Abstract

Many important socio-economic phenomena occur on networks (Goyal, 2007; Jackson, 2010; Vega-Redondo, 2007) and it is widely accepted that the architecture of networks plays an important role in dynamics of these phenomena along network links (Vega-Redondo, 2006; Jackson, 2007). Examples include innovation, behavior, social norms, but also diseases and financial problems (see Jackson and Yariv (2011) for a survey). The di¤usion and contagion is falicitated by the presence of highly connected individuals ("hubs" or "superspreaders") and the di¤usion properties of networks are inversely related to the variance of the connectivity distribution (Anderson and May, 1991; Pastor-Satorras and Vespignani, 2001; see also Acemoglu et al., 2012, for an economic application). We also know that networks endogenously adapt to environmental conditions and the motivation of individual nodes to create ties also depend on these conditions (e.g. Jackson and Wolinsky, 1996; Bala and Goyal, 2000). Hence, whether contagion through network ties can occur or not will determine how individual nodes form their links and consequently the shape of generated networks. This in turn provides a feedback e¤ect on the epidemic dynamics.

We introduce a mechanism determining how people search for new linking opportunities and show how the tie formation depends on the environments the network is embedded in (with a particular focus on volatility or riskiness). Our main finding is that if the environment becomes more volatile people link up more "locally" and the generated networks are more unequal in terms of degree distribution. This in turn has strong implications on the contagion throughout the network. Using a natural experiment, we test the predictions of the model using the collaboration patterns in an large world-wide industry and these predictions are confirmed in the data.

Our results provide new perspective on why many infections stabilize in the population and can also provide an intuition of persistence of and slow recovery from financial crises. In addition, it has a straightforward policy implication.

Policy makers should monitor the network structure during these crises, being them health or financial, to prevent individual agents from shifting the matching structures toward architectures that actually benefit the contagion process.