

Connectedness of Markets with Heterogeneous Agents and the Information Cascades

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Abstract:

Macroeconomic integration of global financial markets is often characterized as complex systems where ever-increasing interactions among a vast number of agents make it difficult for the traditional economic theory to provide a realistic approximation of market dynamics. Schweitzer et al. (Sci., 325: 2009) emphasize that economic systems are increasingly interdependent through cross-country networks of credit and investment, trade relations, or supply chains, and highlight the need for an integration of network theory and economic models to reduce the risk of global failure of financial systems. Our aim is to study the cross holdings of entities in terms of input-output and look at a time varying feature to examine the changes in the network. We also study the ripple effects caused due to the failure of entities inside the model. It is hypothesized that the ripple effects in the network should be caused once an identified entity(-ies) touches or crosses the threshold indicating the cascade of failures. To measure value of cross-holdings of different economic entities, we track the flow of products across industries and countries. We use the WIOD (World Input Output Database) dataset that provides the input-output in current prices, denoted in millions of dollars. The database covers 28 countries from the European Union and 15 other major countries (total 43 countries across 56 industries) in the world for the period from 2000 to 2014. Our research presents the evidence on the nature of interconnectedness that global markets exhibits in terms of their input-output representing the cross-holdings. It shows that the interdependence of some markets in a global network is strongly correlated with not only the size of the markets, but also the direction of trades/cross-holdings, and the type of industries that dominate in their input-output data. With growth model estimation, we are able to project the cascades of failures in the network significantly. Our results as exhibited in the graphs corroborate with the empirical research on the failures of the markets. It is shown that markets having more connections with other markets in the network are likely to sustain the shocks and cascades of failures for longer time. This evidence is aligned with the argument of diversification as a strategy to mitigate risk. Our findings employ innovative approaches such as network formation approach and graph theory to explain the interconnectedness of markets across the world, and contribute significantly to the theoretical issues related to market integration and risk spill-over (Diebold and Yilmaz, 2014; Cabrales et al., 2017; Ahmed et al., 2018).

Keywords: Network Theory · Interconnectedness · Financial Systems · Ripple Effects