Two tales on the centrality of centrality measures in economic networks

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In this communication I plan to talk on two different economic contexts (two "tales"), modeled as economic networks, in which centrality measures play a prominent role as a topological foundation for high performance (i.e. high profit or fast economic growth). I will briefly sketch the theoretical framework that underlies the exercise, then proceed to test the predictions empirically.

The first context pertains to economic growth and aims at shedding light on the primary determinants of a high growth performance in the world economy. The theoretical framework is a stylized one where growth is the result of entrepreneurship, i.e. the materialization of new projects, which require (indirect) connections with agents who are possibly located far apart. This implies that if a country (or the world) is to grow in a fast and sustained manner it must be well-integrated (i.e. connected to many other countries through relatively short paths). But the network evolves over time through the collaborations being generated, so the question arises as to whether a stagnant economy can bootstrap its way up to such a network configuration. If it succeeds, becomes "global," an essential requirement for fast growth. We explore empirically the problem, testing whether the growth performance of countries in the last four decades is well explained in this manner. We find that, in contrast with the many variables that have been used by the empirical growth literature, a measure of integration inspired by our theory commands the highest explanatory power of them all. This suggests the importance of thinking of economic growth as an intrinsic network phenomenon.

The second context involves a general-equilibrium model of a (large) market economy. We model inter-firm input-output through a production network and characterize its perfectly competitive (so-called Walrasian) equilibrium. One key prediction of the model is that, ceteris paribus, the profit of a firm at is proportional to a suitable variant of eigenvalue centrality called Bonacich centrality. The model can also predict what firms have the highest impact on others or, as a extreme implication, what firms can generate a cascade of defaults. For the moment, our empirical exercise focuses on testing the first prediction. Using tax-related data of the Spanish economy that accounts for essentially all interfirm transactions undergone by the Spanish economy over the last ten years, we have a very detailed panel-data representation of the Spanish economy (involving more than 7 million nodes) to which our model can be readily applied. Preliminary results appear to provide strong support to the indicated hypothesis.

This work has involved several collaborators in different projects: Georg Duernecker (Univ. Mannheim), Ignacio Gonzlez (Spanish Tax Agency), Kenan Huremovic (Univ. Aix-Marseille), Moritz Meyer (World Bank), David Prez (Spanish Secretara de Estado de Telecomunicaciones), Tarik Roukny (Universit Libre de Bruxelles)