and Performance Measurement for Thai Mutual Funds.
- Russell, R. and Brooks, R. (2007), An Evaluation of an Interest Free Loan Scheme for Those Affected by Domestic Violence.
- Russell, R., Mihajilo, S., Brooks, R. and Musch, S. (2008), Designing Financial Literacy Training Programs for the Small Business Sector: Some Australian Evidence.
- Treloar, K. and Brooks, R. (2007), The Participation of Women on the Boards of Cooperative Research Centres.
- Zhou, X., Brooks, R. and Chen, G. (2009), Does the Market Reaction to Former Information Influence the Future Voluntary Disclosures of Earnings Forecasts – Evidence from the Chinese A-Share Market.

## **Journal Refereeing and Thesis Examination**

### *Editorial Board (current)*

Accounting & Finance

### *Editorial Board (previous)*

Accounting Research Journal

International Journal of Knowledge, Culture and Change Management

### *Journal Refereeing*

Accounting Research Journal, Accounting & Finance, Agricultural Economics, Agricultural Water Management, Annals of Operations Research, Applied Economics, Applied Financial Economics, Asia Pacific Journal of Economics & Business, Australian Economic Papers, Australian Journal of Agricultural & Resource Economics, Australian Journal of Management, Australian Universities Review, Corporate Governance, Corporate Governance: An International Review, Economic Papers, Economic Record, Economics E-Journal, Emerging Markets Finance and Trade, Emerging Markets Review, European Journal of Finance, European Journal of Operational Research, Financial Markets and Portfolio Management, Financial Review, Global Finance Journal, International Journal of e-Collaboration, International Journal of Emerging Markets, International Review of Economics and Finance, International Review of Finance, International Review of Financial Analysis, Journal of Agricultural and Resource Economics, Journal of Applied Statistics, Journal of Banking & Finance, Journal of Business, Journal of Business Venturing, Journal of Econometrics, Journal of Economic Studies, Journal of Economic Surveys, Journal of Economics and Business, Journal of Empirical Finance, Journal of Futures Markets, Journal of International Financial Markets Institutions & Money, Journal of International Money & Finance, Journal of Quantitative Economics, Managerial Finance, Manchester School, Monash Business Review, Multinational Finance Journal, Pakistan Journal of Statistics, Quantitative Finance, Quarterly Review of Economics and Finance, Review of Pacific Basin Financial Markets and Policies, Review of Quantitative Finance and Accounting, Science of the Total Environment, Studies in Economics and Econometrics.

### *Thesis Examination*

#### *PhD*

Australian National University, Edith Cowan University, Griffith University, LaTrobe University, Monash University, Nanyang Technological University, Queensland University of Technology, University of Melbourne, University of Queensland, University of Southern Queensland, University of the Sunshine Coast, University of Sydney, University of Western Australia, Victoria University



## **1. Supervision of postgraduate research students.**

### **PhD students**

#### **Main Supervisor – Completed: (13)**

Berman, G. A Charity Case – Efficiency and Accountability of Nonprofit Welfare Organisations in Australia, Economics and Finance, RMIT, 2001.

Bissoondoyal-Bheenick, E., Sovereign and Australian Credit Ratings: Determinants and Valuation Effects, Economics and Finance, RMIT, 2004.

Chan, D. The Role of Information In Stock Pricing In The Hong Kong Stock Market, Economics and Finance, RMIT, 1998.

Diggle, J. When Cash Is King – The Optimal Management of an Asset Allocation to Cash, Economics and Finance, RMIT, 2002.

Gionea, J. Trends/Prospects In The Global Grain Sector: The Opportunities For Australia's Grain Industry, Economics and Finance, RMIT, 2003.

Guo, H. The Chinese initial public offering market: underpricing, duration to listing and hot issue cycles, Econometrics and Business Statistics, Monash University, 2009.

Iqbal, J. Asset Pricing on the Karachi Stock Exchange, Econometrics and Business Statistics, Monash University, 2008.

Lambrick, S. An Assessment and Test of the Arbitrage Pricing Theory in Australia: 1974 to 2000, Econometrics and Business Statistics, Monash University, 2009.

Lim, K. An empirical analysis of the weak-form efficiency of stock markets, Econometrics and Business Statistics, Monash University, 2009.

Lin, D. Investment Decision Making Under Uncertainty: A Residual Character Approach, Economics and Finance, RMIT, 1998.

Loh, J. A Framework for the Valuation of Biotechnology Companies, Econometrics and Business Statistics, Monash University, 2007.

McKenzie, M. Australian Exchange Rate Volatility: Modelling, Forecasting And Assessing The Impact On Trade Flows, Economics and Finance, RMIT, 1997

Sokulsky, D. An Empirical Investigation into the Price Effects Associates with Constituent Changes to Australian Equity Indices, Economics and Finance, RMIT, 2002.

**Associate Supervisor – Completed: (18)**

Anderson, J. Trading Rules and Money Management, Economics and Finance, RMIT, 2002.

Coate, B. Australian Indigenous and Non-indigenous Art at Auction, Economics and Finance, RMIT, 2009.

Davidson, S. South African Corporate Structures In An Agency Theory Framework, Economics and Finance, RMIT, 1999.

Di Iorio, A. An Analysis of the Exchange Rate Exposure of the Australian Equities Market, Economics and Finance, RMIT, 2002.

Gangemi, M. Modelling Regional Economic Development, Economics and Finance, RMIT, 2008.

Glasson, S. Censoring Regression Techniques for Credit Scoring, Statistics, RMIT, 2007.

Hart, K. Modelling The Asset Allocation Process And The Effectiveness Of Models Through Time, Communications And Informatics, VUT, 2000.

Jens, P. Valuations and Business Models for Biotechnology Companies, Economics and Finance, RMIT, 2007.

Jugurnath, B. An Analysis of an Integrated Tax System in APEC, Economics and Finance, RMIT, 2005.

Lai, E. The Role of Return Skewness In Financial Modelling: Some International Evidence, Economics and Finance, RMIT, 2000.

Leeprechanon, N. A Pricing Optimisation Model For Transmission Services Open Access In The Competitive Electricity Supply Industry In Thailand, Electrical Engineering, RMIT, 2003.

Luo, L. Business and Economic Forecasting in Australia, Econometrics and Business Statistics, Monash University, 2008.

Maldonado, D. Knowledge Development Between Industries and Universities, Management, RMIT, 2005.

Masters, T. Demand and Supply for the Creative Arts in Rural and Regional Victoria, Economics and Finance, RMIT, 2007.

Parkatt, G. The Role Of Equity Factors In Explaining The Cross-sectional Variation In Stock Returns In The Thai Capital Market, Economics and Finance, RMIT, 2002.

Ragunathan, V. Integration Of And Correlations Between National Stock Market Indices, Economics and Finance, RMIT, 1999.

Wang, Y. Development of China's Capital Markets, Economics and Finance, RMIT, 2006.

Yip, A. A Case Based Reasoning Approach to Business Failure Prediction, Business Information Technology, RMIT, 2005.

**Main Supervisor – In Progress: (2)**

Irawan, B. Development of bond market in East Asia as a policy response to financial crisis, Econometrics and Business Statistics, Monash University.

Treloar, K. Challenges in Early Stage Commercialisation and Entrepreneurship in Australia, Econometrics and Business Statistics, Monash University.

**Associate Supervisor – In Progress: (3)**

Jutasompakorn, P. Forecasting the Financial Crisis, Accounting and Finance, Monash University.

Muth, R. International Real Estate Investments in a Mixed-Asset Portfolio, Accounting and Finance, Monash University

Vaz, J. The Behaviour of Interest Rates and Financial Institution Returns, Accounting and Finance, Monash University.

**DBA Students**

**Main Supervisor – Completed: (1)**

Dimovski, B. Characteristics Of Initial Public Offerings In Australia 1994 to 1999: Recent Evidence of Initial Day Underpricing and Longer Term Underperformance, Management, RMIT, 2002.

**Associate Supervisor – Under Examination: (1)**

Lekkumporn, P An exploration of personal values as antecedent of gift-giving behavior, Marketing, Monash University.

**Master of Philosophy (Research) Students**

**Associate Supervisor – Completed: (1)**

Nurjannah, Asset Pricing in the Indonesian Stock Market, Econometrics and Business Statistics, Monash University, 2009.

**Associate Supervisor – In Progress: (1)**

Ting, S. Essays in Financial Econometrics, Econometrics and Business Statistics, Monash University.

**Master of Business (Research) Students****Main Supervisor – Completed: (1)**

Gangemi, M. Country And Industry Beta Risk: Stability, Mean Reversion And The Role Of Macroeconomic Variables, Economics and Finance, RMIT, 1999

**Associate Supervisor – Completed: (1)**

Piriyapant, G. An Analysis Of The Thai Mutual Fund Industry, Economics and Finance, RMIT, 1999.

### **External Research Grants, Tenders and Contracts**

ARC Small Grant, The Relationship Between Risk Instability And Changes In Markets Conditions, \$14,000, January 1995 to December 1995.

ARC Small Grant, Revisions To Macroeconomic Data And Their News Content For Financial Markets, \$15,000, January 1996 to December 1996.

The Pratt Foundation, Efficiency And Accountability In Charitable Organisations In Australia, \$10,000 per annum, March 1998 to February 2001

ARC SPIRT Grant, The Development Of New Sub-Category Benchmark Indices On The Australian Stock Exchange, \$25,756 per annum, January 1999 to December 2001.

William Noall Ltd, Developing Socially Responsible Investment Criteria, \$12,500, May 2001 to November 2001.

Australian International Hotel School, The Economic Impact of the Australian International Hotel School, \$25,000, August 2001 to December 2001

AUSTROADS, Benefits of Road Investment to Assist Tourism, \$54,000 August 2001 to March 2002

Siemens Ltd, The Implications and Effects on the Culture of Siemens Ltd as it shifts from being primarily a manufacturing/engineering company to a Fully Integrated Service Company, \$20,500, January 2002 to July 2002.

Taxpayers Research Foundation, Do R&D Tax Concessions Add Value, \$46,255, May 2002 to April 2003

Universal Postal Union, Knowledge Base Case Study, \$15,000, July 2002 to November 2002

Department of Industry, Innovation and Regional Development & Southern Grampians Shire Council, The Economic Impact of RMIT Hamilton, \$15,000, October 2002 to December 2002

ARC Discovery Grant, A Complex Systems Approach to Modelling Time Varying Risk in the Presence of Market Frictions, January 2003 to December 2005, 2003 - \$40,000, 2004&2005 - \$38,000 per annum

ARC Linkage Grant, Valuations and Business Models for Biotechnology Companies, January 2003 to December 2005, \$28,033 per annum

ARC Linkage Grant, Censored Regression Techniques for Credit Scoring, January 2003 to December 2005, \$28,033 per annum

ARC Linkage Grant, Demand and Supply for the Creative Arts in Rural and Regional Victoria, January 2004 to December 2006, \$28,033 per annum

Department of Industry, Tourism and Resources – Minerals Council of Australia, February to June 2005, \$7,000.

The Big Chair, Development of the CEO Performance Index, September to December 2008, \$20,000.

ARC Discovery Grant, Financial Crises, Volatility and Sovereign Ratings: Do Ratings Really Matter When They Are Needed Most? January 2010 to December 2012. 2010 - \$80,000, 2011 - \$70,000, 2012 - \$72,000

ARC Linkage Grant, Organisational Performance During Environmental Uncertainty: The Impact Of An Influential Human Resource Function And High Involvement Work Practice, January 2010 to December 2012, \$31,669 per annum.



**UNITED ENERGY**

**Distribution**

United Energy Distribution Pty Limited  
ABN 70 064 651 029

**Registered Office**

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**6<sup>th</sup> August 2010**

Our Reference: UE-SU-01

**By email: Neil.Diamond@buseco.monash.edu.au**

Dr Neil Diamond  
Room 674, Building 11E  
Department of Econometrics and Business Statistics  
Monash University  
CLAYTON VICTORIA 3800  
Australia

Dear Dr Diamond,

**Expert report on the value of imputation credits**

The Australian Energy Regulator (**AER**) is currently conducting its five-yearly review of pricing proposals submitted by the five Victorian electricity distribution businesses, United Energy, Citipower, Powercor, Jemena and SP Ausnet. As part of the review process, the AER must determine an appropriate return on capital, which is a function of the valuation of dividend imputation credits, also referred to as gamma. The AER has taken account of a number of dividend drop-off studies in its consideration of the value of gamma, including:

- A 2006 study by Beggs and Skeels;<sup>1</sup> and
- A February 2010 study by SFG Consulting<sup>2</sup>

One of the concerns raised by the AER with the more recent SFG study is multicollinearity. This is one of the reasons for the AER's rejection of the SFG findings and reliance on the Beggs and Skeels study.

In this context, we request a report setting out your expert opinion on the following matters:

1. Whether you consider multicollinearity to significantly impact on the findings of the SFG study.
2. Whether you consider the Beggs and Skeels study should be relied upon by the AER, given that the dataset has not been made available by the authors and the results cannot be reproduced.

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<sup>1</sup> Beggs, D. J. and Skeels, C.L., (2006), 'Market arbitrage of cash dividends and franking credits', *Economic Record*, 82 (258), 239 – 252.

## Guidelines in preparing your report

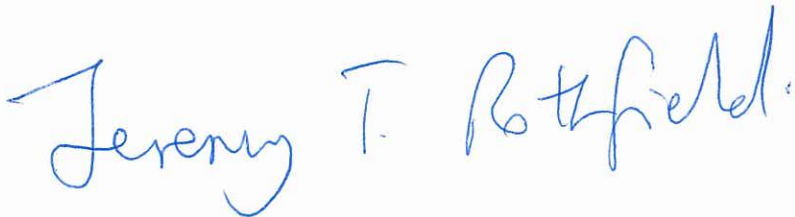
Attached are Expert Witness Guidelines issued by the Federal Court of Australia. Although this brief is not in the context of litigation, the Victorian electricity distribution businesses are seeking a rigorously prepared independent view for use in the context of regulatory decision making and you are requested to follow the Guidelines to the extent reasonably possible in the context.

In particular, please:

Identify your relevant area of expertise and provide a curriculum vitae setting out the details of that expertise:

- 1.1.1. only address matters that are within your expertise;
- 1.1.2. where you have used factual or data inputs please identify those inputs and the sources;
- 1.1.3. if you make assumptions, please identify them as such and confirm that they are in your opinion reasonable assumptions to make;
- 1.1.4. if you undertake empirical work, please identify and explain the methods used by you in a manner that is accessible to a person not expert in your field;
- 1.1.5. confirm that you have made all the inquiries that you believe are desirable and appropriate and that no matters of significance that you regard as relevant have, to your knowledge, been withheld from your report; and
- 1.1.6. please do not provide legal advocacy or argument and please do not use an argumentative tone.

Yours sincerely,



Jeremy Rothfield  
*Regulatory Economist*

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<sup>2</sup> SFG, *Further analysis in response to the AER Draft Determination in relation to gamma: Prepared for ETSA Utilities*, 4 February 2010



## FEDERAL COURT OF AUSTRALIA

### *Practice Note CM 7*

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

1. Practitioners should 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)).
2. 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>1</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>2</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<sup>3</sup>.
- 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 Evidence<sup>4</sup>**

- 2.1 An expert's written report must give details of the expert's qualifications and of the literature or other material used in making the report.
- 2.2 All assumptions of fact made by the expert should be clearly and fully stated.

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<sup>1</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>2</sup> See rule 35.3 Civil Procedure Rules (UK); see also Lord Woolf "Medics, Lawyers and the Courts" [1997] 16 CJQ 302 at 313.

<sup>3</sup> See *Sampi v State of Western Australia* [2005] FCA 777 at [792]-[793], and *ACCC v Liquorland and Woolworths* [2006] FCA 826 at [836]-[842].

<sup>4</sup> See rule 35.10 Civil Procedure Rules (UK) and Practice Direction 35 – Experts and Assessors (UK); *HG v the Queen* (1999) 197 CLR 414 per Gleeson CJ at [39]-[43]; *Ocean Marine Mutual Insurance Association (Europe) OV v Jetopay Pty Ltd* [2000] FCA 1463 (FC) at [17]-[23].

- 2.3 The report should identify and state the qualifications of each person who carried out any tests or experiments upon which the expert relied in compiling the report.
- 2.4 Where several opinions are provided in the report, the expert should summarise them.
- 2.5 The expert should give the reasons for each opinion.
- 2.6 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.*”
- 2.7 There should be included in or attached to the report: (i) a statement of the questions or issues that the expert was asked to address; (ii) the factual premises upon which the report proceeds; and (iii) the documents and other materials that the expert has been instructed to consider.
- 2.8 If, after exchange of reports or at any other stage, an expert witness changes a material opinion, having read another expert’s report or for any other reason, the change should be communicated in a timely manner (through legal representatives) to each party to whom the expert witness’s report has been provided and, when appropriate, to the Court<sup>5</sup>.
- 2.9 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 (see footnote 5).
- 2.10 The expert should make it clear when a particular question or issue falls outside the relevant field of expertise.
- 2.11 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>6</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.

M E J BLACK  
Chief Justice  
25 September 2009

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<sup>5</sup> The “*Ikarian Reefer*” [1993] 20 FSR 563 at 565

<sup>6</sup> The “*Ikarian Reefer*” [1993] 20 FSR 563 at 565-566. See also Ormrod “*Scientific Evidence in Court*” [1968] Crim LR 240