

# *Abstract*

Estimating and predicting joint second-order moments of asset portfolios is of huge importance in many practical applications and, hence, modeling volatility has become a crucial issue in financial econometrics. In this context multivariate generalized autoregressive conditional heteroscedasticity (M-GARCH) models are widely used, especially in their versions for the modeling of conditional correlation matrices (DCC-GARCH). Nevertheless, these models typically suffer from the so-called curse of dimensionality: the number of needed parameters rapidly increases when the portfolio dimension gets large, so making their use practically infeasible. Due to these reasons, many simplified versions of the original specifications have been developed, often based upon restrictive *a priori* assumptions, in order to achieve the best tradeoff between flexibility and numerical feasibility. However, these strategies may implicate in general a certain loss of information because of the imposed simplifications. After a description of the general framework of M-GARCH models and a discussion on some specific topics relative to second-order multivariate moments of large dimension, the main contribution of this thesis is to propose a new method for forecasting conditional correlation matrices in high-dimensional problems which is able to exploit more information without imposing any *a priori* structure and without incurring overwhelming calculations. Performances of the proposed method are evaluated and compared to alternative predictors through applications to real data.