Recent developments in Financial Econometrics

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1 Introduction

This issue of the Annals of Economic and Statistics follows a meeting with the same title held in Aix-Marseille in 2015. It provides a representative overview of how modern Financial Econometrics is addressing the challenges of electronic markets, large data sets, liquidity, globalization, or improved supervision and control of risks in a forecast perspective. The standard dynamic models used for analyzing returns can be written either in discrete time, or in continuous time. In the first category are the Vector Autoregressive Models (VAR), the Autoregressive Conditionally Heteroscedastic (ARCH) models, or the stochastic volatility models. They have their analogues in continuous time with diffusion models with jumps. These basic models can be extended to account for the random market activity (or trading time), an extension especially needed in liquidity analysis. Several papers in this issue propose versions of such models appropriate for a joint analysis of a large number of assets. To avoid the curse of dimensionality and provide more robust predictions, tit is necessary to introduce constraints, or structures on these models. This can be done in different ways. For instance, we can test for a constant dependence between risks, more precisely for the constancy of conditional correlation in a multivariate ARCH model (Peguin-Feyssolle, Sanhaji), distinguish the comovements in the continuous part of the dynamics from the comovements between jumps (Lahaye). We can also try to exhibit the underlying common factors for the risk, the so-called systematic or systemic risk factors in line with the regulation for financial stability. More precisely the supervisors will ask for stress tests exercises in order to fix a level of reserves sufficient to be protected against adverse scenarios. The stress tests are usually done in several steps; we first exhibit the underlying common factor, and we study their relation with the macro variables used in the scenario. Then the shocks on the macro variables have a direct effect on the risk factor and then on returns. They have also an indirect effect through contagion phenomena. This explains the interest in factor models and on interconnectedness. Ahelegbey, Billio, Casarin develop a graphical vector autoregression to reveal the network structure of the realized volatilities between 118 institutions among the largest ones of the Euro area. The introduction of such macro adverse scenarios appears after the 2008 financial crisis, where the link between the financial markets and the real sphere of the economy became clear. This explains why the modelling is applied in both macro and finance, and why several papers illustrate their models with both economic and financial applications. An example is Hecq, Lieb, Telg who look for the presence of speculative bubbles in the market of solar

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panels as well as on different market indexes. When mixing financial and macro data, we have to treat together data collected at different frequencies (the so called mixed data sampling, or MIDAS). Such MIDAS approach is also used to improve daily volatility forecast by also using intraday data (Banulescu, Candelon, Hurlin, Laurent), or to exhibit the long run component of the risk (Bauwens, Braione, Storti). The research of the underlying common factor can be specialized to specific types of risks; very extreme risks in Bienvenue, Robert, who introduce new extreme values distributions for high dimensional vector, default risks in Gagliardini, Gourieroux. In this latter application to default the stochastic common factor is the default intensity and the choice of its distribution affects the pattern of the term structure of the corporate spreads. Of course there exist other components of the CDS spread than the one due to default risk, in particular one for the degree of illiquidity. This liquidity aspect is considered in Darolles, Dudek, Le Fol. The new models considered by the different authors demand appropriate estimation methods, such as hierarchical Bayesian approach to simplify the analysis of networks, efficient quasi maximum likelihood to estimate in a coherent way the conditional Value-at-Risk at different levels (Francq, Zakoian), or to filter a liquidity measure from historical returns only (Darolles, Francq, Le Fol, Zakoian), hierarchical likelihood approaches, to implement dynamical hedging strategies of latent volatility (Badescu, Castillo, Ortega). Finally this issue proves how rich is the current research in Financial Econometrics and highlights the diversity of the applied fields concerns by this research. We hope that this issue will be a useful overview on both the econometric methods but also the empirical applications of these methods.