

Modeling and prediction of financial trading networks: A case study in the NYMEX natural gas futures market

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Over the last few years there has been a growing interest in using financial trading networks to understand the microstructure of financial markets. However, most of the methodologies developed so far have been based on descriptive summaries of the networks such as the average node degree and the clustering coefficient. This paper develops novel statistical methods for modeling sequences of financial trading networks. Our approach uses a stochastic block- model to describe the structure of the network during each period, and then links multiple time periods using a hidden Markov model. This structure allows us to identify extreme events that affect the structure of the market and make accurate short-term prediction of future transactions. The methodology is illustrated using data from the New York Mercantile Exchange (NYMEX) natural gas futures market from January 2005 to December 2008.

Keywords: Financial Trading Network; Stochastic Blockmodel; Hidden Markov Model; Systemic Risk