Chapter 2

Literature Review

Michel Beine, Agnès Bénassy-Quéré and Christelle Lecourt (1999) studied about "The Impact of Foreign Exchange Interventions: New Evidence from FIGARCH Estimations" This study investigated the impact of official intervention on the short run dynamics of the Deutschemark and the yen against the US dollar. To this goal, they relied on a FIGARCH model of the exchange rate dynamics, which yields a more appropriate measure of the ex post volatility of the exchange rates than the GARCH model. Indeed, the FIGARCH model implies a finite persistence of volatility shocks (while there is no persistence in the GARCH framework), and is strongly supported by the data. The result showed that the traditional GARCH estimations used in the literature tend to underestimate the effects of central bank interventions on the ex-post volatility of exchange rates. This illustrates that measuring volatility through the FIGARCH approach instead of the GARCH one matters in empirical work.

James Davidson (2003) studied about "Moment and Memory Properties of Linear Conditional Heteroscedasticity Models, and a New Model" This paper analyses moment and near-epoch dependence properties for the general class of models in which the conditional variance is a linear function of squared lags of the process. It is shown how the properties of these processes depend independently on the sum and rate of convergence of the lag coefficients, the former controlling the existence of moments, and the latter the memory of the volatility process. Conditions are derived for existence of second and fourth moments, and also for the processes to be L_1- and L_2- near epoch dependent (NED), and also to be L_0-approximable, in the absence of moments. The geometric convergence cases (GARCH and IGARCH) are compared with models having hyperbolic convergence rates, the FIGARCH, and a

newly proposed generalization, the HYGARCH model. The latter model is applied to 10 daily dollar exchange rates for 1980-1996, with very similar results. When nested in the HYGARCH framework, the FIGARCH model appears as a valid simplification. However, when applied to data for Asian exchange rates over the 1997 crisis period, a distinctively different pattern emerges. The model exhibits remarkable parameter stability across the pre- and post-crisis periods.

JH Venter and PJ de Jongh(2004) studied about “A Comparison of Several Maximum Likelihood Based Methods for Estimating GARCH Model Parameters, Volatility and Risk” It has become common practice to fit GARCH models to financial time series by means of pseudo maximum likelihood. In this study we investigate the behaviour of several maximum likelihood based methods for estimating the Garch model parameters and for estimating volatility and risk measures (VaR and expected shortfall). We consider NIG, skewed-t, t and nonparametric kernel densities for this purpose and compare the efficiency of the resulting estimates with those based on the normal distribution. The NIG based approach is found to be competitive with the other methods in most of the cases considered.

Thomas Lux and Taisei Kaizoji (2004) studied about “Forecasting Volatility and Volume in the Tokyo Stock Market: The Advantage of Long Memory Models” We investigate the predictability of both volatility and volume for a large sample of Japanese stocks. The particular emphasis of this paper is on assessing the performance of long memory time series models in comparison to their short-memory counterparts. Since long memory models should have a particular advantage over long forecasting horizons, we consider predictions of up to 100 days ahead. In most respects, the long memory models (ARFIMA, FIGARCH and the recently introduced multifractal models) dominate over GARCH and ARMA models. However, while FIGARCH and ARFIMA also have a number of cases with dramatic failures of their forecasts, the multifractal model does not suffer from this shortcoming and its performance practically always improves upon the naïve forecast provided by historical volatility. As a somewhat surprising result, we also find that, for FIGARCH and ARFIMA

models, pooled estimates (i.e. averages of parameter estimates from a sample of time series) give much better results than individually estimated models.

Fulvio Corsi, Uta Kretschmer,Stefan Mittnik and Christian Pigorsch (2005) studied about “The Volatility of Realized Volatility” Using unobservable conditional variance as measure, latent–variable approaches, such as GARCH and stochastic–volatility models, have traditionally been dominating the empirical finance literature. In recent years, with the availability of high–frequency financial market data modeling realized volatility has become a new and innovative research direction. By constructing “observable” or realized volatility series from intraday transaction data, the use of standard time series models, such as ARFIMA models, have become a promising strategy for modeling and predicting (daily) volatility. In this paper, we show that the residuals of the commonly used time–series models for realized volatility exhibit non–Gaussianity and volatility clustering. We propose extensions to explicitly account for these properties and assess their relevance when modeling and forecasting realized volatility. In an empirical application for S&P500 index futures we show that allowing for time–varying volatility of realized volatility leads to a substantial improvement of the model’s fit as well as predictive performance. Furthermore, the distributional assumption for residuals plays a crucial role in density forecasting.

Yi-Ping Chang, Ming-Chin Hung, Huimei Liu and Jian-Feng Jan (2005) studied about “Testing Symmetry of a NIG Distribution” Heavy-tailed and skewed distributions have recently appeared in many empirical financial studies and many researchers have found that the normal inverse Gaussian (NIG) distribution fits these stylized nonnormal data well and is at the same time analytically tractable. In this article, we propose a likelihood ratio test (LRT) for symmetry of a NIG distribution. Due to the complexity of the likelihood function, an EM type algorithm proposed by Karlis (2002) is used to find the maximum likelihood estimates of the NIG distribution. The conclusions from a simulation study show that the LRT is usually able to achieve the desired significance levels and the testing power increases as the

asymmetry increases, i.e., the proposed LRT is successful in detecting the asymmetric behavior of the NIG distribution.

Ashok Banerjee and Sahadeb Sarkar (2006) studied about “Long Memory Property of Stock Returns: Evidence from India” Recent research on emerging capital markets has shown presence of long memory property in asset returns. Studies report that emerging capital markets exhibit higher average returns as well as higher volatility. This paper examines the presence of long memory property in the Indian stock market. Using data from the most popular stock market index in India, SENSEX, this paper finds evidence of long memory property in the Indian stock market as seen in other emerging markets. It is observed that the fractionally integrated GARCH (FIGARCH) is the best-fit volatility model and it outperforms other GARCH-type models. It is also observed that the leverage effect is insignificant in SENSEX returns and performance of symmetric volatility models is superior. This shows that a particular emerging market may behave differently from developed markets and hence a researcher needs to first verify the stylized properties of such a market before modeling. That volatility of asset returns can be conveniently modeled using information from the remote past as well would help traders in derivative markets to more effectively price their products.

Gabjin oh, Seunghwan Kim and Cheoljun Eom (2006) studied about “Long-term memory and volatility clustering in high-frequency price changes” They studied the long-term memory in diverse stock market indices and foreign exchange rates using Detrended Fluctuation Analysis (DFA). For all high-frequency market data studied, no significant long-term memory property was detected in the return series, while a strong long-term memory property was found in the volatility time series. The possible causes of the long-term memory property were investigated using the return data filtered by the AR(1) model, reflecting the short-term memory property, the GARCH(1,1) model, reflecting the volatility clustering property, and the FIGARCH model, reflecting the long-term memory property of the volatility time series. The memory effect in the AR(1) filtered return and volatility time series remained unchanged, while the long-term memory property diminished significantly in the

volatility series of the GARCH(1,1) filtered data. Notably, there is no long-term memory property, when we eliminate the long-term memory property of volatility by the FIGARCH model. For all data used, although the Hurst exponents of the volatility time series changed considerably over time, those of the time series with the volatility clustering effect removed diminish significantly. Our results imply that the long-term memory property of the volatility time series can be attributed to the volatility clustering observed in the financial time series.

Lars Stentoft (2006) studied about "Modelling the Volatility of Financial Assets using the Normal Inverse Gaussian distribution: With an application to Option Pricing" In the original GARCH model of Bollerslev (1986) conditional normality is assumed, and although the model was immediately applied to model financial returns the assumption has been found to be violated empirically for many time series. Thus, since then alternative distributions like the Student's t-distribution in Bollerslev (1987) and the Generalized Error Distribution in Nelson (1991) have been introduced and analyzed along with a host of other more or less exotic distributions (see e.g. Lambert & Laurent (2001)). In the present paper we will analyze the Normal Inverse Gaussian distribution, which has been introduced to financial econometrics recently. In relation to the GARCH literature it was used in Forsberg & Bollerslev (2002) to model the ECU/USD exchange rate. In this paper the focus is on modelling individual stock returns, and using Realized Volatility as a measure of daily variance we provide evidence that the Normal Inverse Gaussian framework can provide a good description of the returns of some major US stocks. We also provide estimation results for a NIG GARCH model for these assets. Finally, we show how the NIG GARCH model can be used in an option valuation context. Through a Monte Carlo study we illustrate that incorporating excess kurtosis and skewness in the option pricing model could potentially explain some of the systematic pricing errors of Gaussian GARCH models found in Stentoft (2004c). However, the results on the empirical performance of the option pricing model are somewhat disappointing and further research is called for in this area.

Silvano Bordignon, Massimiliano Caporin and Francesco Lisi (2006) studied about “Generalised long-memory GARCH models for intra-daily volatility” The class of fractionally integrated generalised autoregressive conditional heteroskedastic (FIGARCH) models is extended for modelling the periodic long-range dependence typically shown by volatility of most intra-daily financial returns. The proposed class of models introduces generalised periodic long-memory filters, based on Gegenbauer polynomials, into the equation describing the time-varying volatility of standard GARCH models. A fitting procedure is illustrated and its performance is evaluated by means of Monte Carlo simulations. The effectiveness of these models in describing periodic long-memory volatility patterns is shown through an empirical application to the Euro–Dollar intra-daily exchange rates.

Sang Hoon Kang and Seong-Min Yoon (2007) studied about “Long memory properties in return and volatility: Evidence from the Korean stock market” In this paper, we study the dual long memory property of the Korean stock market. For this purpose, the ARFIMA–FIGARCH model is applied to two daily Korean stock price indices (KOSPI and KOSDAQ). Our empirical results indicate that long memory dynamics in the returns and volatility can be adequately estimated by the joint ARFIMA–FIGARCH model. We also found that the assumption of a skewed Student-t distribution is better for incorporating the tendency of asymmetric leptokurtosis in a return distribution.

Fulvio Corsi, Stefan Mittnik, Christian Pigorsch and Uta Pigorsch (2008) studied about “The Volatility Of Realized Volatility” In recent years, with the availability of high-frequency financial market data modeling realized volatility has become a new and innovative research direction. The construction of “observable” or realized volatility series from intra-day transaction data and the use of standard time-series techniques have lead to promising strategies for modeling and predicting (daily) volatility. In this article, we show that the residuals of commonly used time-series models for realized volatility and logarithmic realized variance exhibit non-Gaussianity and volatility clustering. We propose extensions to explicitly account for these properties and assess their relevance for modeling and forecasting realized

volatility. In an empirical application for S&P 500 index futures we show that allowing for time-varying volatility of realized volatility and logarithmic realized variance substantially improves the fit as well as predictive performance. Furthermore, the distributional assumption for residuals plays a crucial role in density forecasting.

Chin Wen Cheong, Abu Hassan Shaari Mohd Nor, Zaidi Isa (2009) studied about “An empirical study of realized and long-memory GARCH standardized stock return” In this article, we study the interday and intraday returns on KLSE over the year January 2003 to year January 2006. The empirical results showed that the realized–standardized return series with 10- and 20-min intervals show remarkably near to a Gaussian distribution compared to GARCH-standardized return series. Our findings in this interesting case study of an emerging market may provide some statistical implications in the returns series for any further theoretical modelling and prediction of others emerging market financial time series.