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A multiple regime smooth transition heterogeneous autoregressive model for long memory and asymmetries. (English) [Zbl 1429.62405](#)

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Summary: In this paper we propose a flexible model to describe nonlinearities and long-range dependence in time series dynamics. The new model is a multiple regime smooth transition extension of the Heterogeneous Autoregressive (HAR) model, which is specifically designed to model the behavior of the volatility inherent in financial time series. The model is able to simultaneously approximate long memory behavior, as well as describe sign and size asymmetries. A sequence of tests is developed to determine the number of regimes, and an estimation and testing procedure is presented. Monte Carlo simulations evaluate the finite-sample properties of the proposed tests and estimation procedures. We apply the model to several Dow Jones Industrial Average index stocks using transaction level data from the Trades and Quotes database that covers ten years of data. We find strong support for long memory and both sign and size asymmetries. Furthermore, the new model, when combined with the linear HAR model, is viable and flexible for purposes of forecasting volatility.

MSC:

[62M10](#) Time series, auto-correlation, regression, etc. in statistics (GARCH)

[62P20](#) Applications of statistics to economics

[91B84](#) Economic time series analysis

[62P05](#) Applications of statistics to actuarial sciences and financial mathematics

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realized volatility; smooth transition; heterogeneous autoregression; financial econometrics; leverage; sign and size asymmetries; forecasting; risk management; model combination

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