

EARTHQUAKES AND VOLCANOES: THE INTERNATIONAL CONFERENCE ON MODELLING AND FORECASTING FINANCIAL VOLATILITY, PERTH, AUSTRALIA, 7–9 SEPTEMBER 2001

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In 1982, *Time Magazine* named the IBM PC as the man of the year! Never before (or since) had an inanimate object been chosen as the ‘man of the year’. With hindsight, if *Econometrica* had a prize for person of the year, 1982 could well have been the year for Rob Engle, with the publication in *Econometrica* of *Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of United Kingdom Inflation*. Without the PC, perhaps Engle’s ideas might not have been so widely disseminated via email, online journals, and the Internet. His ARCH model, its direct descendants, GARCH, GARCH-M, log-ARCH, EGARCH, GJR-GARCH, GQ-ARCH, general GARCH, FIGARCH, power GARCH, NARCH, TARCH, TGARCH, STAR-GARCH, STAR-STGARCH, VS-GARCH, BEKK-GARCH, MGARCH, CC-MGARCH, VC-MGARCH and, in particular, YA-GARCH (‘Yet Another GARCH’) and SQUARCH (??) (see McAleer *et al.*, 1998, p. 120), and the more demanding new generation of stochastic volatility siblings, might never have been so easily estimated and therefore popularised. A few mouse-clicks and virtually any member of the GARCH family can be estimated using pre-programmed software. Perhaps, like the current trend with the Nobel Prize in Economics, Engle and the IBM-PC could have shared the limelight as the ‘1982 person of the year’!

Few papers before or since have surpassed this seminal piece in terms of measured citations (references to Durbin and Watson’s DW test may be one instance that actually surpasses citations to Engle’s ARCH paper). Rob Engle developed the Autoregressive Conditional Heteroskedasticity (ARCH) model, which underlies all time-varying models of volatility; and Rob Engle and Clive Granger jointly invented Co-integration Analysis, the most widely used technique for non-stationary time series processes. The classic papers by Engle on ARCH, and by Engle and Granger on Co-integration, are widely regarded as two of the five most important papers in econometrics over the last three decades.

In recognition of the anniversary of the publication of Engle's ARCH paper, Michael McAleer (University of Western Australia) and Philip Hans Franses (Erasmus University Rotterdam) organised the *International Conference on Modelling and Forecasting Financial Volatility*, hosted by the Department of Economics, University of Western Australia, Perth, 7–9 September 2001. On the twentieth anniversary of Engle's classic publication, the *Journal of Applied Econometrics* will be publishing a special issue in 2002 dedicated to *Modelling and Forecasting Financial Volatility*, based on a selection of papers presented at this international conference. The *Journal of Economic Surveys* will also be celebrating the anniversary with a special issue on *Financial Econometrics*, to be edited by Michael McAleer and Les Oxley. This special issue will also be published as a monograph by Blackwells, continuing the recent successful survey series.

The international conference on *Modelling and Forecasting Financial Volatility* was without parallel in terms of the distinguished keynote speakers and contributed paper presenters in modelling and forecasting financial volatility (or risk). The keynote speakers were R. F. Engle (New York University and University of California, San Diego), C. W. J. Granger (University of California, San Diego), and Neil Shephard (Official Fellow, Nuffield College, Oxford, and Professor of Economics, University of Oxford). In addition to the keynotes, there were 3 participants from the USA, 5 from the Netherlands, 4 from Australia (including two PhD students from the Department of Economics at UWA, Felix Chan and Peter Verhoeven), 2 from Taiwan, 2 from Spain, and one from each of Belgium, Canada, New Zealand, Singapore, and Sweden. In total, there were representatives from 11 countries. There was no registration fee for the conference because the convenors, Philip Hans Franses and Michael McAleer, wanted to maximise participation by colleagues at UWA and other universities in Perth, in particular, as well as from elsewhere in Australia and from overseas. In fact, there were participants from Melbourne, Sydney and the Gold Coast, Queensland, as well as from Hong Kong, Japan, the Netherlands, New Zealand, Sweden, Taiwan and the UK, who did not present papers but attended various conference sessions. All the papers presented at the conference appeared in a volume of Conference Proceedings, which was superbly manufactured by Uniprint at UWA.

Academic program

The conference was opened by Ken Clements, Head of the Department of Economics at the University of Western Australia. The program comprised three keynote and five regular sessions, with the innovative use of an additional poster session. Although common in the natural, physical, biological and medical sciences, poster sessions have not been particularly popular in economics. I would recommend them to future conference organisers. The first session of the conference was the keynote presentation by Rob Engle, entitled 'New Frontiers for ARCH'. Engle set the tone for the conference by not wearing a tie. Indeed, apart from Kimio Morimune from Kyoto University, no one at the conference

sported a tie — I left my own in New Zealand as it (yes, I only have one) is used solely for interviews and weddings!

With over 70 interested listeners in attendance, Michael McAleer introduced Engle as the inventor of time-varying models of volatility. As Michael quipped, 'Engle's papers were so well known that the citation counts for his two classic contributions, namely ARCH and (with Clive Granger) Co-integration Analysis, were actually *decreasing* over time because his papers had become so well known'. This is certainly a good measure of the importance of a paper.

Engle's keynote paper identified the 'old' frontiers as being; the stochastic properties of ARCH models, macroeconomic applications, simple options trading strategies, modelling risk and return trade-offs, and measuring risk via VaR approaches. The 'new' frontiers centred on high frequency volatility, multivariate GARCH, the modelling of non-negative processes, and simulation methods for model comparisons and option hedging. An interesting part of his presentation focused on the notion of the 'volatility of volatility' and 'volatility of variance'. Once defined, however, he then asked how they could be computed in stochastic volatility or long memory models? If the ideas prove to be of intellectual and practical interest, I am sure that the industry of ARCH-type econometricians will resolve the computational problems in the years ahead.

It is refreshing to see that the 'grandfather' of ARCH is still posing interesting and demanding questions for the new generation of financial econometricians just starting their careers. There were several of these new rising stars at the conference, and they were enthralled by the presentation by Engle. His keynote was highly anticipated, well attended and a perfect 'opener' for the conference, setting the highest of professional standards for the other presenters to follow. It must have been a daunting task for the other presenters but, as will become clear, all exceeded expectations.

The keynote presentation on the second day of the conference was by Clive Granger, entitled 'Some Comments on Risk', where over 70 eager listeners were in the audience. Granger was introduced by Michael McAleer as an academic whose work in time series over an extended period had been so influential that he had been transformed into an adjective, as in Granger Causality, Engle-Granger Co-integration Analysis, and the Engle-Granger two-step estimator. Interestingly, in a recent seminar at the Department of Economics, University of Canterbury, New Zealand, Clive said that: 'I am one of the few people who does not refer to Granger Causality but instead call it "Causality". However, when they do refer to Granger Causality, they often don't refer correctly to the definition as I stated it!' Such a statement marks both the humility of this gentleman, and seems to indicate that many researchers, though citing his work, have never actually read it! As with Rob Engle, direct references to the path-breaking work of Clive Granger have also been decreasing over time as his classic papers had become so well known.

Granger's paper focused particularly on risk in the stock market. As his opening address made clear, there are many researchers/agents interested in modelling and explaining stock market behaviour, including continuous time mathematicians (interested in option pricing theory); economists interested in

uncertainty (via portfolio theory, diversification and CAPM); econometricians (who typically focus on ARCH modeling); empirical statisticians (often focusing on random walks and the Efficient Market Hypothesis); journalists; and brokers and individual investors. His talk reminded me of some of the issues I faced as a graduate student struggling to understand the work of Shackle (1955) on his distinctions between 'risk' and 'uncertainty', and how the words now seem to be used interchangeably when some academics have very strong views on what they see as fundamental differences between the concepts.

As we have perhaps now come to expect, Granger's talk was inspiring, thought provoking, and simply 'Granger-esque'. His ability to create a potent mixture of statistical theory, common sense and perception is an incredible asset to the profession.

Philip Hans Franses introduced the third keynote speaker, Neil Sheppard as 'one of Europe's leading theoretical econometricians, with an astonishing publications record. In particular, he is a leading contributor to the literature on stochastic volatility models. His work is widely regarded as highly influential, and he is well known for his active participation in scientific discussions'. No one at the conference could possibly disagree with such an assessment.

Introducing his session, entitled 'Realised Power Variation and Stochastic Volatility models', Sheppard commenced with the following insights: 'Like many people in this room I went to university after 1982 and for my generation ARCH has always been taken for granted — like regression, likelihood, autoregression, electricity! For us it is difficult to imagine econometrics without it. Rob's 1982 paper is a piece of great clarity, with a focus on ideas. It started the field of volatility modelling, which, as this conference shows, is still going strong. Further, Rob's paper was the first influential one in econometrics, which built non-Gaussian time series directly in terms of one-step-ahead prediction distributions. In 1981 my colleague D. R. Cox called such models "observations driven" (that is, driven by past observations), although we econometricians tend to think of them as models built out of conditional distributions. This approach is very important and has led to other major methodological developments in econometric modelling. As Rob's talk on multiplicative time series models shows, his interest in this general approach is still very active'.

In his introduction to Rob's keynote presentation, Michael said that the number of direct references to Rob's 1982 paper was actually decreasing over time, which is a good measure of the importance of the paper for everyone knows about ARCH. Another good measure of the worth of a paper is that you can go back to it over the years and gain fresh insight each time you read it. I believe I currently read the 1982 paper about every second year! I was so pleased to note that in the introduction to Rob's 1995 OUP "Selected Readings in ARCH" that he wrote that he thought his 1982 paper was still a good place for people to first read about ARCH. He is so right'.

In addition to the three keynote papers, there were 12 contributed papers grouped into 5 sessions, and a lunchtime poster session with 6 poster presentations. The overall standard of the contributed paper and poster sessions

was simply outstanding. I am a regular conference participant and there have been few, if any, regular *Econometric Society* conferences which I have been to where the general level of paper content and presentation has been so high. With such a high standard, it is difficult to identify any 'exceptional' or 'exemplary' papers, but some are worthy of specific mention.

The paper by Eric Ghysels (University of North Carolina), written with Elena Andreou (University of Cyprus and University of Manchester), entitled 'When does microstructure noise affect the estimation of asset pricing model?', was exemplary in both content and style of presentation. Ghysels has a very calm and professional presentation style, which almost lulls the audience into a false sense of security that the questions raised are easy to answer. Typically, they are not, being deep and interesting questions which require careful theoretical modelling and typically powerful computing solutions. As the conclusion states: 'the paper is about the tension between the statistical properties of tick-by-tick returns and the probabilistic prescriptions implied by continuous time models'. Their solution is to propose 'a formal statistical test (that) is fully parametric, entirely data driven and does not involve any specific asset pricing model nor any type of price discreteness'. Time will show whether such tests are adopted in the growing discipline.

A second 'exemplar' was the paper by Nour Meddahi (Universite de Montreal, CRDE, CIRANO and CEPR), entitled, 'An Eigenfunction Approach for Volatility Modelling'. Meddahi presented a new approach for volatility modelling in discrete and continuous time, where the variance process is assumed to be a linear combination of the eigenfunctions of the conditional expectation operator associated with the state governing the volatility. Within the approach, Meddahi derived formulae for the unconditional and conditional moments for inference. The approach has the advantage of being flexible and one that fits well within the developing stochastic volatility paradigm, where the volatility is a function of the state variable. However, rather than specifying the variance as being equal to some specific function of the state variable, it is assumed to be a linear combination of the eigenfunctions of the conditional expectation operator associated with the state variable.

Two other paper presentations were exemplary for different reasons. The papers by Felix Chan (University of Western Australia) and Angeles Carnero (Univeridad Carlos III Madrid) were both presented by PhD students, and were written with their respective supervisors. What was so remarkable about these two presentations was that they were both presenting their first ever paper at an international conference. In both cases, the presentations were clear, confident, professional, and informative, namely, truly exceptional, and would humble many of their more experienced colleagues at this and at other international conferences.

Felix Chan, in the first year of his PhD after completing an Honours degree at UWA in 2000, presented a paper written jointly with Michael McAleer, entitled 'Estimating smooth transition autoregressive models with GARCH errors in the presence of extreme observations and outliers'. The paper was topical and interesting. Chan's confident presentation provided a survey of recent

developments in using GARCH, STAR, STAR-GARCH and STAR-STGARCH models, and also highlighted the difficulties in evaluating such models due to the absence of structural and statistical properties, particularly the regularity conditions for the existence of moments, as well as their connection to consistency and asymptotic normality. The paper also presented some empirical evidence that showed that the QMLE for STAR-GARCH models are sensitive to the choice of optimization algorithm and also extreme observations and outliers.

Angeles Carnero presented a paper, written jointly with her supervisors Esther Ruiz and Daniel Pena (Universidad Carlos III Madrid), entitled 'Is stochastic volatility more flexible than GARCH?' As with most such rhetorical titles, the answer is clearly in the affirmative and, when compared with GARCH(1,1) the ARSV(1) model is shown to be more flexible in the sense that it can generate series with higher kurtosis and smaller first-order autocorrelation of squares for a wider variety of parameter specifications. The presentation included some of the 'nicest' and most useful graphics I have seen presented at a conference, perhaps only exceeded in colorfulness and complexity by papers presented by hydrologists at the Modelling and Simulation Society of Australia and New Zealand (MODSIM) meetings (see Oxley (1996, 1998))! Using a wide range of simulated and empirical examples, Carnero was able to demonstrate the flexibility of ARSV(1) of modelling typical financial data.

Social program

The first social event on the evening of the first day of the conference was a two-hour cocktail party at the University's Lawrence Wilson Art Gallery. In deference to the Gallery's policy of not serving red wine because of possible stains on the light carpet, a variety of white wines, beers and non-alcoholic beverages was on offer. The catering throughout the conference, undertaken by All Seasons Catering under the supervision of the owner-manager, Michael Towey, was widely trumpeted as exceptional. A delightful string trio also played in the background. There was a short speech by Michael McAleer who, on behalf of his co-convenor, Philip Hans Franses, thanked the UWA Vice-Chancellor's Discretionary Fund, the Department of Economics at UWA, the Faculty of Economics and Commerce, Education and Law at UWA, and Erasmus University Rotterdam, for financial support. He also thanked the keynote and contributed speakers for making a great effort to travel to Perth for the conference, the local organisers, Felix Chan, Suhejla Hoti (who was in Italy during the conference) and Lee Kian Lim, as well as Clinton Watkins, Jasslyn Yeo and Mahendra Chandra, for their contributions to the organisation of the conference. The drinks and food were plentiful, and few felt the need to visit a restaurant after the cocktail, though some delegates did retire to a public bar 'to play some pool' (or so they said).

The conference dinner was held on the evening of the second day of the conference. A bus collected the delegates from outside the Economics and Commerce Building at 6.15 pm and drove the delegates to Fremantle Prison, a 25-minute trip from the UWA campus. A 30-minute tour of the prison was provided

by an entertaining tour guide. Not everyone could face a tour of the 'execution room' and I have my own list of those who stayed outside and those who jostled to see the room. [I was one of the lily-livered group who waited outside!] It was hard to imagine that the prison was in operation until 1991. Kimio Morimune remarked that he had toured the prison in 1992 just after it had been opened to tourists, but that the malodorous vapors had dissipated. The tour ended in D Block, where Michael Towey and his many helpers were waiting to provide a sumptuous feast for the delegates. Food and a range of high quality wine were plentiful. In view of there being no carpets in D Block, both red and white wine were available.

Just before the main meal was served, Michael McAleer begged the indulgence of the visitors for a few words. Philip Hans Franses and he had been walking along the banks of the Swan River adjacent to the UWA campus in March 1999 when they discussed the approaching Twentieth Anniversary of the publication of the classic ARCH paper by Rob Engle in *Econometrica* in 1982. They decided to organise a conference to honour this pathbreaking event, and so it came to pass. [In this context, it might be worth reading 'The Ten Commandments for Organizing a Conference' (McAleer (1997)), 'The Ten Commandments for Attending a Conference' (McAleer and Oxley (2001)), and 'The Ten Commandments for Presenting a Conference Paper' (McAleer and Oxley (2002)).] McAleer described the first conference he had ever attended, which coincided with his first conference presentation, namely the European Meeting of the Econometric Society in Athens, from 3–6 September 1979. There had been a buzz at the conference about a certain session in econometrics. What was particularly interesting about the excitement surrounding this session was that it involved some significant papers, and not any rumoured ill feelings among any of the paper presenters (which tends to provide fireworks of an entirely different nature). The high-profile session McAleer had in mind was 'Time Series II: Specification', which was chaired by David Hendry (LSE). The third paper in the session was by Essie Maasoumi (USC), current Editor of *Econometric Reviews*. The second paper was by Hashem Pesaran (Cambridge), Foundation Editor of the *Journal of Applied Econometrics*. The first paper was by a certain Rob Engle (LSE), whose paper was 'Autoregressive Conditional Heteroscedasticity'. Here was an outstanding paper, which was approaching the Twentieth Anniversary of its publication, which had brought so much pleasure to those working in the field, and which was instrumental in the organisation of the conference on modelling and forecasting financial volatility in Perth, Australia. With this in mind, McAleer asked everyone to fill their glasses and to toast 'Rob Engle and ARCH'.

Wine glasses were, in fact, filled and refilled throughout the evening, in which old and new friends met to celebrate Rob Engle on his many contributions to econometrics. All in all, it was a flawless evening.

For those not faint of heart, numerous photographs from the academic and social events can be viewed at:

<http://pacific.photoisland.com/servlet/com.arcsoft.LoginNew?com=arcsoftBanner&awp=index3.html&DIRECT=show&username=&priv=>

with *login*: **loxley@waikato.ac.nz** and *password*: **engle**. Unlike some international conferences (see McAleer and McKenzie (2002)), it was perfectly safe to post on the web all the photographs taken during the conference dinner.

Some conference statistics

There were 75 registered attendees from 11 countries. The numbers below represent attendance at the various sessions/events:

Keynote 1 (Engle): 70+; Keynote 2 (Granger): 70+; Keynote 3 (Shephard): 45+ (Sunday morning); Session 1: 50+; Session 2: 40+; Session 3: 45+; Session 4: 50+; Session 5: 40+; Poster Session: 40+; Reception (Friday): 55; Conference Dinner (Saturday): 42.

Given the inclement weather, it was perhaps not surprising that each delegate and paper presenter attended every session. Of particular interest was the large number of delegates in attendance during the last session on Sunday.

Classic quotes

As with many conferences, there was a plethora of classic quotes. Perhaps somewhat strangely, names have not had to be omitted to protect the guilty! A selection is given below.

‘Call me Angeles’. (Maria Angeles Carnero Fernandez).

‘By the end there were a lot of MATEs (Many ARCH-Type Equations)’.

‘Occasionally we have to go home to sleep’. (Neil Shephard, in discussing the derivation of strong form rather than weak form conditions)

‘Now I can see that the graphs are barely visible from here, so not at all from the back’. (Phillip Hans Franses’ realization upon drawing Dutch unemployment on a distant whiteboard in a pale colour)

‘I am frighteningly good at pinball’. (Philip Hans Franses)

‘We’ve been waiting for you to come back so we can say goodbye’. (Michael McAleer to Rob Engle)

‘Models with nice names are more successful’. (Philip Hans Franses on the CLEAR model)

‘The proofs exist, but they are in Barcelona’.

‘I can say I have been in Perth and have been in prison too’. (Neil Shephard)

‘This works because of Richard Paap. He only lends his name to things that work’. (Philip Hans Franses)

‘Rob Engle’s citation counts for his two major contributions seem to be decreasing over time because his papers have become so well known’. (Michael McAleer)

‘Clive Granger has become an adjective’. (Michael McAleer)

'Clive Granger was invited to discuss second moments and volatility, but he seems to prefer first moments and volume'. (Michael McAleer, on Clive Granger's keynote presentation)

'This is just for fun between consenting adults'. (unnamed)

Epilogue

The original idea for the conference as a celebration of the publication of the original ARCH paper was inspirational. Both Michael McAleer and Philip Hans Franses are to be congratulated on their foresight and organisation. The list of delegates combined a veritable 'Who's Who' of legends with new and upcoming leaders in the field. Once again the organisers are to be congratulated for this format. It is all too easy to organise a 'friends only' junket, excluding young scholars, almost by definition. This conference was certainly not that. On the contrary, it combined frontier presentations from the 'best in the world', combined with papers presented by some delegates who were attending their first international conference. The outcome was a highly successful, intense, stimulating and productive conference, where the average level of presentation and paper content was 'outstanding' and the variance (or volatility) approached zero!

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