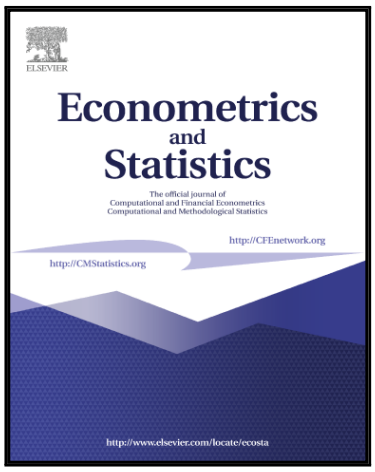

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Volatility forecasting using global stochastic financial trends extracted from non-synchronous data

Lyudmila Grigoryeva[1] , Juan-Pablo Ortega[2,3], and Anatoly Peresetsky[4]

Abstract

A method based on various linear and nonlinear state space models used to extract global stochastic financial trends (GST) out of non-synchronous financial data is introduced. These models are constructed in order to take advantage of the intraday arrival of closing information coming from different international markets so that volatility description and forecasting is improved. A set of three major asynchronous international stock market indices is considered in order to empirically show that this forecasting scheme is capable of significant performance gains when compared to standard parametric models like the dynamic conditional correlation (DCC) family.

Keywords: Multivariate volatility modeling and forecasting, global stochastic trend, extended Kalman filter, dynamic conditional correlations (DCC), non-synchronous data.

1. Introduction

Many frameworks for the description of financial returns have as their first building block a factor model of the form

$$r_t = \alpha + \beta y_t + u_t \quad \text{with} \quad \{u_t\} \sim \mathrm{WN}(0, \sigma^2),$$

where the instantaneous returns r_t at time t of individual assets are presented as an affine function of a common factor y_t additively perturbed with a stochastic stationary white noise process $\{u_t\}$ (not necessarily normal) with variance σ^2. This factor usually accounts for a common market feature to which all the assets under study are exposed. Consequently, this functional dependence allows to determine, for a given asset return r_t, how much of it has to do with the market situation (through the coefficient β, which is a function of the correlation between r_t and y_t) and how much comes from an idiosyncratic

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