Introduction to the special issue on recent developments in Financial Econometrics

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Introduction

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This special issue of the Annals of Economics and Statistics is further to a meeting on recent developments in financial econometrics, 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. The first category includes the Vector Autoregressive Models (VAR), the Autoregressive Conditionally Heteroscedastic (ARCH) models, and the stochastic volatility models. Diffusion models with jumps are analogues in continuous time. 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, it is necessary to introduce constraints in 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), or we may 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 performed 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 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 yielded by Hecq, Lieb, Telg who look for the presence of speculative

bubbles in the market of solar 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 a MIDAS approach is also used to improve daily volatility forecast through 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 the analysis of Bienvenue and Robert, who introduce new extreme values distributions for high dimensional vector, or default risks in the contribution of Gagliardini and Gouriéroux. 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 by Darolles, Dudek and Le Fol.

The new models considered by the different authors require appropriate estimation methods, such as the 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 special issue illustrates the richness of the current research in Financial Econometrics and it highlights the diversity of its applications. We hope that it will provide a useful overview of econometric methods in this field and of their applications.