Good Contagion:
What Do Networks Say about Policy Transmission?

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Extended Abstract

We tend to think of contagion as something bad, as a small initial shock amplifying into a systemic crisis, as a financial distress propagating from one bank to another, or as a spread of infectious disease. This paper takes a different perspective and focuses on how (good) contagion can facilitate monetary policy transmission throughout the network. The understanding of how the contagiousness of the network and the network structure more widely can influence the transmission of a particular economic policy can be useful for this policy's successful implementation in the future.

We develop multi-layer network based contagion measures and apply them to analyse the transmission efficiency of the European Central Bank's interest rate policy measures undertaken to achieve the 2% inflation target. The measures incorporate theories of copulas and heavy-tailed distributions, as well as the multi-layer network effects. The introduced contagion measures have several important uses. First, they can characterise the evolution of the dependence and contagion structure of the multi-layer network over time and act as an early warning system of contagion risk. Second, they can be useful for the identification of the systemically important nodes. And finally, they can be applied for analysing the efficiency of a policy transmission across the network and thereby identifying the favourable environment for that policy in the future.

The paper considers transmission of monetary policy into the desired inflation targets through the asset prices channel. According to this channel an expansionary monetary policy, for instance an interest rate cut, causes an increase in asset prices, for instance stock prices, which in turn raises the wealth value of the households and enables them to increase their consumption. Consequently, higher consumption raises aggregate demand in the economy and leads to higher consumer good prices, i.e. to inflation. Putting this into a network context, the monetary policy announcement is an initial shock affecting the asset prices in all the individual country-nodes in the network. When the contagion level and interconnectedness in the network are high, the direct impact of that initial interest rate shock can signify even more due to the network feedback and amplification.

Literature Review

This paper is related to three strands in the literature. The first one is on the origins and the propagation of shocks in networks. Gabaix (2011) shows that idiosyncratic shocks to individual firms can contribute to aggregate shocks if the firm-size distribution is heavy-tailed. Acemoglu, Ozdaglar, and Tahbaz-Salehi (2017) address this question in a network setting and demonstrate that the idiosyncratic shocks to the network nodes may indeed generate aggregate macroeconomic fluctuations given that the nodes' degree distribution is sufficiently heterogeneous. This paper focuses on the study of the transmission of shocks in the networks as well. However, the paper differs in that it also sheds light on the origins of those idiosyncratic shocks (tail events) in the first place. The results indicate that the network effect captured by the multi-layer contagion measures is one of the determinants of tail risk.

The second strand in the literature to which we contribute is on the monetary policy transmission. Cook and Hahn (1989) empirically test whether changes in federal funds' rates can affect the bond rates. Bernanke and Kuttner (2005) study the effect of the Federal Reserves' monetary policy on the equity prices. More recently, Leombroni, Vedolin, Venter, and Whelan (2018) consider the impact of the ECB's communications on the bond yields in Europe. This paper differs from those studies in that it analyses monetary policy transmission into the inflation target through the asset prices network rather than into the asset prices themselves. Specifically, we analyse how the contagion level in the asset prices network can affect the efficient transmission of the ECB's interest rate policy across the Eurozone countries' network.

The third strand in the literature to which this paper relates is on the network effects of monetary policy. This question was mainly addressed in the context of production (input-output) networks until now. Ozdagli and Weber (2017) and references herein consider the impact of the intersectoral input-output network on the monetary policy transmission into equity prices. Analysis in this paper differs from that literature in that it examines the transmission of the policy into the inflation target rather than into asset prices.

Key results

The main insight we gain from this analysis is that the policy transmits most efficiently during severe bearish contagion and is least efficient during intense bullish contagion. This finding may have behavioural foundations. In the bearish environment, generally associated with crises, the uncertainty is high and the markets' attention is focused on the Central Bank's policy announcements. In the bullish environment, generally associated with booms, the overoptimism and lack of attention can make the policy transmit slower.

The key finding from the tail risk analysis is that the countries that are located more centrally in the contagion network appear to be less susceptible to tail risk in their bond markets than the periphery countries (GIIPS countries generally). For the stock markets, we find that the more central countries tend to be more resilient to upper tail risk, however, they are still prone to stock market crashes.

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