

Strategic Network Formation under Resource Constraint

Vincent Boucher*

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Abstract

Social structures are often characterized by the presence of networks. A network is simply a set of individuals, linked together following a specific structure. I am interested in the non-cooperative process of network formation when agents are constrained by some initial endowment of resources. I assume that a link, i.e. a joint provision of resources, between two agents generates a local public good. Two examples of economic situations that reflect those characteristics are (1) the creation of co-authorship network in scientific research, and (2) partnership for innovation between firms.

I study the network formation process in using a theoretical framework. Each agent is characterized by a type, and is endowed with a fixed amount of resources that he may choose to invest in a project with another agent in order to provide a local public good. The public good production technology depends on the resources invested by the agents, and proximity between the types of the agents, given a metric (for example, the compatibility between two researchers, or simply geographical distance between them...). The model has two important features. First, the initial endowment creates scarcity and induces a *feasibility* constraint. If agent i is investing resources in a project with agent j , he will have less resources available to create a potential project with another agent, say k . Since the amount of resources that i invests in a project with j depends on the amount of resources that j invests in the same project, in equilibrium, the utility of k will be affected by the strategy chosen by j . Second, the model also generates direct *externalities*. Since projects are local public goods, the amount of resources invested by some agent in a given project directly affects the utility of the agents with whom he invests

The paper has two principal objectives. First, I concentrate on existence results, which are scarce in the network formation literature. I analyze the influence of the underlying local technology on the existence of Bilateral Nash Equilibria (Goyal and Vega-Redondo, 2009), and the properties of the equilibrium networks. Some of the functional forms analyzed cover existing models as special cases. Second, since the theoretical model provides sharp results on existence and characterization for a large class of economies, I derive (partial) identification conditions on the set of parameters characterizing the equilibria. I provide an example using data on the co-authorships in economics.

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*Department of Economics, Université de Montreal.