

ESTIMATING VECTOR MULTIPLICATIVE ERROR MODEL USING THE CLOSED-FORMED MOMENT METHOD

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Abstract. The Vector Multiplicative Error Model (VMEM) is a popular model for its capable of analyzing and forecasting multi-dimensional non-negative valued time series process. In this paper, we present a closed-form estimator for the VMEM. The estimator has the advantage that it can be easily implemented by solving moment equations and does not require the use of any distribution or optimal weight matrix. We prove consistency and derive the asymptotic properties. A simulation study confirms our theoretical results and compares the performance between the closed-form estimator (CLFE) and the quasi-maximum likelihood estimator (QMLE).

Keywords. Vector Multiplicative Error Model; the closed-form estimator; quasi-maximum likelihood estimator; asymptotic property; moment equation.

AMS (MOS) subject classification: 60G10, 62M10

1 Introduction

Recently more and more researches focus on non-negative time series in financial markets, such as volume, realized volatility, duration. Engle (2002) explores a much wider range of potential applications of GARCH type models for nonnegative time series process, namely Multiplicative Error Model (MEM). Engle and Gallo (2006) propose VMEM analysing the interactions between variables and their conditional expectations.

It is a challenging task for estimating VMEM. Cipollini and Engle (2007) propose the QMLE assumed that the joint distribution of innovations are Gamma distributions linked by Student't copula. Whereas copulas are not always able to model adequately the association among components of the

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