

Attachment M.25

Attachment M25_SCHLOGL: The AER's JGN draft decision on the cost of debt – a review of the critique by the CEG

20 April, 2015



**The AER’s JGN draft decision on the cost of debt —
a review of the critique
by the Competition Economists Group (CEG)**

Prepared for United Energy and Multinet Gas

Professor Erik Schlögl

1. Executive Summary

1. I have been retained by United Energy and Multinet Gas to review the “Critique of the AER’s JGN draft decision on the cost of debt,” by Dr. Tom Hird and Daniel Young, Competition Economists Group (**CEG report**). This includes reviewing the approach proposed by the AER for a transition from the “rate-on-the-day” method for determining the return on debt to a trailing average method of determining the rate of return on debt, and comparing the AER’s method for the transition with the alternative approach to the transition that has been put forward by in the CEG report. I was also instructed to consider specifically the “Evaluation of Methods for Extrapolating Australian Corporate Credit Spreads published by the Reserve Bank of Australia,” by Dr. Neil Diamond and Professor Robert Brooks, ESQUANT Statistical Consulting and Monash University (**ESQUANT report**). Additionally, where appropriate I referred to publicly available documents referenced by these two reports. The Terms of Reference of my engagement by United Energy and Multinet Gas are attached as an appendix to my present report.
2. The CEG report deals with two overarching issues. The first is that it argues that the “AER’s cost of debt transition does not define a feasible debt management strategy.” Section 2 below discusses these arguments. In essence, the AER’s cost of debt transition deliberately departs from any feasible prospective debt management strategy in order to retrospectively smooth out gains which it perceives were made by regulated entities in the past — Section 3 below elaborates on this point. The second issue deals with the question of how the efficient cost of debt should be estimated, and it is this issue for which the ESQUANT report is also relevant. I discuss this issue in Sections 4 and 5. Aside from minor remarks detailed below, I broadly agree with the economic and statistical arguments set out in the CEG and ESQUANT reports.

3. This report has been authored by Professor Erik Schlögl in a private capacity as a consultant retained by United Energy and Multinet Gas. My opinions set out in this report are based on the specialist knowledge acquired from my training and experience: Currently, I hold a position as Professor of Finance at the UTS Business School, University of Technology Sydney (UTS). I am also the Director of the Quantitative Finance Research Centre at UTS. I hold a doctorate in Economics from the University of Bonn, Germany, for work on interest rate term structure models and the pricing of fixed income derivatives. I teach graduate level courses in quantitative finance, including courses dealing with the valuation and risk management of corporate debt. My experience in providing consultancy services for financial institutions, software developers, government agencies and regulators spans twenty years and three continents, and I have served as an expert witness in cases before the Federal Court of Australia. My research interests cover a broad area of quantitative finance, in particular model calibration, interest rate term structure modelling, credit risk and the integration of multiple sources of risk. My research articles have been published in a number of highly ranked international journals. In addition to UTS, I have held positions at the University of New South Wales, Australia, and the University of Bonn, Germany. Further details on my training and experience can be found in the curriculum vitae attached as an appendix to this report.
4. I have read, understood and complied with the Federal Court of Australia Practice Note CM7 *Expert Witnesses in Proceedings in the the Federal Court of Australia*. I have made all the inquiries that I believe are desirable and appropriate and no matters of significance that I regard as relevant have, to my knowledge, been withheld from the report.
5. Paragraphs 6 to 8 below summarise my main conclusions, which are further elaborated in Sections 2 to 5.
6. The AER argues that a particular strategy was the most efficient response by a regulated entity to the past regulatory methodology. This is the “hybrid” debt management strategy, where the risk due to the variation of ten–year swap rates is then eliminated using interest rate swaps, while the risk due to the variation in the “debt risk premium” (DRP) remains unhedged. I concur with the opinion expressed in the CEG report (e.g., in Paragraph 17(b)) that the belief, that the “hybrid” debt management strategy is uniquely efficient, is “unreasonable.” I further concur with the CEG report that under the assumption that the “hybrid” debt management strategy was in fact uniquely efficient, the regulated cost of debt should be calculated based on the assumption that for ten–year debt, issued in the prior regulatory period on an

evenly staggered basis, swap arrangements based on the “hybrid” strategy are in place, while for the unhedged DRP component of the regulated cost of debt, there should be an immediate transition to the trailing average.

7. In particular, the “windfall gain” by regulated entities purported by the AER is not a consequence of the proposed change from the “on-the-day” regulatory methodology to the “trailing average” methodology. Rather, under the assumptions made by the AER on the behaviour of a benchmark efficient entity in the past, this gain would have occurred irrespective of whether prospectively there is a change in the regulatory methodology or not. Thus, economically, the AER would only be justified in imposing its transition arrangements if it were pursuing an objective to manage the rate of return of regulated entities retrospectively as well as prospectively. Economically, managing the rate of return of regulated entities retrospectively in the manner pursued by the AER is not consistent with the National Gas Objective or the Revenue and Pricing Principles.
8. For the DRP, in order to estimate the efficiently attainable cost of debt, some extrapolation beyond the maximum maturity of the readily obtainable data is required. If one restricts oneself to evaluating methods of extrapolation solely as curve-fitting exercises, the analysis presented in the ESQUANT and CEG reports is reasonable and I agree with its conclusions. Alternatively, one could consider applying the method of Nelson and Siegel (1987) for extrapolation, or using a fully consistent, arbitrage-free econometric model for interest rates and credit spreads.

2. Debt management strategy

9. In order to evaluate whether the AER’s cost of debt transition defines a feasible debt management strategy or not, one has to first determine the starting point of the transition, which would be defined by the optimum response of a regulated entity to the efficient cost of debt calculated under the previous regulatory methodology. As noted in Paragraph 37 of the CEG report, this optimum response should consist of minimising the expected (risk adjusted) costs of financing. As noted in Paragraph 41, there is a consensus between CEG and the AER with regard to the issuance of debt by the regulated entity:

There is general agreement between the AER and us that the efficient debt management strategy involves the issuance of 10 year debt on an evenly staggered basis. There is similarly agreement that the benchmark credit rating falls within the BBB band.

10. This means that under the previous regulatory methodology the regulated entity was exposed to the risk of a mismatch between its actual cost of debt and the regulated “efficient” cost of debt. Specifically, issuance of debt on an evenly staggered basis means that the actual cost of debt will be determined by a trailing average (in fact, this is the rationale for moving to the new regulatory methodology), while the regulated cost was fixed “on the day” at the beginning of the regulatory period. An optimum response in the presence of this risk would be to attempt to enter hedge transactions, i.e. additional financial transactions to minimise the mismatch between the actual and regulated cost of debt.
11. As noted in Paragraph 16(b) of the CEG report, the AER argues that a particular strategy, the “hybrid” debt management strategy, was the most efficient in the past, and thus should form the starting point of the transition. This strategy decomposes the risk of mismatch into two parts, one due to the variation of the level of interest rates, as represented by ten-year swap rates, and the other due to variation of the DRP, as represented by the spread between ten-year yields on BBB-rated debt and ten-year swap rates. The risk due to the variation of ten-year swap rates is then eliminated using interest rate swaps, while the risk due to the variation in the DRP remains unhedged.
12. The CEG report expresses the opinion (e.g., in Paragraph 17(b)) that the belief, that the “hybrid” debt management strategy is uniquely efficient, is “unreasonable.” Having expressed this opinion, one would expect that examples of one or more alternative strategies for managing the risk of mismatch between actual and regulated cost of debt under the past regulatory methodology would be provided, along with evidence that these reasonably could be considered as good or better than the “hybrid” strategy. The CEG report does not provide this. However, such strategies are conceivable, such as minimum variance hedging strategies which may capture some of the risk due to the variation in the DRP.
13. The CEG report goes on to evaluate the proposed transition arrangements under the assumption — for the sake of clarity of argument — that the “hybrid” debt management strategy was in fact uniquely efficient. Thus, during a ten-year transition period, the regulated cost of debt should be calculated based on the assumption that for ten-year debt, issued in the prior regulatory period on an evenly staggered basis, swap arrangements based on the “hybrid” strategy are in place. This calculation is accurately explained in Paragraphs 22 to 26 and 88 to 93 of the CEG report.

14. As Paragraph 16(c) of the CEG report notes,

Notwithstanding that the AER states that the hybrid was the most efficient debt management strategy in the past and that the simple trailing average is the most efficient debt management strategy in the future, the AER does not propose a transition from the hybrid to the simple trailing average debt management strategy. Rather, the AER proposes a transition which, applied at the present time, will undercompensate all businesses - including both those that funded themselves with: i) a simple trailing average debt management strategy; and ii) the hybrid debt management strategy (that the AER argues was the uniquely efficient strategy in the past).

This is correct. Paragraph 16(d) continues,

The AER's justification for its proposed transition rests on a belief that businesses received 'windfall gains' from the on-the-day approach in the last regulatory period. The AER believes that a regulator ought to impose offsetting 'windfall losses' over prospective regulatory periods.

This is a fair summary of the line of argument put forward by the AER. In particular, based on statements by the AER as well as the analysis in Section 4.3 of the CEG report, there is no implementable debt management strategy by which a regulated entity could expect its actual cost of debt to replicate the regulated cost under the transition arrangements.

3. Prospective vs. retrospective regulation of the rate of return

15. The purported "windfall gain"¹ by regulated entities under transition from the previous to the new regulatory methodology is an artefact of a deficiency of the previous methodology, in the sense that the risk of a mismatch between the actual and regulated cost of debt due to variation in the DRP could not be eliminated through hedging transactions.² Thus it is due to a random realisation of a risk which the previous regulatory methodology imposed on the regulated entities. A legal interpretation of the NER and NGR

¹"Windfall gain" is a terminology introduced by the AER in its draft decision; see Australian Energy Regulator (2014).

²The AER states, "However, with respect to the debt risk premium component, the debt risk premium component could not have been hedged." (Australian Energy Regulator (2014), Attachment 3 Rate of return, p. 117)

is outside of my field of expertise, but in my reading of the NER and NGR from an economic and financial perspective I cannot discern any intent or mechanism by which gains or losses by regulated entities due to a mismatch between regulated and actually, efficiently attainable cost of debt in a past regulatory period would be compensated by a deliberate downward or upward mismatch in future periods. This is also the core point of the analysis in Section 4.3 of the CEG report.

16. The AER argues that the purported “windfall gain” is a consequence of the proposed change from the “on–the–day” regulatory methodology to the “trailing average” methodology. This is incorrect. Rather, under the assumptions made by the AER on the behaviour of a benchmark efficient entity in the past, such an entity would have gained from the mismatch between the actual and regulated cost of debt due to variation in the DRP which could not be eliminated through hedging transactions. This gain would have occurred irrespective of whether prospectively there is a change in the regulatory methodology or not. Therefore, in my reading of the NER and NGR from an economic and financial perspective, this is not an impact of the type described in rule 87(11)(d) of the NGR and rule 6.5.2(k)(4) of the NER. An immediate switch to the trailing average methodology for the DRP would simply mean that there would no further gains or losses from the mismatch between the actual and regulated cost of debt due to variation in the DRP.
17. The AER refers to Lally (2014b), arguing that the proposed transitional arrangements are justified, because “Lally found that either continuing with the on–the–day approach or switching to the new approach with a transition results in a similar outcome.”³ The AER goes on to state, “Lally’s analysis is summarised in table 3–26. Accordingly, transitional arrangements reduce the potential for windfall gains or losses to service providers or consumers.”⁴ There are two fundamental problems with these statements. Firstly, the transitional arrangements *do not* “reduce the potential for windfall gains or losses,” at least not in a prospective sense — rather, they seek to impose “windfall” losses in the future in order to compensate for gains already realised. This is an attempt to regulate the rate of return retrospectively. Secondly, in order to arrive at the conclusion that “either continuing with the on–the–day approach or switching to the new approach with a transition results in a similar outcome,” Lally assumes a future evolution of the

³Australian Energy Regulator (2014), Attachment 3 Rate of return, p. 118

⁴Australian Energy Regulator (2014), Attachment 3 Rate of return, p. 118

DRP reverts to a constant level of 1.3% from 2016 onwards to 2025,⁵ ignoring the possibility of any future variation in the DRP, for example due to variations in market conditions as were experienced in the recent past.

18. Economically, the AER would only be justified in imposing its transition arrangements if it were pursuing an objective to manage the rate of return of regulated entities retrospectively as well as prospectively. Whether or not it has this mandate would appear to be primarily a legal question and thus outside my area of expertise. However, from an economic and financial perspective, I would interpret the “allowed rate of return objective” defined in rule 87 of the NGR and rule 6.5.2 of the NER as exclusively prospective, and prospective management only would entail minimising the mismatch between the actual and regulated cost of debt in the future, without regard to any realised mismatch in the past.
19. Furthermore, retrospective management of the rate of return of regulated entities would be consistent with the promotion of “efficient investment in, and efficient operation and use of, natural gas services” (as set out in the National Gas Objective and further elaborated in the Revenue and Pricing Principles⁶) *only if* the mechanism by which this retrospective management was to occur was known to the regulated entities *ex ante* (i.e., prior to the beginning of the past regulatory period). From the material available to me, I cannot discern any *ex-ante* guarantees by the AER to compensate for the mismatch between regulated and actually, efficiently attainable cost of debt by future adjustments. Therefore, an efficient entity had to operate under the assumption that it had to bear the risk of this mismatch, and thus the type of retrospective management pursued by the AER is inconsistent with the National Gas Objective.

4. Estimation of efficiently attainable cost of debt — CEG and ESQUANT reports

20. In order to obtain the best estimate of the actual, efficiently attainable cost of debt in the transition period from the previous to the new regulatory methodology, two components are required: the term structure of interest rates and the DRP. The former could be determined based on Commonwealth Government securities or using swap rates — which choice one makes in this respect is a matter of convenience, with little material impact since the DRP

⁵See Lally (2014b), in particular Table 2 on p. 19.

⁶See National Gas (South Australia) Act 2008–30.1.2015, Schedule — National Gas Law, Chapter 1, Section 23 and 24.

is then defined as the appropriate spread of the yield of BBB-rated ten-year debt to the thus determined “risk-free” ten-year interest rate. In either case, the data to determine the term structure of interest rates is readily available. For the DRP, on the other hand, some extrapolation beyond the maximum maturity of the readily obtainable data (sourced either from the RBA or Bloomberg, or an average of both) is required. Consequently, most of Sections 5 and 6 of the CEG report, and the entire ESQUANT report, are dedicated to the evaluation of extrapolation methods.

21. Four methods are considered: the Gaussian kernel method that is applied by the RBA (which is a form of local constant smoothing), local linear smoothing, an extrapolation method proposed by Lally (2014a), and an extrapolation method proposed by SA Power Networks (2014) (**SAPN method**). The ESQUANT report concludes that the SAPN method is “superior in totality,” and therefore the most appropriate “when using the published RBA series on spreads over swap for current and prospective averaging periods”.⁷ However, the ESQUANT report qualifies this conclusion for the calculation of historical averages, stating⁸

When applying extrapolation methods to the published RBA data for extended timeframes in the past, there is merit in applying the Lally (2014a) approach because it is subject to less bias.

The ESQUANT report and the CEG report concur on this issue, and recommend that the approach of Lally (2014a) be used to estimate the nine-year average DRP for the trailing average, and the SAPN method be used to determine the extrapolated DRP in the first averaging period under the new regulatory methodology.

5. Estimation of efficiently attainable cost of debt — Critique

22. All methods of extrapolation considered in the ESQUANT and CEG reports (including the one reported to be used by the RBA and the one proposed by the AER) are solely curve-fitting exercises. Econometric estimation of a full, consistent model of interest rates and spreads is not considered, nor (based on the material made available to me) does it appear to have been

⁷Diamond, N. and R. Brooks (2015) Evaluation of Methods for Extrapolating Australian Corporate Credit Spreads published by the Reserve Bank of Australia. Report, ESQUANT Statistical Consulting and Monash University, p. 7.

⁸Diamond, N. and R. Brooks (2015) Evaluation of Methods for Extrapolating Australian Corporate Credit Spreads published by the Reserve Bank of Australia. Report, ESQUANT Statistical Consulting and Monash University, p. 7.

considered by the AER or the RBA. If one restricts oneself to evaluating methods of extrapolation solely as curve-fitting exercises, the analysis presented in the ESQUANT and CEG reports is reasonable. I agree with the conclusion that the SAPN method of extrapolation is the most robust of those which were considered.

23. Both reports justify the preference for the Lally (2014a) method to estimate the nine-year average DRP for the trailing average by the argument that it is subject to less bias than the SAPN method. This is a reasonable choice to make, based on a sound mathematical argument, but also intuitively appealing: most of the (unbiased) noise introduced by the Lally (2014a) method essentially will be “averaged out” when calculating the nine-year average DRP, and thus the lower bias of the Lally (2014a) method becomes more important in this case.
24. In order to evaluate the extrapolation methods under consideration, the ESQUANT and CEG reports make reference to the parametric technique due to Nelson and Siegel (1987). *Inter alia*, the CEG report states (in Paragraph 224),

We consider that the Nelson–Siegel curves support the choice of the SAPN extrapolation methodology in preference to the AER extrapolation methodology over the averaging period.

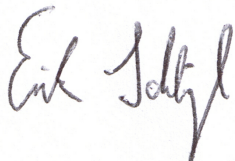
In Appendix C, the CEG report quotes Christensen et al. (2011), who state,

The Nelson–Siegel model is a flexible curve that provides a remarkably good fit to the cross section of yields in many countries, and it is very popular among financial market practitioners and central banks

This is correct. In fact, given that the spread curves are constructed from “noisy” data, which by its nature cannot be fitted perfectly, it is surprising that Nelson and Siegel’s technique wasn’t considered as an alternative method of extrapolation. Unlike the extrapolation methods evaluated in the ESQUANT and CEG reports, the version of the Nelson/Siegel model proposed by Christensen et al. (2011) can be supported by a consistent, arbitrage-free econometric model for interest rates (for credit spreads, a model based on Cox, Ingersoll and Ross (1985) model dynamics would be more appropriate).

25. A further point to note is that extrapolation in the ESQUANT and CEG reports is performed at the level of spreads between yields of BBB-rated

bonds and market swap rates. Yields and swap rates are rather “aggregated” representations of the term structure of interest rates. The most “disaggregate” representation of the term structure would be in terms of instantaneous forward rates (yields are averages of all instantaneous forward rates over the time to maturity). By extrapolating (or interpolating) interest rates in their more aggregate representation, positivity of all rates is not guaranteed. In particular, the chosen extrapolation could result in the “forward” DRP being negative for the extrapolated period (e.g., for the period from 8.7 to 10 years from the time the debt is issued). Such a negative “forward” DRP would be economically nonsensical.



Erik Schlögl

References

- Australian Energy Regulator** (2014) Draft decision Jemena Gas Networks (NSW) Ltd Access arrangement 2015–20. November 2014.
- Christensen, J.H.E., F.X. Diebold and G.D. Rudebusch** (2011) The affine arbitrage-free class of Nelson–Siegel term structure models. *Journal of Econometrics*, Volume 164, Issue 1, 1 September 2011, pp. 4–20.
- Cox, J.C., J.E. Ingersoll and S.A. Ross** (1985) A theory of the term structure of interest rates. *Econometrica* 53, pp. 385–407.
- Diamond, N. and R. Brooks** (2015) Evaluation of Methods for Extrapolating Australian Corporate Credit Spreads published by the Reserve Bank of Australia. Report, ESQUANT Statistical Consulting and Monash University.
- Hird, T. and D. Young** (2015) Critique of the AER’s JGN draft decision on the cost of debt. Report, Competition Economists Group.
- Lally, M.** (2014a) Implementation Issues for the Cost of Debt. Capital Financial Consultants Ltd. Report to the Australian Energy Regulator. 20 November 2014.

Lally, M. (2014b) Transitional Arrangements for the Cost of Debt. Capital Financial Consultants Ltd. Report to the Australian Energy Regulator. 24 November 2014.

Nelson, C.R. and A. F. Siegel (1987) Parsimonious Modeling of Yield Curves, *The Journal of Business*, 60(4), pp 473–489.

SA Power Networks (2014) SA Power Networks Regulatory Proposal 2015-2020.

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TERMS OF REFERENCE

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 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). Additionally the rules require the AER to publish Guidelines concerning how they intend to apply the rules (attached). The AER has made a recent preliminary determination for Jemena Gas Networks applying the rules (attached).

In that context, Tom Hird and Daniel Young of Competition Economists Group have prepared an expert report (the attached "CEG Report") that will be submitted to the AER in connection with its regulatory determination work¹.

Engagement

You are engaged by Jones Day on behalf of United Energy and Multinet Gas (UEMG) to provide the work (set out below). UEMG will be directly responsible for your invoices.

Please provide all invoices via email to Jeremy.Rothfield@ue.com.au and addressed to:

Jeremy Rothfield
Economist
United Energy and Multinet Gas
Level 1
Pinewood Corporate Centre

¹ CEG (2015), Critique of the AER's JGN draft decision on the cost of debt, prepared by the Competition Economists Group, April 2015.

43-45 Centreway Place
Mount Waverley VICTORIA 3149
P.O. Box 449
Mount Waverley VICTORIA 3149

Copied to njtaylor@jonesday.com

While UEMG has a strong track record of making payments on time, no interest shall be payable in any circumstances.

Scope of work

You are asked to:

- Critique the CEG Report indicating whether or not you agree with CEG's approach and findings, stating your reasons.
- Review the approach proposed by the AER for a transition from the "rate-on-the-day" method for determining the return on debt to a trailing average method of determining the rate of return on debt. Compare the AER's method for the transition with the alternative approach to the transition that has been put forward by CEG.
 - Assess whether the AER's proposed approach to the return on debt would result in the best estimate of the return on debt that contributes to the achievement of the allowed rate of return objective and meets the requirements of Rule 87; and
 - Comment on whether the return on debt estimate using the AER approach would produce a result that is consistent with the achievement of the National Gas Objective (NGO) and the Revenue and Pricing Principles (RPP).
- Where relevant, comment upon the paper by Dr Neil Diamond and Professor Robert Brooks of ESQUANT concerning the extrapolation of the Reserve Bank's corporate debt series².

Timeframe

The consultant should provide a final report by no later than 22nd April, 2015.

Reporting

Jeremy Rothfield of UEMG will serve as the primary contact for the period of the engagement. 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.

Conflicts

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

² ESQUANT (2015), Evaluation of Methods for Extrapolating Australian Corporate Credit Spreads published by the Reserve Bank of Australia, A Report Prepared for United Energy and Multinet Gas, 27th March 2015.

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

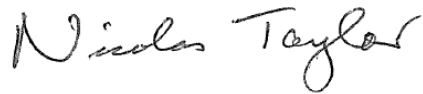
Any questions regarding this terms of reference should be directed to:

Nick Taylor (Jones Day)

Email: njtaylor@jonesday.com

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 evidence³, 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 Court⁴**

- 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 Report⁵

- 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

³ 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].

⁴ The "*Ikarian Reefer*" (1993) 20 FSR 563 at 565-566.

⁵ Rule 23.13.

- (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) above⁶; 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 Court⁷.
- 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 reports⁸.

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

⁶ See also *Dasreef Pty Limited v Nawaf Hawchar* [2011] HCA 21.

⁷ The “Ikarian Reefer” [1993] 20 FSR 563 at 565

⁸ The “Ikarian Reefer” [1993] 20 FSR 563 at 565-566. See also Ormrod “Scientific Evidence in Court” [1968] Crim LR 240

CURRICULUM VITAE

Erik Schlögl

Personal Information:

Office Address: Finance Discipline Group, UTS Business School
University of Technology, Sydney
PO Box 123, Broadway, NSW 2007
Telephone: (02) 9514 7785 (office), 0413 482144 (mobile)
E-Mail: Erik.Schlogl@uts.edu.au
Fax: (02) 9514 7711

Present Position:

Professor, Finance Discipline Group, UTS Business School, and Director, Quantitative Finance Research Centre, University of Technology, Sydney.

University Education:

Oct. 1987 – Oct. 1992 Studies in economics at the University of Bonn.
Diploma in Oct. 1992; thesis *A Computer-Supported Didactic Presentation of Financial Market Theory on the Basis of the Capital Asset Pricing Model* awarded the scholarship prize of the Faculty of Law and Economics.
Nov. 1992 – Oct. 1997 Ph.D. in economics at the University of Bonn.
Thesis: *Interest Rate Factor Models: Term Structure Dynamics and Derivatives Pricing*

Peer-reviewed Publications:

- PILZ, K. F. AND E. SCHLÖGL (2013) A Hybrid Commodity and Interest Rate Market Model, *Quantitative Finance* 13(4) 543–560
- SCHLÖGL, E. (2013) Option Pricing Where the Underlying Assets Follow a Gram/Charlier Density of Arbitrary Order, *Journal of Economic Dynamics and Control* 37(3) 611–632.
- NIELSEN, J. A., K. SANDMANN AND E. SCHLÖGL (2011) Equity-linked Pension Schemes with Guarantees, *Insurance: Mathematics and Economics* 49 547–564.
- CHUNG, I.-H., T. DUN AND E. SCHLÖGL (2010) Lognormal Forward Market Model (LFM) Volatility Function Approximation; in: Chiarella, C. and A. Novikov (Eds.): *Contemporary Quantitative Finance — Essays in Honour of Eckhard Platen*; Springer Verlag, pp. 369–406.
- SCHLÖGL, E. AND L. SCHLÖGL (2010) Duffie/Singleton Model; in: Cont, R. (Ed.): *Encyclopedia of Quantitative Finance*; Volume 1 (A–D); Wiley Finance, pp. 499–501.

- BRUTI-LIBERATI, N., C. NIKITOPOULOS SKLIBOSIOS, E. PLATEN AND E. SCHLÖGL (2009) Alternative Defaultable Term Structure Models, *Asia-Pacific Financial Markets* 16 1–31.
- SCHLÖGL, E. AND L. SCHLÖGL (2008) Factor Distributions Implied by Quoted CDO Spreads And Tranche Pricing; in: Cont, R. (Ed.): *Frontiers in Quantitative Finance*; Wiley Finance, pp. 217–234.
- SCHLÖGL, E. (2008) Markov Models for CDOs; in: G. Meissner (Ed.): *The Definitive Guide to CDOs — Market, Application, Valuation, and Hedging*; RISK Books.
- MAHAYNI, A. AND E. SCHLÖGL (2008) The Risk Management of Minimum Return Guarantees, *Business Research* 1(1) 55–76.
- CHIARELLA, C., C. NIKITOPOULOS AND E. SCHLÖGL (2007) A Control Variate Method for Monte Carlo Simulations of Heath-Jarrow-Morton with Jumps, *Applied Mathematical Finance* 14(5) 365–399.
- CHIARELLA, C., E. SCHLÖGL AND C. NIKITOPOULOS (2007) A Markovian Defaultable Term Structure Model with State Dependent Volatilities, *International Journal of Theoretical and Applied Finance* 10(1) 155–202.
- CHOY, B., T. DUN AND E. SCHLÖGL (2004) Correlating Market Models, *Risk*, September 2004, 124–129. Additionally published in *Asia Risk*, October 2004, 53–59, and in Dunbar, N. (2005) *Derivatives Trading and Option Pricing*, RISK Books, pp. 303–322.
- SCHLÖGL, E. (2002a): A Multicurrency Extension of the Lognormal Interest Rate Market Models, *Finance and Stochastics* 6(2) 173–196.
- SCHLÖGL, E. (2002b): Arbitrage-Free Interpolation in Models of Market Observable Interest Rates; in: K. Sandmann and P. Schönbucher (Eds.): *Advances in Finance and Stochastics*; Springer Verlag; Heidelberg.
- BARTON, G., T. DUN AND E. SCHLÖGL (2001): Simulated Swaption Delta-Hedging in the Lognormal Forward LIBOR Model, *International Journal of Theoretical and Applied Finance* 4(4) 677–709.
- SCHLÖGL, E. AND L. SCHLÖGL (2000): A Square-Root Interest Rate Model Fitting Discrete Initial Term Structure Data, *Applied Mathematical Finance* 7(3), September 2000, 183–209.
- SCHLÖGL, E. AND D. SOMMER (1998): Factor Models and the Shape of the Term Structure, *The Journal of Financial Engineering* 7(1), March 1998, 79–88.
- SANDMANN, K. AND E. SCHLÖGL (1996): Zustandspreise und die Modellierung des Zinsänderungsrisikos (State Prices and the Modelling of Interest Rate Risk), *Zeitschrift für Betriebswirtschaft* 66(7), July 1996, 813–836.

SANDMANN, K. AND E. SCHLÖGL (1994): Binomial Structure Model and the Forward Probability Measure: Algorithmic Model Specification and Simulation Results; in: A. Karmann, K. Mosler, M. Schader and G. Uebe (Eds.): *Operations Research '93*; Physica-Verlag; Heidelberg; 434-437.

Book:

SCHLÖGL, E. (2013) *Quantitative Finance: An Object-oriented Approach in C++*, 1st edition, Chapman & Hall/CRC Financial Mathematics Series. Taylor and Francis, Florida, USA.

Published Brief Communications:

CHOY, B., T. DUN AND E. SCHLÖGL (2004) Response to Comments by Stephen Blyth and Maciej Sawicki, *Risk*, November 2004, 118. Additionally published in *Asia Risk*, February 2005, 48.

Recent Working Papers:

CHANG, YANG AND E. SCHLÖGL (2014) A Consistent Framework for Modelling Basis Spreads in Tenor Swaps.

CHANG, YANG AND E. SCHLÖGL (2012) Carry Trade and Liquidity Risk: Evidence from Forward and Cross-Currency Swap Markets.

PILZ, K. F. AND E. SCHLÖGL (2010) Calibration of the Multi-Currency LIBOR Market Model.

Award

2003 “Outstanding Paper Award” of the German Finance Association (DGF) for MAHAYNI, A. AND E. SCHLÖGL (2003) The Risk Management of Power Options Embedded in Life-Insurance Products.

Invited Seminars and Lectures:

1. Internal Seminar, DG Bank, Frankfurt/Main, July 13, 1994;
Presentation: On Short Rate Processes and Their Implications for Term Structure Movements.
2. Internal Seminar, Deutsche Bank, Frankfurt/Main, July 20, 1994;
Presentation: On Short Rate Processes and Their Implications for Term Structure Movements.
3. Research seminar, Aarhus University, Denmark, October 7, 1994;
Presentation: On Short Rate Processes and Their Implications for Term Structure Movements.

4. Centre for Analytical Finance, Aarhus University, February 12, 1997;
Presentation: Evolution of the Term Structure Shape in One- and Multifactor Models.
5. School of Mathematical Sciences, University of Technology, Sydney, May 26, 1998;
Presentation: Robustness of Gaussian Hedges Under Parameter and Model Misspecification.
6. Department of Statistics, University of Newcastle, Australia, October 27, 1998;
Presentation: Guest lecture on term structure models.
7. Joint Statistical Meetings, Baltimore, August 8–12, 1999;
Presentation: Implied and Latent Volatilities in Options Markets.
8. Research Seminar, Johannes–Gutenberg–Universität Mainz, Germany, June 26, 2000;
Presentation: A Multicurrency Extension of the Lognormal Interest Rate Market Models.
9. Internal Seminar, BNP Paribas, London, July 6, 2000;
Presentation: A Multicurrency Extension of the Lognormal Interest Rate Market Models.
10. Q Group Australia 2000 Colloquium, Sydney, August 16, 2000;
Presentation: A Multicurrency Extension of the Lognormal Interest Rate Market Models.
11. Risk 2000 Conference, Sydney, August 22 & 23, 2000;
Presentation: A Multicurrency Extension of the Lognormal Interest Rate Market Models.
12. Risk 2000 Conference, Sydney, August 22 & 23, 2000;
Presentation: One–day post–conference seminar on Advanced Credit Risk Modelling Techniques for Effective Portfolio Credit Risk Management.
13. School of Banking and Finance, University of New South Wales, Sydney, May 3, 2001;
Presentation: A Multicurrency Extension of the Lognormal Interest Rate Market Models.
14. *Risk Magazine* Conference, Sydney, August 20 & 21, 2001;
Presentation: One–day post–conference seminar on Advanced Credit Risk Modelling Techniques for Effective Portfolio Credit Risk Management.
15. Curtin University, Perth, September 6, 2001;
Presentation: Robustness of Gaussian Hedges and the Hedging of Fixed Income Derivatives.
16. Edith Cowan University, Perth, September 7, 2001;
Presentation: Robustness of Gaussian Hedges and the Hedging of Fixed Income Derivatives.

17. Q Group Australia 2001 Colloquium, Sydney, October 24, 2001;
Presentation: Modelling Default Correlation for Portfolio Credit Risk Management — A Survey.
18. Research Seminar, Rheinische Friedrich–Wilhelms–Universität Bonn, Germany, June 6, 2002;
Presentation: Arbitrage–Free Interpolation in Models of Market Observable Interest Rates.
19. *Risk Magazine* 2002 Conference, Sydney, August 20 & 21, 2002;
Presentation: Integration of Interest Rate and Currency Risk Across Markets: Model Calibration, Derivatives Pricing and Risk Management.
20. IQPC 2004 Conference *Derivatives and Risk Management*, Sydney, March 9 & 10, 2004;
Presentation: Modelling Default Correlation for Portfolio Credit Risk.
21. *3rd National Symposium on Financial Mathematics*, Melbourne, Australia, 10–11 June 2004;
Presentation: Gram/Charlier Expansions, Edgeworth Expansions and Multivariate Distributions Implied by Option Prices.
22. *Risk Magazine* Workshop, Hong Kong, October 7 & 8, 2004;
Presentation: Advanced Credit Risk Measurement and Modelling Techniques for Effective Portfolio Credit Risk Management.
23. *Credit Risk Forum 2004*, Sydney, October 25–27, 2004;
Presentation: Understanding the Key Issues and Concerns in Modelling Portfolio Credit Risk.
24. *4th National Symposium on Financial Mathematics*, Daydream Island, Australia, 10–16 July 2005;
Presentation: Factor Distributions and Correlations Implied by Market Quotes for Synthetic CDO Tranches.
25. School of Mathematics, University of New South Wales, Sydney, August 31, 2005;
Presentation: Spoken and Implied: Factor Distributions Implied by Quoted CDO Spreads and the Pricing of Bespoke Tranches.
26. HfB Business School of Finance & Management, Frankfurt, September 22, 2005;
Presentation: Spoken and Implied: Factor Distributions Implied by Quoted CDO Spreads and the Pricing of Bespoke Tranches.
27. Petit Déjeuner de la Finance, Paris, September 27, 2005;
Presentation: Spoken and Implied: Factor Distributions Implied by Quoted CDO Spreads and the Pricing of Bespoke Tranches.
28. Q-Group Seminar, Sydney, November 9, 2005;
Presentation: Credit risk modelling and credit derivatives.

29. 2006 *Symposium on Credit Risk, Extreme Values, and Actuarial Studies*, Canberra, March 9 & 10, 2006;
Presentation: Fitting CDO Factor Distributions to Quoted Synthetic Tranche Spreads.
30. *5th National Symposium on Financial Mathematics*, Melbourne, September 27–29, 2006;
Presentation: Generic Implementation of Control Variates in Option Pricing.
31. University of Melbourne, October 13, 2006;
Presentation: Gram/Charlier Series A Expansions for Option Pricing.
32. Statistical Society of Australia (NSW branch), May 24, 2007;
Presentation: Real-World and Risk-Neutral Probability Distributions in Finance.
33. Applied Mathematics Seminar, University of Sydney, May 30, 2007;
Presentation: Gram/Charlier Series A Expansions for Option Pricing.
34. Statistics Seminar, Macquarie University, June 26, 2007;
Presentation: Gram/Charlier Series A Expansions for Option Pricing.
35. Q Group Australia 2007 Colloquium, Sydney, October 23, 2007;
Presentation: Option Pricing Where the Underlying Assets Follow a Gram/Charlier Density of Arbitrary Order.
36. *Risk Magazine* Workshop, Hong Kong, November 28 & 29, 2007;
Presentation: Fixed Income Derivatives and the Effective Management of Interest Rate Risk in Hybrid and Structured Products.
37. Internal seminar, Lehman Brothers investment bank, London, July 14, 2008;
Presentation: Option Pricing Where Assets Follow a Gram/Charlier Density of Arbitrary Order
38. Internal seminar, Lehman Brothers investment bank, London, July 14, 2008;
Presentation: Dynamic Default Correlation Models: Binomial Lattices, Cross-Entropy and Perfect Match
39. SimCorp Corporate Event *Time to rethink Risk Management?*, The Mint, Sydney, May 26, 2009;
Presentation: Quantitative Finance Before & After the Crisis — Where Do We Go from Here?
40. Seminar, School of Actuarial Studies, UNSW, April 15, 2011;
Presentation: Equity-Linked Pension Schemes with Guarantees
41. Finance and Stochastics Seminar, Imperial College London, October 10, 2012;
Presentation: Calibration of Multi-Currency LIBOR Market Model: an Orthonormal Procrustes Problem
42. Seminar, Rheinische-Friedrich-Wilhelms-University, Bonn, October 25, 2012;
Presentation: Calibration of Multi-Currency LIBOR Market Model: an Orthonormal Procrustes Problem

43. IDTC (Mathematics & Statistics) Induction Program 2014, March 25, 2014;
Presentation: Lawyers, Maths and Money: Lessons for quantitative analysts from a Federal Court of Australia judgment in the aftermath of the Global Financial Crisis
44. *AUT Mathematical Sciences Symposium*, Auckland, New Zealand, November 27–28, 2014;
Presentation: A Consistent Framework for Modelling Basis Spreads in Tenor Swaps

Presentations at Conferences and Workshops:

1. Bonn–Aarhus Seminar on Finance, Bonn, May 13, 1993;
Presentation: A Simulation Study of Binomial Term Structure Models.
2. European Meeting of the Econometric Society, Uppsala, Sweden, August 22–26, 1993;
Presentation: A Simulation Study of Binomial Term Structure Models.
3. 18th Symposium über Operations Research (SOR), Cologne, September 1–3, 1993;
Presentation: Binomial Structure Model and the Forward Probability Measure: Algorithmic Model Specification and Simulation Results.
4. 6th Conference on Money, Banking and Insurance, Karlsruhe, December 8–11, 1993;
Presentation: A Simulation Study of Binomial Term Structure Models.
5. Second Bonn–Aarhus Seminar on Finance, Aarhus University, Denmark, May 26–27, 1995;
Presentation: Fitting One–Factor Term Structure Models to Cap & Floor Data: Some Computational Issues.
6. 12th International Conference in Finance of the Association Française de Finance, Bordeaux, June 29–July 1, 1995;
Presentation: On Short Rate Processes and Their Implications for Term Structure Movements.
7. XXII. Annual Meeting of the European Finance Association, Milan, August 23–26, 1995.
Presentation: On Short Rate Processes and Their Implications for Term Structure Movements.
8. International Workshop on the Interplay between Insurance, Finance and Control, Aarhus, February 25–March 1, 1997;
Presentation: A Tractable Term Structure Model with Endogenous Interpolation and Positive Interest Rates
9. 14th International Conference in Finance of the Association Française de Finance, Grenoble, June 23–25, 1997;
Presentation: A Tractable Term Structure Model with Endogenous Interpolation and Positive Interest Rates
Presentation: Factor Models and the Shape of the Term Structure

10. Conference *Quantitative Methods in Finance 1997*, Sydney, Cairns and Canberra, August 20–September 3, 1997;
Presentation: A Tractable Term Structure Model with Endogenous Interpolation and Positive Interest Rates
11. Conference *Quantitative Methods in Finance 1998*, Sydney, December 14–17, 1998;
Presentation: A Simulation Algorithm Based on Measure Relationships in the Lognormal Market Models
12. Conference *Computational Finance 99*, New York, January 7–8, 1999;
Presentation: A Simulation Algorithm Based on Measure Relationships in the Lognormal Market Models
13. Conference *Quantitative Methods in Finance 1999*, Sydney, July 15–17, 1999;
Presentation: A Multicurrency Extension of the Lognormal Interest Rate Market Models
14. *Sydney Financial Mathematics Workshop*, November 9, 1999;
Presentation: The Lognormal Forward Rate Models
15. *First World Congress of the Bachelier Finance Society*, Paris, June 28–July 1, 2000;
Presentation: A Multicurrency Extension of the Lognormal Interest Rate Market Models
16. *First National Symposium on Financial Mathematics*, Canberra, June 20–22, 2001;
Presentation: Arbitrage Free Term Structure Interpolation in Models of Market Observable Interest Rates
17. *Second World Congress of the Bachelier Finance Society*, Crete, June 12–15, 2002;
Presentation: Arbitrage-Free Interpolation in Models of Market Observable Interest Rates
18. Conference *Quantitative Methods in Finance 2002*, Sydney and Cairns, December 9–19, 2002;
Presentation: Joint Calibration of Volatilities and Correlations in Interest Rate and FX Markets
19. *20th International Conference in Finance of the Association Française de Finance*, Lyon, France, 23–25 June 2003;
Presentation: The Risk Management of Minimum Return Guarantees
20. *Retirement Provision in Scary Markets — 11th Australian Colloquium of Superannuation Researchers*, Centre for Pensions and Superannuation, UNSW, 7–8 July 2003;
Presentation: The Risk Management of Minimum Return Guarantees
21. *2nd National Symposium on Financial Mathematics* (embedded in ICIAM), Sydney, Australia, 7–11 July 2003;
Presentation: Implied Volatilities, Implied Correlations, Implied Distributions: Information Contained in Options Prices.

22. Conference *Quantitative Methods in Finance 2003*, Sydney, December 10–13, 2003;
Presentation: The Risk Management of Minimum Return Guarantees
23. *Sydney Financial Mathematics Workshop*, February 25, 2004;
Presentation: Overview of Credit Derivatives and Credit Risk Modelling
24. *Sydney Financial Mathematics Workshop*, March 30, 2004;
Presentation: Default Correlation Modelling
25. Conference *Quantitative Methods in Finance 2004*, Sydney, December 15–18, 2004;
Presentation: Factor Distributions and Correlations Implied by Market Quotes for Synthetic CDO Tranches
26. Conference *Quantitative Methods in Finance 2005*, Sydney, December 14–17, 2005;
Presentation: Spoken and Implied: Factor Distributions Implied by Quoted CDO Spreads and the Pricing of Bespoke Tranches
27. Conference *Quantitative Methods in Finance 2006*, Sydney, December 13–16, 2006;
Presentation: Fitting the Market: Tractable Approximations and Calibrating Models to Multiple Volatility Smiles
28. Conference *C.R.E.D.I.T. 2007*, Venice, Italy, September 27–28, 2007;
Presentation: Real-World Pricing for Defaultable Term Structure Models
29. Conference *C.R.E.D.I.T. 2007*, Venice, Italy, September 27–28, 2007;
Presentation: Default Correlation Modelling: Binomial Lattices, Cross Entropy and Perfect Match
30. Conference *Quantitative Methods in Finance 2007*, Sydney, December 12–15, 2007;
Presentation: Default Correlation Modelling: Binomial Lattices, Cross Entropy and Perfect Match
31. *Bachelier Finance Society 5th World Congress*, London, July 15–19, 2008;
Presentation: Option Pricing Where Assets Follow a Gram/Charlier Density of Arbitrary Order
32. *Third International Conference on Mathematics in Finance*, Berg-en-Dal, South Africa, September 1–6, 2008;
Presentation: Option Pricing Where Assets Follow a Gram/Charlier Density of Arbitrary Order
33. Conference *Quantitative Methods in Finance 2008*, Sydney, December 17–20, 2008;
Presentation: Default Correlation Modelling: Design patterns and objects in Monte Carlo simulation
34. *14th International Congress on Insurance: Mathematics and Economics*, Toronto, June 17–19, 2010;
Presentation: Equity-Linked Pension Schemes with Guarantees
35. *Bachelier Finance Society 6th World Congress*, Toronto, June 22–26, 2010;
Presentation: A Hybrid Commodity and Interest Rate Market Model

36. Conference *Quantitative Methods in Finance 2010*, Sydney, December 15–18, 2010;
Presentation: Calibration of LIBOR Market Models Incorporating Multiple Sources of Risk
37. *Fourth International Conference on Mathematics in Finance*, Berg-en-Dal, South Africa, August 22–26, 2011;
Presentation: Calibration of LIBOR Market Models Incorporating Multiple Sources of Risk
38. *2012 Auckland Finance Meeting*, Auckland, New Zealand, December 19–21, 2012;
Presentation: Carry Trade and Liquidity Risk: Evidence from Forward and Cross-Currency Swap Markets
39. *Sydney Financial Mathematics Workshop*, December 3, 2013;
Presentation: Generic and object-oriented programming techniques for Monte Carlo simulation in C++
40. *Fifth International Conference on Mathematics in Finance*, Berg-en-Dal, South Africa, August 24–29, 2014;
Presentation: A Consistent Framework for Modelling Basis Spreads in Tenor Swaps

Panel memberships

- *Credit Risk Forum 2004*, Sydney, October 25–27, 2004;
Topic: Do credit risk models actually add value to your portfolios?
- *Q-Group Australia Colloquium 2011*, Sydney, September 21, 2011;
Topic: A discussion on strengths and weaknesses of Software tools being used by Quants

Media mention

- Interview for “NAB increases provisions for potential losses” on the ABC radio program “PM,” broadcast Friday, 25 July 2008 at 18:13:00.

Teaching Experience:

- Subject *Computational Methods and Model Implementation* (PG) (**subject coordinator**), University of Technology, Sydney, Spring 2014.
- Subject *Credit Risk* (PG) (**subject coordinator**), University of Technology, Sydney, Autumn 2013, 2014, 2015.
- Subject *Derivative Security Pricing* (honours) (**subject coordinator**), University of Technology, Sydney, Spring 2003, 2004, 2010, 2011.
- Half of the subject *Integrated Risk Management* (PG), University of Technology, Sydney, Autumn 2003, Spring 2003, Summer each year 2005–2009, Autumn 2010 & 2011.
- Subject *Computational Finance* (PG) (**subject coordinator**), University of Technology, Sydney, January/February each year 2003–2009, Autumn 2010 & 2011.

- Subject *Synthetic Financial Products* (PG) (**subject coordinator**), University of Technology, Sydney, Spring 2006, Autumn 2007 (listed as one of the top twenty lecturers in the Graduate School of Business), Autumn 2008.
- Executive Development Short Course *Advanced Credit Risk Modelling* (**subject coordinator**), University of Technology, Sydney, June 28/29, 2001, September 15/16, 2003, and October 27/28, 2004. Course also delivered in-house at Westpac Banking Corporation, Sydney, September 3/4, 2007.
- Executive Development Short Course *Standard Methods for Pricing Derivatives* (**subject coordinator**), University of Technology, Sydney, May 21/22, 2001, November 20/21, 2001 and April 29/30, 2003. Course also delivered in-house at Western Australian Treasury Corporation, Perth, April 20–22, 2009.
- Subject *Numerical Methods 1* (UG), University of Technology, Sydney, session 2, 2001.
- Subject *Derivative Securities* (UG) (**subject coordinator**), University of Technology, Sydney, since Spring 2000, and Taylor’s College, Kuala Lumpur, Malaysia, sessions 1 & 2, 2001 and session 1, 2002.
- Subject *Advanced Financial Modelling* (PG) (**subject coordinator**), University of Technology, Sydney, session 2, 2000.
- Subject *Investment Analysis* (UG) (**subject coordinator**), University of Technology, Sydney, session 2, 2000.
- Subject *Probability Theory & Stochastic Processes* (UG) (**subject coordinator**), University of Technology, Sydney, sessions 1 & 2, 1999 and session 1, 2000.
- Subject *Financial Modelling* (second half) (PG), University of Technology, Sydney, session 2, 1999.
- Lectures in financial mathematics (UG) — parts of the subjects *Mathematics of Security Markets I* and *II*, School of Mathematics, The University of New South Wales, sessions 1 & 2, 1998.

Grants

- 2000 UTS Internal Research Grant “Volatilities and correlations implied by market prices of actively traded financial derivatives” (\$17,400)
- 2001 UTS Faculty of Business Grant “An Integrated Analysis of Currency and Interest Rate Risk Implied by Options Prices” (\$10,000)
- *Research Program in Computational Finance*, A.D. Hall, N. El-Hassan, X. He, O. Kwon and E. Schlögl, funded by UTS, ac3 and the Capital Markets CRC, \$440,000, 2002–2003.
- 2003 UTS Faculty of Business Grant “Managing the market risk in pensions & life insurance contracts” (\$7,500)

- 2003 UTS Faculty of Business Curriculum Development Grant, C. Terry, E. Schlögl, T. Hutcheson, S. Walker, J. Williamson and K. Chan (\$4,000)
- 2004 UTS Faculty of Business Grant “Default Correlation: Risk Assessment and Risk Management” (\$7,800)
- 2004 UTS Incentive Grant, E. Platen, A. Novikov and E. Schlögl “A New Approach to Managing Risk in Financial Markets” (\$20,000)
- ARC Linkage Grant LP0455464, E. Schlögl and D. Le; “An Integrated Approach to Credit Risk Management and the Valuation of Credit Derivatives”, \$70,668, 2004–2007.
- ARC Discovery Grant DP0559879, E. Platen, A. Novikov and E. Schlögl; “A New Integrated Approach to Managing Risk in Financial Markets”, \$265,000, 2005–2007.
- ARC Linkage Grant LP0562616, E. Schlögl and A.D. Hall; “Implied Distributions and Implied Asset Dynamics: Calibration and Visualisation of Models on Market Data”, \$308,296, 2005–2008.
- ARC Discovery Grant DP0878155, E. Platen and E. Schlögl; “Pricing and Hedging Extreme Maturity Contracts”, \$340,000, 2008–2011.
- UTS 2010 Partnership Grant (Round 2) commencing 2011, D. Melser and E. Schlögl (industry partner EG Funds Management); “Examining Cyclical Risks in Real Estate Markets”, \$30,000, 2011.
- ARC Discovery Grant DP130104074, E. Platen and E. Schlögl; “A new theoretical approach to pension fund economics, asset management and insurance”, \$270,000, 2013–2015.

Professional Experience:

Jun. 1992 – Oct. 1992	Computer programming (C++) and consulting for the Department of Economics, University of Bonn.
Nov. 1992 – Dec. 1997	Research Assistant, Department of Statistics, University of Bonn. Responsibilities: teaching, supervising masters’ theses, personnel administration, UNIX computer network and Web server administration.
Jul. 1993 – May 1994	Development of exotic options pricing software for Deutsche Bank AG, Frankfurt
Jul. 1996 – Dec. 1997	Consulting on term structure models for MuchNet, Bonn
Jan. 1998 – Jan. 1999	Senior Research Associate, School of Mathematics, The University of New South Wales, Sydney
May 1998 – Dec. 1999	Consulting on term structure models for NumeriX, New York
Jan. 1999 – June 2000	Lecturer, School of Mathematical Sciences, University of Technology, Sydney
July 1999 – July 2000	Consulting on term structure models for

July 2000 – June 2001	Banque Paribas, London Lecturer, School of Finance and Economics, University of Technology, Sydney
July 2001 – June 2004	Senior Lecturer, School of Finance and Economics, University of Technology, Sydney
Mar. 2002 – Nov. 2003	Consulting for ANZ Investment Bank (Sydney)
Sep. 2002 – Nov. 2006	Consulting for Tillinghast Software Solutions (Sydney)
Aug. 2003 – July 2007	Consulting for Commonwealth Bank of Australia (Sydney)
July 2004 – Jan. 2009	Associate Professor, School of Finance and Economics, University of Technology, Sydney
Jan. 2006 – Mar. 2006	Consulting for Westpac Institutional Bank (Sydney)
Jun. 2006 – Aug. 2006	Consulting for National Australia Bank (Sydney/Melbourne)
Mar. 2006 – Dec. 2006	Consulting for Applied Financial Diagnostics (Sydney)
Nov. 2006 – current	Director, Quantitative Finance Research Centre, University of Technology, Sydney
Feb. 2008 – Feb. 2010	Member of the Technical Advisory Board of Julius Finance (New York)
July 2008 – Sep. 2009	Consulting for the Independent Pricing and Regulatory Tribunal of NSW (Sydney)
Jan. 2009 – current	Professor, Finance Discipline Group, University of Technology, Sydney
Feb. 2009 – Apr. 2009	Consulting for Western Australian Treasury Corporation (Perth)
Sep. 2009 – Dec. 2011	Expert witness services on <i>Bathurst Regional Council v Local Government Financial Services Pty Ltd (No 5)</i> [2012] FCA 1200
Nov. 2011 – May 2012	Consulting for Commonwealth Bank of Australia (Sydney)
Dec. 2011 – Nov. 2012	Expert witness services on <i>Research Affiliates vs. Commissioner of Patents</i>
June 2012 – Sep. 2012	Consulting for Suncorp
Feb. 2015 – Mar. 2015	Consulting for Suncorp

International academic conferences (co-)organised:

Dec. 2010	<i>Quantitative Methods in Finance</i> (QMF), Sydney 2010
Dec. 2011	<i>Quantitative Methods in Finance</i> (QMF), Sydney 2011
June 2012	<i>7th World Congress of the Bachelier Finance Society</i> , Sydney 2012
June 2012	<i>Quantitative Methods in Finance</i> (QMF), Cairns 2012
Dec. 2013	<i>Quantitative Methods in Finance</i> (QMF), Sydney 2013
Dec. 2014	<i>Quantitative Methods in Finance</i> (QMF), Sydney 2014

Offices held in professional/community organisations:

July 1995 – Dec. 1997	Assistant Editor, <i>Finance & Stochastics</i>
Nov. 1999 – ongoing	Member of the organising committee of the Sydney Financial Mathematics Workshop (SFMW)
July 2000 – June 2005	Editor for financial markets at NEP

	New Economics Papers, an Internet mailing list for working paper abstracts
July 2005 – ongoing	Chairman of the organising committee of SFMW
July 2005 – ongoing	Member of the Executive Committee of Q-Group Australia
Sep. 2012 – ongoing	Ambassador for Business Events Sydney