A Network Autoregressive Model with GARCH Effects and it's Applications

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Abstract

This study proposes a network autoregressive model with GARCH effects, denoted by NAR-GARCH, to depict the return dynamics of stock market indices. The GARCH effects of each index are deleted marginally and the NAR model with the Granger causality test is used to capture the joint effects caused by other indices with the most updated market information. The proposed model has fewer parameters and is more flexible in changing model sizes than classical vector autoregressive models. The returns of 20 global stock indices from 2006 to 2020 are employed for our empirical investigation. The numerical results reveal that the NAR-GARCH model has satisfactory performances in both fitting and prediction for the 20 stock indices, especially when a market has strong upward or downward movements.

Keyword: GARCH, Granger causality test, network autoregressive model