Strategic Network Formation and the Emergence of Equilibrium Network Dynamics
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Objectives:

Networks are pervasive. We routinely communicate over the internet, advance our careers by networking, travel to conferences over the transportation network and pay for the trip using the banking network. Doing this utilizes networks in our brain. The list could go on. While network models have had a long history in sociology, the natural sciences, and engineering (e.g., in modeling social organizations, brain architecture, and electrical circuits), the rise of the network paradigm in economics is relatively recent. Economists are now beginning to think of political, economic, and financial interactions as network phenomena and to model everything from terrorist activities to asset market micro structures as games of network formation. This trend in economics, which began with the seminal paper by Myerson (1977) on graphs and cooperation and accelerated with the publication of the paper by Jackson and Wolinsky (1996) on social and economic networks, is likely to continue with the development of new algorithms, the expansion of computational capacity and the broad application of network theories to political, economic, and financial phenomena.

What economists bring to the study of networks that is new is game theory. For the most part sociologists, natural scientists and engineers have used networks descriptively and have focused on the design of networks from the perspective of a single designer or on the random evolution of networks from the perspective of nature. This singularity of perspective is a consequence of the nonstrategic nature of the phenomena being explained or the problem being solved (e.g., the spread of a disease through a given population, the transmission of electrical impulses in the brain, or the optimal design of an integrated circuit). In economics the perspective is often times strategic. In particular, in many economic situations, several individuals, guided by their own self interest, behave strategically in putting into place pieces of the network of economic, political, or financial interactions under their control and in so doing generate payoffs and externalities that determine the network of economic interactions that eventually emerges in equilibrium. Thus in economics, pieces of the network are the strategies and the network that ultimately prevails is the result of strategic competition rather than the design of a single individual or nature. Conversely, what networks bring to the study of economics is a way of modeling the structure economic interactions and externalities that makes possible a game-theoretic analysis of how theses structures influence individual payoffs and the economic equilibrium that emerges from competition.

In all social and economic interactions, individuals or coalitions choose not only with whom to interact but how to interact, and over time both the structure (the "with whom") and the strategy ("the how") of interactions change. Our objectives will be to model the structure and strategy of interactions prevailing at any point in time as a directed network and to address the following questions in the theory of social and economic network formation: (i) Given the rules of network formation, the preferences of individuals over networks, and the strategic behavior of individuals and coalitions in forming networks, what networks are likely to emergence and persist. Thus, we propose to study the emergence of **endogenous networks** from the rules of network formation and the strategic behavior of individuals and coalitions in forming networks. (ii) Given the rules of network formation, the preferences of individuals over networks, the strategic behavior of coalitions in forming networks, and the trembles of nature through time, what network and coalitional dynamics are likely to emergence and persist. Thus, we propose to study the emergence of **equilibrium network dynamics** from the rules of network formation, the preferences of individuals over networks, the strategic behavior of coalitions in forming networks, and the randomness in nature through time.

Outline:

Some Basic Texts:

Social and Economic Networks, by Matthew O. Jackson, Princeton University Press, 2008

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