Bollerslev, Tim; **Engle, Robert F.**
Common persistence in conditional variances. (English) Zbl 0782.62102
Econometrica 61, No. 1, 167-186 (1993).

Summary: Since the introduction of the autoregressive conditional heteroskedastic (ARCH) model by the second author [ibid. 50, 987-1007 (1982; Zbl 0491.62099)], numerous applications of this modeling strategy have already appeared. A common finding in many of these studies with high frequency financial or monetary data concerns the presence of an approximate unit root in the autoregressive polynomial in the univariate time series representation for the conditional second order moments of the process, as in the so-called integrated generalized ARCH (IGARCH) class of models proposed by the authors [Econ. Rev. 5, 1-50 (1986; Zbl 0619.62105)]. In the IGARCH models shocks to the conditional variance are persistent, in the sense that they remain important for forecasts of all horizons.

This idea is readily extended to a multivariate framework. Even though many time series may exhibit persistence in variance, it is likely that several different variables share the same common long-run component. In that situation, the variables are naturally defined to be co-persistent in variance, and the co-persistent linear combination is interpretable as a long-run relationship.

Conditions for co-persistence to occur in the multivariate linear GARCH model are presented. These conditions parallel the conditions for linear co-integration in the mean, as developed by the second author and *C. W. J. Granger* [Econometrica 55, 251-276 (1987; Zbl 0613.62140)]. The presence of co-persistence has important implications for asset pricing relationships and in optimal portfolio allocation decisions. An empirical example relating to the time series properties of nominal U.S. dollar exchange rates for the Deutschemark and the Britisch pound provides a simple illustration of the ideas.

MSC:

62P20 Applications of statistics to economics
91B84 Economic time series analysis
62M10 Time series, auto-correlation, regression, etc. in statistics (GARCH)

Keywords:

co-persistence in variance; generalized autoregressive conditional heteroskedasticity; factor GARCH; exchange rate dynamics; integrated generalized ARCH; IGARCH models; time series; persistence in variance; multivariate linear GARCH model; linear co-integration; asset pricing relationships; optimal portfolio allocation

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