On a Rescaled Fractionally Integrated GARCH Model

Abstract

Hyperbolic memory volatility and the HYGARCH model are both firstly proposed in Davidson(2004). The former one is to define a new kind of strong persistence in volatility and is more precise to distinct the FIGARCH model from the geometric (short) memory cases represented by the common GARCH and IGARCH processes, while the latter one is a nest parameterization of the GARCH-type models and sharing both the properties of hyperbolic decay and covariance stationarity. In light of the observed covariance structure of many real-life time series, the HYGARCH model has been used widely because of its desirable characters. But some paradox in its intrinsic structure is discovered when we inspect the connection between the common GARCH(1,1) and the simplest HYGARCH$(1,0,0)$. To solve this paradox, in this paper, we introduce a new long (hyperbolic) memory volatility model, denoted by rescaled FIGARCH, or R-FIGARCH, which also allows for both the same properties aforementioned as the HYGARCH. Moment conditions, parameter estimation and diagnostic checking of the model are discussed. Monte Carlo simulations are conducted to study the finite-sample performance of the model. An empirical application to the financial market volatility is carried out to demonstrate the usefulness of the new model.

Key words: Hyperbolic memory volatility, FIGARCH, ARCH(∞), covariance stationarity.