Empirical Economics
DOI 10.1007/s00181-005-0010-0

EDITORIAL

**Luc Bauwens · Winfried Pohlmeier · David Veredas**

# Editor's introduction



> *"But there are several aspects of the quantitative approach to **finance**, and no single one of these aspects, taken by itself, should be confounded with **financial econometrics**. Thus, **financial econometrics** is by no means the same as **finance** statistics. Nor is it identical with want we call general **financial** theory...Not should be **financial econometrics** a synonymous with the application of mathematics to **finance**. Experience has shown that each of these three view-points, that of statistics, **financial** theory, and mathematics, is a necessary, but not sufficient, condition for a real understanding of the quantitative relations of modern **finance**. It is the unification of all the three that is powerful. And it is this unification that constitutes **financial econometrics**."*

This paragraph is a virtual copy of the one in page 2 of Frisch Editor's note on Econometrica Vol.1, No. 1. The only difference is that economics has been replaced by finance, econometrics by financial econometrics and finance by economic.

It was written 72 years ago but it fully reflects the spirit of this special issue. High Frequency Finance is an archetypical example of Ragnar Frisch words. It represents a unification of 1) financial theory, namely market microstructure, 2) mathematical finance exemplified in derivatives markets and 3) statistics, for instance the theory of point processes. It is the intersection of these three components that yields an incredibly active research area, with contributions that enhance the understanding of today's complex intra daily financial world.

> *"Theory, in formulating its abstract quantitative notions, must be inspired to a larger extent by the technique of observations. And fresh statistical and other factual studies must be the healthy element of disturbance that constantly threatens and disquiets theorist and prevents him from coming to rest on some inherited, obsolete set of assumptions."*

Here again High Frequency Finance is fully reflected. Its modus vivendi is a perfect combination of observed real facts, market microstructure theory and statistics and they all form a system in which each component dovetails nicely with the others. Market microstructure theory deals with models explaining price and agent's behaviour in a market governed by certain rules. These markets have opening and closing hours, maximum price variations, minimum traded volume. Empirical analysis deals with the study of market behaviour using real data. For example, which are the relations between traded volume, price variations and liquidity? Which are the potential problems? Last, statistically speaking, High Frequency data are the so called point processes, that is, the arrival of the observations is random. This, jointly with the fact that financial data has pathological and unique features (long memory, big skewness and kurtosis) implies that new methods, new econometric models, are needed.

The econometric analysis of High Frequency data permits us to answer to questions that are of great interest for policy markers. For instance, how much information should regulators disclose to market participants? Or, how do extreme movements in the book affect market liquidity? Or, last, is a market maker really necessary? On the other side, the practitioners, the traders that participate in the market every day, also have a growing interest in the understanding of financial markets that operate at high frequency. For instance, trading rules may be constructed based on the market conditions that, in turn, may be explained with financial econometrics. This special issue presents some advanced research in this area. In order to document the potential of high frequency finance it was our goal to select a wide range of papers including studies of the order book dynamics, the role of news events, the measurement of market risks as well as new econometric approaches to the analysis of market microstructures.

*Liesenfeld, Nolte and Pohlmeier* develop a dynamic model to capture the fundamental properties of financial prices at the transaction level. They decompose the price in discrete components—direction of the price change and size of price changes—and, using autoregressive multinomial models, they show that the model is well suited to test some theoretical implications of the market microstructure theory on the relationship between price movements and other marks of the trading process.

*Frey and Grammig* analyze adverse selection costs and liquidity supply in a pure open limit order book market using the Glosten/Sandas modeling framework. Relaxing some assumptions of Sandas' (2001) basic model, they show that their revised methodology delivers improved empirical results.[1] They find empirical support for one of the main hypothese put forth by the theory of limit order book markets, which states that liquidity supply and adverse selection costs are inversely related. Furthermore, adverse selection cost estimates based on the structural model and those obtained using popular model-free methods are strongly correlated.

[1] Sandås P (2001) Adverse selection and competitive market making: Empirical evidence from a limit order market. *Rev Financial Stud* 14:705–734

*Hall and Hautsch* study the determinants of order aggressiveness and traders' order submission strategy in an open limit order book market. Applying an order classification scheme, they model the most aggressive market orders, limit orders as well as cancellations on both sides of the market employing a six-dimensional autoregressive conditional intensity model. Using order book data from the Australian Stock Exchange, they find that market depth, the queued volume, the bid–ask spread, recent volatility, as well as recent changes in both the order flow and the price play an important role in explaining the determinants of order aggressiveness. Overall, their empirical results broadly confirm theoretical predictions on limit order book trading.

In the mid-1990s, financial institutions started implementing VaR type measures to meet the 1988 and 1996 Basel Accords' capital requirements to cover their market risk. Based on an internal model, they compute the "Value-at-Risk", which represents the loss they can incur over ten trading days at a 1% confidence level. However, most of these models do not account for the liquidity risk that has been widely documented in the microstructure literature. Due to the price impact of trades, which relies on its size, there may indeed be a difference between the market value of a portfolio, computed over "no-trade returns", and its liquidation value. *Grammig and Giot* propose an original way to shed light on the liquidity discount that should be part of the evaluation of market risk borne by financial institutions. They quantify the liquidity risk premiums over different time horizons, for portfolios of different sizes, composed of three stocks traded on Xetra, using a VaR methodology. This paper thus not only contributes to the existing literature on market liquidity, but provides also an answer to practitioners' concerns relative to the measurement of market risk.

*Tay and Ting* carry out an empirical analysis on high frequency data and more specifically estimate the distribution of price changes conditional on trade volume and duration between trades. Their main empirical finding is that even when controlling for the trade volume level, duration has an effect on the distribution of price changes, and the higher the conditioning volume level, the higher the impact of duration on price changes. The authors find significant positive (negative) skewness in the distribution of price changes in buyer (respectively seller)-initiated trades, and see this finding as support of the Diamond and Verrecchia (1987) analysis of the probability of large price falls with high levels of duration.[2] The analysis is carried out using up-to-date techniques for the nonparametric estimation of conditional distributions, and outlines a descriptive procedure that can be useful in choosing the good specification of the relationship between duration, volume, and prices when performing a parametric investigation.

Despite its rather weak theoretical and statistical foundation chart analysis is still a frequently used tool among financial analysts. *Ben Omrane and van Oppens* investigate the existence of chart patterns in the Euro/Dollar intra-daily foreign

[2] Diamond DW, Verrecchia RE (1987) Constraints on short-selling and asset price adjustment to private information. *J Financial Econ* 18:277–311

exchange market at the high frequency level. Checking twelve types of chart patterns, they study the detected patterns through two criteria (predictability and profitability) and find an apparent existence of some chart patterns in the currency market. More than one half of detected charts present a significant predictability. But only two chart patterns imply a significant profitability which is however too small to cover the transaction costs.

News is the driving forces of price movements in financial markets. *Veredas* analyses the effect of macroeconomic news on the price of the 10 year Treasury bond future. Considering 15 fundamentals he investigates the effect of their forecasting errors conditional upon their sign and the momentum of the business cycle. The results show that traders react when the forecasting error varies from zero. The reaction to a positive or negative forecasting error is different and, most importantly, the reaction varies significantly depending on the momentum of the economic cycle. Moreover, the time of the release matters and the closer it is to the covering period, the more effect it has on the bond future.

*Escribano and Pascual* proposes a new approach of jointly modelling the trading process and the revisions of market quotes. This method accommodates asymmetries in the dynamics of ask and bid quotes after trade-related shocks. The empirical specification is a vector error correction (VEC) model for ask and bid quotes, with the spread as the co-integrating vector, and with an endogenous trading process. Contrary to some hypothesis implied from of market microstructure theory they provide evidence against several symmetry assumptions and report asymmetric adjustments of ask and bid prices to trade-related shocks, and asymmetric impacts of buyer and seller-initiated trades. In general, buys are more informative than sells.

*Bauwens, Rime and Sucarrat* shed new light on the mixture of distribution hypothesis by means of a study of the weekly exchange rate volatility of the Norwegian krone. They find that the impact of information arrival on exchange rate volatility is positive and statistically significant, and that the hypothesis that an increase in the number of traders reduces exchange rate volatility is not supported. Moreover, they document that the positive impact of information arrival on volatility is relatively stable across three different exchange rate regimes, and that the impact is relatively similar for both weekly volatility and weekly realised volatility.

*Editors*
**Luc Bauwens**
Université catholique de Louvain, Belgium
E-mail: bauwens@core.ucl.ac.be

**Winfried Pohlmeier**
University of Konstanz, Germany
E-mail: winfried.pohlmeier@uni-konstanz.de

**David Veredas**
ECARES-Université Libre de Bruxelles, Belgium
E-mail: dveredas@ulb.ac.be