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## SEMIPARAMETRIC MULTIVARIATE GARCH MODELS

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### Abstract

Estimation of multivariate GARCH models is usually carried out by quasi maximum likelihood (QMLE), for which recently consistency and asymptotic normality have been proven under quite general conditions. However, there are to date no results on the efficiency loss of QMLE if the true innovation distribution is not multinormal. We investigate this issue by suggesting a nonparametric estimation of the multivariate innovation distribution, based on consistent parameter estimates obtained by QMLE. We give conditions under which the semiparametric efficiency bound can be attained. A simulation experiment demonstrates the efficiency gain of our procedure compared with QMLE, and an application to a bivariate stock index series illustrates the results.

**Keywords:** multivariate GARCH models, semiparametric methods, efficient estimation.

*JEL Classification:* C14, C22.

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