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Efficiency in decentralized oligopolistic markets

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Abstract

The paper analyzes quantity competition in economies in which a network describes the set of feasible trades. A model is presented in which the identity of buyers, of sellers, and of intermediaries is endogenously determined by the trade flows in the economy. The analysis first considers small economies, and provides sufficient conditions for equilibrium existence, a characterization of prices and flows, and some negative results relating welfare to network structure. The second and central part of the analysis considers behavior in large markets, and presents necessary and sufficient conditions on the network structure for equilibria to be approximately efficient when the number of players is large.

JEL classification: L13; D6; D85; C7

Keywords: Decentralized markets; Intermediation; Oligopoly; Efficiency; Market power

1. Introduction

Classical models of competition rely on the anonymity of markets to explain prices and trade. According to this view, exchanges in an economy take place in centralized markets and the identity of players has no effect on prices and terms of trade. Recent models of decentralized competition depart from such a stark paradigm by considering markets in which exchanges take place in bilateral relationships. Prices and outcomes in such economies crucially depend on the set of feasible trades and on the implied market power. Results to date have mainly focused on economies in which the identity of buyers and sellers is exogenously determined, and in which

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only trade from sellers to buyers are feasible. This study analyzes decentralized oligopolistic markets in which the role of players in the economy is determined in equilibrium, and presents conditions on the structure of an economy for trade to be almost efficient when the number of players is large.

The paper introduces a static model of decentralized oligopolistic trade for economies in which a network describes the set of feasible trading relationships. In the model, individuals choose their supply to neighboring players, correctly anticipating that the equilibrium price for a trade will be given by a buyer's marginal value. Since trade affects the marginal rate of substitution of both players involved in a transaction, supply decisions influence both the price at which goods are purchased and the price at which they are sold. Traders maximize their private utility, taking into account how their supply decisions affect prices. The resulting flow of goods endogenously determines whether an individual buys, sells, or does both based on preferences, production possibilities and the position held in the network. That is, supply chains arise endogenously in this model. Intermediation and significant price dispersion are generic phenomena in small or poorly connected economies.

When the number of players is small, trade is necessarily inefficient because of the price distortions implied by quantity competition. However, when the number of players is large, simple conditions can be imposed on an economy to ensure that trade is approximately efficient. To study large markets with a fixed topology, the analysis introduces the notion of community structure of a trade network. Communities consist of subsets of players who share the same potential trade partners in the economy. For instance, when the network captures the geography of an economy, a community identifies the subset of players at a given geographical location. The analysis of large markets fixes the community structure and considers what happens when the number of players in some communities is large. Even when communities are large, trade between communities and intermediation may still be required to support an efficient allocation. Our main result establishes that trade is almost efficient if and only if it is possible to clear markets without recourse to intermediation in any large community. If so, direct competition among players belonging to neighboring large communities eliminates resale and restores efficiency. In contrast, when intermediation is required to implement the efficient allocation, players mediating trade necessarily command a rent and distort trade, as their supply decisions affect feasible outcomes. If so, trade remains inefficient even when an economy is arbitrarily large.

The first part of the analysis develops baseline results for economies in which the number of players is small. It presents: sufficient conditions for pure strategy equilibrium existence; a characterization equilibrium prices, flows and markups; and some negative results on welfare. A key feature of the outflow model is that resale markups are strictly positive due to the double-marginalization problem faced by players acting as intermediaries. Thus, goods never cycle in equilibrium, and not all linked players with different marginal rates of substitution elect to trade. Individuals would never purchase units previously sold, because a higher price would have to be paid; and individuals with low willingness to pay might prefer not to sell their goods, as trade might increase the price paid on the units purchased.[1] Equilibrium behavior involves price discrimination across locations of the trade network. Intermediation arises both because of the scarcity of trading partners and because of the different prices that prevail throughout the economy in equilibrium.

[1] This implication differs from that of the Cournot model [9] in which any two players with different marginal rates of substitution always elect to trade.