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THE ET INTERVIEW: A CONVERSATION WITH ERIC GHYSELS

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Eric Ghysels

Eric Ghysels is the Bernstein Distinguished Professor of Economics and Professor of Finance at the University of North Carolina at Chapel Hill. In 2008, Eric Ghysels and Robert Engle (2003 Nobel co-Laureate in Economic Science with Clive Granger) founded the Society for Financial Econometrics (SoFiE), establishing a global network of academics and practitioners dedicated to the

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fast-growing field of financial econometrics. In June 2010, Eric visited the Centre for Financial Econometrics (CoFiE) and the Sim Kee Boon Institute of Financial Economics at Singapore Management University. During his visit we conversed with him about SoFiE and the growing toolroom of financial econometric research, what it has to offer industry practice, and how it might assist central banks and regulators in their daunting task of surveillance of financial markets following the turbulence of the last 3 years.

You are a founding copresident of the new Society for Financial Econometrics (SoFiE). What is SoFiE, and what does it seek to achieve?

The Web page of the society (http://sofie.stern.nyu.edu/) states that SoFiE is a global network of academics and practitioners dedicated to the fast-growing field of financial econometrics. SoFiE is committed to promoting and expanding research and education by organizing annual conferences and sponsoring programs and activities in the intersection of finance and econometrics. The annual meetings of the society alternate between the U.S., Europe, and Asia–Australia.

The first conference was held in New York City at the New York University (NYU) Stern School of Business on June 4–6, 2008. With about 200 in attendance and sponsors from the NYU Salomon Center and Beyondbond, Inc., the society became globally recognized as a leading organization in financial econometrics. The Founding Council met here to discuss the administrative structure and the future of the society.

The second annual conference (SoFiE European Conference) was sponsored by the Swiss Finance Institute and held at the University of Geneva in Geneva, also a significant financial center, Switzerland, on June 10–12, 2009. The third annual conference (the SoFiE Asian Conference) was sponsored by the Commonwealth Bank of Australia and was held at the University of Melbourne in Australia on June 16–18, 2010.

In addition to the annual conferences, SoFiE also sponsors and helps organize regional conferences, workshops, and seminars. In particular, the society has cosponsored a number of conferences—typically 1-day events—that focus on a specific topic. Several conferences took place at NYU, organized by the Volatility Institute, and one took place at the University of Chicago, sponsored by the Stevanovich Center. The joint Volatility Institute–SoFiE conferences covered topics such as volatility and correlations in stressed markets or long-run volatility and economic fundamentals, whereas the Chicago conference focused on the theme of extreme events, credit risk, and liquidity. These topics were of great importance at the time—and remain so—during the financial crisis and its aftermath. All conferences were very heavily attended by academics as well as practitioners. The New York conferences joint with the Volatility Institute are now an annual Spring event. A first European thematic conference was held at CREATES—Aarhus University—in October 2010, and addressed the theme of measuring and

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predicting risk with high-frequency financial data. There are several other events that are being discussed at the moment. Past and upcoming conference details are on the SoFiE Web site.

As you know, the society also built a network of institutional members. Among them figures the Sim Kee Boon Institute for Financial Economics at Singapore Management University as the only Asian institutional member. The others are CentER at Tilburg University, CREATES at Aarhus University, CREST in Paris, NCER at Queensland University of Technology, the Stevanovich Center at the University of Chicago, the Swiss Finance Institute, and the Volatility Institute at NYU Stern.

Can you tell us what prompted the idea of creating SoFiE?

Rob Engle and I thought there were a lot of people doing work on financial econometrics, but they were scattered around in different areas. They attend either the Western Finance Association meetings, American Finance Association meetings, Econometric Society meetings, or various statistical society meetings. Yet, all these scholars are doing similar or closely related research. SoFiE provides a platform for them to interact. We wanted to create the synergies of a society. In particular, international and interdisciplinary synergies are two important features that set us apart.

During the 2007–2008 academic year I was on sabbatical and had contacted Rob to spend time at NYU. During my sabbaticals I try to do something that differs from the usual research activities. You may perhaps recall that I spent my first sabbatical at the Cowles Foundation, where I worked on an *ET* interview with Marc Nerlove. Marc taught me time series during graduate school, and I published my very first (English language) academic paper with him.

Prior to my NYU sabbatical, Rob and I already had talked about the idea of creating a society that would be a home and intellectual beacon for the field of financial econometrics. The real work started during my sabbatical. Rob and I typically met once a week. These meetings were held jointly with Hayley Kelly—who became the associate director of SoFiE.

How did you handle the initial startup costs and logistics?

Looking upon it now, I must admit we never anticipated how much brainstorming was required to actually create a scientific society. I am most grateful to Rob for having dedicated the resources at Stern that allowed us to jump-start SoFiE. During our meetings Rob and I would bounce off ideas, and Hayley would do the background research for us; she would refine our ideas and make them operational. A lot of credit goes to Hayley, as she spent countless hours shaping our thoughts into a practical and feasible project. She was entrepreneurial and highly motivated.

There were also funny moments. I recall one person whose reply to a message from Hayley started with *Dear Sofie*.

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FIGURE 1. Eric Ghysels and Rob Engle—cofounding presidents of SoFiE—first European SoFiE conference, Geneva 2009.

How do SoFiE and the Journal of Financial Econometrics (JFEC) relate to each other?

That is a very good question. I am glad you asked this as it allows me to talk about the important role played by René Garcia and Eric Renault as well as Martin Green from Oxford University Press. René Garcia and Eric Renault embraced the idea of the society with great enthusiasm. In some sense they had laid some of the groundwork for SoFiE. The society had right from the start its own journal thanks to the support of René Garcia and Eric Renault and the keen interest of Martin Green to make a formal connection between SoFiE and the Oxford University Press publication.

I might add that the Founding Council of SoFiE were the members of the Editorial Board of *JFEC*. Eric and René started their journal with an impressive board of prominent scholars in the field. For Rob and me this was the natural starting point for the governance structure of the society. Over the past three years, as SoFiE grew, we added more members to represent the different constituencies of the society.

Moreover, some of the connections between SoFiE and the journal are more subtle. For example, when we designed the logo of the society we selected the colors of *JFEC*'s cover page.

What was the grassroots response when SoFiE was launched?

It was simply overwhelming. For example, when we launched the society we created a category of founding members and asked them to help us build via a

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small contribution a financial fund that would support the society. The response was instant, and the numbers were impressive. It was a humbling experience. Rob and I are grateful to each and every person who made those contributions (the list can be found at http://sofie.stern.nyu.edu/founding.members). That includes you both, Peter and Jun, as among SoFiE's founding members.

Does SoFiE have industry connections? How are these fostered, and what sort of feedback do you get from industry? Does SoFiE collect or offer data or means by which empirical researchers can approach industry for data?

We have industry connections in various ways. First, as I mentioned before, our annual meeting typically involves a private sector partner—such as Beyondbond, Inc., for the New York meeting and the Commonwealth Bank of Australia for the Melbourne meeting. The Swiss Finance Institute and NCCR FinRisk sponsored the Geneva meetings. The former is a private foundation created in 2006 by Switzerland's banking and finance community in cooperation with leading Swiss universities. Second, our conferences are attended by practitioners as well as academics. The thematic conferences may perhaps be more appealing to them as they sometimes cover hot topics—such as credit risk, research on liquidity, risk management, and systemic risk—and they tend to be 1-day events. We are not (yet, at least) dealing with data collection issues. One of our institutional members—the Volatility Institute at NYU—does provide such services in terms of model-based predictions of volatility and systemic risk. This is certainly an issue that is of potential interest to SoFiE.

What is SoFiE doing to reach out to the financial industry?

Many thematic conferences and the inaugural conference had a panel discussion in addition to regular academic papers. We have had panel discussions on topics such as measuring default risk and systematic risk. For the panel discussions we picked practitioners, central bankers, regulators, etc., and mixed them with academics.

What does financial econometrics have to offer financial industry practice?

The short answer is: I think a lot. If we think about asset allocation questions, we think first and foremost about estimating comovements and covariation of returns. If we think about risk management we think of volatility, extreme events, and so on. If we think of (long-term) return predictability we deal with some intriguing econometric issues of modeling and forecasting. If we try to link fixed income securities to the underlying macroeconomic driving forces such as the business cycle and monetary policy, again we think about models, data, estimation, and

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FIGURE 2. Gala dinner of the inaugural SoFiE conference, New York 2008. Exchanging thoughts with Hayley Kelly (back to the camera).

testing. Practitioners care about all these topics—asset allocation, risk management, return predictability, bond pricing, and so forth. Many years of research in financial econometrics have provided them with the tools that they use. These tools obviously need constant improvement—in part because they are used in a changing environment due to financial innovation and changing technology in financial markets. I would like to stress that it should be a two-way street. Practitioners often come up with some "simple solutions" that trigger a flurry of subsequent academic research—one such example would be implied volatilities derived from options. I think we are not much different in that regard from other sciences such as engineering and medical research.

Can you give us some leading examples where financial econometrics has changed financial industry practice?

I would like to give three examples. The leading example is the literature on volatility. The seminal work by Rob Engle made practitioners aware of the fact that risk, measured by volatility, has a predictable pattern. That idea has had an immense impact on day-to-day practice on asset allocation and risk. The second is the entire regulatory framework of the Basel recommendations for risk management. The Basel committee has made over time several proposals on value at risk and other such measures on risk exposure. There is a constant debate on

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FIGURE 3. With Paul Kofman (center) and Rob Engle (right) at the first Australian SoFiE conference, Melbourne 2010.

these measures, particularly in the wake of the financial crisis. They are reexamining the guidelines for risk management. Behind their expertise, recommendations, and technical documents lies a substantial body of academic research. The third example is less obvious. More and more financial trading is being done by computers on electronic platforms based on algorithmic formulae. Deep down these formulae rely on short-term predictable patterns in trading. These are closely related to the econometric models that we develop and explore in financial econometrics.

Recent events in investment banking and finance have thrown into question many existing paradigms concerning derivatives and the bundling of financial assets. How has this affected the field of financial econometrics? What light does econometrics shed on the limitations of existing paradigms?

I am currently reading the book *Lords of Finance* by Liaquat Ahamed (which was awarded the Financial Times and Goldman Sachs Business Book of the Year Prize), covering the Great Depression from a central banking historical perspective. I have a second book lined up, *This Time Is Different: Eight Centuries of Financial Folly* by Carmen M. Reinhart and Kenneth Rogoff, which provides a quantitative history of financial crises based on an impressive amount of historical

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data analysis. It is good to put current events in a historical context. It is clear that crises are part of the fabric of economies driven by markets. The question is how to avoid crises that have devastating effects on the economy and the welfare of nations. More specifically to your question, issues about derivatives come up regularly when financial markets are in turmoil. After the 1987 crash there were many discussions about speculative trading in derivatives. The recent events put the spotlight on complex financial products—mostly related to the real estate and corporate bond markets—that were virtually impossible to appraise in terms of risk. Rating agencies used outdated models to assess the risks of such products. They obviously had conflict of interest issues with their clients, but frankly they also had very little historical data in many cases to make sound estimates of the underlying risk characteristics. In the case of real estate markets, this was compounded by the fact that many people on Main Street and Wall Street were overoptimistic about housing prices in the U.S. The latter phenomenon is, however, something we see regularly happening in history. We are fundamentally talking about extracting long-term trends, about estimating rare events such as defaults, systemic failures, and so forth. When you look at the Great Depression era, for example, central bankers obviously did not have the data at their fingertips that allowed them to monitor financial markets as we have now. So, in this regard, we are better off, and the scope for using financial econometric tools has therefore vastly increased. But we also have to be realistic about limitations. One comparison in this regard is particularly illuminating. In recent years we have witnessed heated debates (no pun intended) about global warming. The science and the data behind such debates tell us something about the limitations we face with models and data analysis in general.

With more data available are financial econometricians able to deal with more realistic models?

The answer is yes. In some areas it is definitely yes. Using an example of volatility, what is known as high-frequency data—typically intraday data—has allowed us to estimate volatility much more precisely as well as the time series behavior of day-to-day changes in volatility. That makes models more realistic. In the 1970s, volatility was assumed to be constant over time, but that is no longer assumed in present models. With more data we can measure volatility more and more precisely and hence build more realistic models for risk management.

There are limitations. More data does not solve all problems**.** We are still struggling with the estimation of very large covariance matrices in portfolio problems, for instance.

More data does not necessarily mean data measured at higher frequencies. Another way to obtain more data is to expand the time span, say back in history. I am working with a historian and trying to go back to the Great Depression to collect data with features that allow us to back test measures of systematic risk.

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Do you think that the circumstances and events of the financial crisis over 2007–2008 have influenced research directions in financial econometrics? Are there urgent new questions that need to be addressed by financial econometricians?

On a personal note, I happened to be resident scholar at the Federal Reserve Bank of New York during the financial crisis. I arrived in the summer of 2008—so the subprime mortgage crisis had already taken its toll and the Bear Stearns bankruptcy had already taken place. However, I witnessed the Lehmann events and their aftermath from the eye of the storm, so to speak. The events have marked me and, in particular, my research in many ways. Aside from this personal experience, I think the recent financial crisis has dramatically changed the research agenda of many fields in economics, including financial econometrics. For example, macroeconomists used to largely ignore the impact of financial market frictions. They no longer do. Specifically in financial econometrics, I think we are being challenged to think more about how to measure systemic risk, how to measure counterparty risk, how to monitor the trends, notably your joint work on testing for bubbles, and how to monitor relatively low-frequency phenomena in data-rich environments. Many aspects of financial regulation that are being discussed involve a greater role for financial institutions such as the Federal Reserve and require them to address these aforementioned issues. We have terabytes of data being dumped on regulatory institutions on a daily basis. How do we use those data? What do we measure and how? Take, for example, leverage of financial institutions. Regulators typically only monitored closely the systemic risk banks, a small but important subset of the banking sector, and extrapolated their leverage to gauge the soundness of the whole sector. The events surrounding Lehmann and AIG have shown that this is not enough. The interconnectedness of markets and the shadow banking system have made this a more challenging task. Again, on a more personal note, I have been quite involved in trying to use large cross sections of high-frequency (financial) data for the purpose of monitoring, updating, and predicting low-frequency phenomena such as macroeconomic fluctuations and financial leverage. I am using some of my research on mixed data sampling (MIDAS) regressions for that purpose, and it seems to fit in well with some of the current challenges faced by regulators. While the use of MIDAS regressions seems to be useful and some of its implementations appear successful, there is still a lot to be done in terms of fundamental research as well as practical implementation.

Risk management is obviously important, especially now that many conventional models have failed. Can financial econometrics help to improve risk measurement?

The first example is the one that I mentioned that high-frequency observations allow us to improve the measurement of volatility. It is a nice combination with

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finance theory. The other example that is very important is tail behavior or extremes. We have made a lot of progress on understanding tail risk and the skewness that is related to downside risk.

The Singapore Monetary Authority has now set up surveillance teams that overlook the macroeconomy and financial activity. Central banks and financial regulatory institutions elsewhere in the world are considering similar measures. Our own work on testing for financial bubbles has led to a simple new diagnostic for market exuberance that can be used as an early warning device by central banks and regulatory bodies in monitoring financial markets. What other econometric methods might be useful for these surveillance teams to utilize in their operations?

I had the pleasure of presenting a paper (entitled "Should Macroeconomic Forecasting Use Daily Financial Data and How?") at the CoFiE miniconference (June 2010) that you organized at SMU. It is an example of methods that are currently being implemented at several central banks that allow us to improve and update macroeconomic forecasts on a real-time basis. A closely related approach involves large state space models and so-called nowcasting using Kalman filters. The MIDAS regression approach I use is much simpler in terms of implementation, underlying assumptions, and computations. At weekly briefings, say, central bankers want to update estimates of what to expect in terms of gross domestic product growth, inflation, unemployment, and other relevant measures. Macroeconomic forecasting is only one example, of course. I talked about monitoring leverage earlier as another.

What differences do you see between Asian financial markets and their North American and European counterparts? How might these figure in modeling?

In finance there is an area called "emerging markets." Asian financial markets typically were put in this category along with South American and other markets. I think financial markets are becoming much more integrated than they used to be and therefore the differences are fading quickly. Electronic trading platforms make it easy to have access to many financial products around the world. Also, financial news used to be mostly related to what was happening in the U.S. and Europe. That is no longer the case. Markets respond to news about Asian economies as much as they do about the rest of the world.

Singapore is now aiming to become a major financial hub in Asia. What, in your opinion, are the necessary ingredients for success in this endeavor?

I think you have to ask yourself what has made New York, London, Frankfurt, Hong Kong, and Tokyo centers of financial activity. The answer usually involves

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many different ingredients such as financial regulation, economic fundamentals, transparency of financial markets, banking, and so on. It seems to me that Singapore surely has many of the right ingredients.

Financial econometrics has come a long way since it emerged as a distinct discipline. What signs are there now about how the subject is likely to develop in future?

First of all, I think the financial crisis has jolted the field of financial econometrics and finance in general. The connections between the real economy and the financial sector, default risk, contagion, liquidity risk, counterparty risk, etc., are now being discussed much more intensely. There are many fresh ideas out there. Many seeds are being planted, as Clive Granger used to say. If we go back to the Great Depression, we saw fundamental shifts in the economics profession as well. Most notably, of course, there was Keynes, but then there were also Ragnar Frisch, Jan Tinbergen, and Paul Samuelson—incidentally the first Nobel Prize winners in economic science—who promoted, respectively, practical econometric research and mathematical modeling in economics and finance.

Let me also say something about the future of SoFiE. The young people in the profession are the future of SoFiE. I see so many enthusiastic young researchers. Many identify themselves with the goal of the society and its activities. Let me also note that the next annual meeting (June 2011) of SoFiE will be held in Chicago—hosted by the Stevanovich Center—one of SoFiE's institutional members, as noted earlier. Many people in the Chicago area have helped us make this possible, particularly Lars Hansen and Per Mykland. I expect it will be an exciting meeting with the participation of both academics and practitioners, like the previous SoFiE meetings.

To sum it up, SoFiE is a society that is mushrooming. Rob Engle and I are very pleased that it has grown beyond our own expectations.

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