Journal of Economic Behavior & Organization 80 (2011) 50–67

Contents lists available at ScienceDirect

Journal of Economic Behavior & Organization

journal homepage: www.elsevier.com/locate/jebo

Price formation on the Marseille fish market: Evidence from a network analysis

Annick Vignes*, Jean-Michel Etienne

ERMES-CNRS, UMR 7181, Université Pantheon-Assas Paris II, 12, place du Pantheon, F-75230 Paris Cedex 05, France

ARTICLE INFO

Article history:
Received 6 August 2009
Received in revised form 7 July 2011
Accepted 9 July 2011
Available online 23 July 2011

JEL classification:
C01
D4
L14

Keywords:
Fish market
Price dispersion
Networks
Dynamic panel model

ABSTRACT

The empirical analysis of fish markets always reveals strong price dispersion for homogeneous or very similar goods. The problem is how to explain this price dispersion on a market where there is no evident arbitrage. Explanations proposed by different authors include differences in organization, the characteristics of the good, and the influences of social interactions between buyers and sellers. In line with the last of these three approaches, we consider the fish market of Marseille as a seller–seller network. We start by examining the influence of market interactions, through a static and then a dynamic econometric model. We then analyze the role of the seller's position in the network. We bring to light a surprising paradox, in that the sellers who share the most buyers with competitors (*i.e.* the most central sellers) charge the highest prices.

1. Introduction

For a long time, economic theory treated the market as a 'pure' economic relation, ignoring the specificity of individual behavior. Agents were usually considered to be anonymous and the influences of social interactions and social norms were ignored. Kranton and Minehart (2001) departed from this paradigm, building a model on the empirical premise that buyers and sellers need a link to exchange. This link can be of different types, essentially social or industrial.

Taking into account the way in which agents interact means recognizing that they are not anonymous. Brown et al. (2004) show experimentally that the absence of third party enforcement of contracts causes fundamental changes in the nature of market interactions. In certain situations, traders prefer to deal exclusively with the same partner, with the consequence that, over time, bilateral relationships come to dominate the market. The form and the influence of social interactions depend on the specificity of the goods and/or services supplied, on the organizational structures of the transactions and on the form of the links between agents. Jackson and Watts (2002) or Kosfeld (2004) show how an individual's payoff from an economic or social activity depends on the network of connections among individuals. As exhaustively summarized by Jackson (2008, 2010), the role of individual links and social networks has now been widely explored in the theoretical literature, as in the theory of international trade (e.g. Casella and Rauch, 2002; Rauch, 2001) or the analysis of non-competitive markets (e.g. Goyal and Joshi, 2003). Some authors have analyzed the process of exchanges in terms of a buyer–seller network rather than a market, following the path opened by Kranton and Minehart (2000, 2001). In these seminal articles, the authors seek

* Corresponding author. Tel.: +33 1 44 41 89 78.
E-mail address: AVignes@u-paris2.fr (A. Vignes).

0167-2681/$ – see front matter © 2011 Elsevier B.V. All rights reserved.
doi:10.1016/j.jebo.2011.07.003

to determine whether buyers and sellers, acting as non-cooperative maximizers, form a network structure that maximizes overall economic surplus. Studying the efficient link patterns, Kranton and Minehart (2001) observe that it is not necessary for all agents to be connected to all the others. Groups of people can be related by sparse links and this is not a sign of trading inefficiencies. It may represent an optimal trade-off between the cost of links and the potential gains from exchange. Jackson (2003) expands Kranton and Minehart's efficiency results, showing how over-connectedness can be avoided when the cost of a link is borne by both the buyer and the seller. Wang and Watts (2006) consider buyer–seller trade networks in a quality-differentiated product market, analyzing how the formation of links influences prices. In their model, heterogeneous sellers can join associations and buyers can establish links with these associations. In this particular theoretical framework, pairwise links between homogeneous buyers and heterogeneous sellers' associations can create trade frictions that result in inefficient outcomes.

In many applications, an individual's payoff depends not only on the value generated by the network but also on his position in the network. The link between power and centrality in exchange markets has long been explored by sociologists, but only more recently considered by economists. Cook et al. (1983) showed that power is not necessarily equal to centrality in exchange networks. The structure of the graph, especially in negatively connected networks,[1] plays a major role and experimental results are ambiguous. This result was undermined by Cook and Yamagishi (1992), who pointed out the role of mutual dependence in the formation of power. Corominas-Bosch (1999, 2004) studied how buyers and sellers bargain in an exogenously given network. The author explains how, when the realization of exchanges requires the existence of a social network, the network structure and the degree of competition in the market directly determine each individual player's bargaining power and the formation of prices. Conditions are established under which the subgame perfect equilibrium of the bargaining game is a situation where the short side of the market extracts all the surplus. Empirical evidence, as in Sorenson and Stuart (2001) or Hochberg and Ljungqvist (2007), testifies to the importance of an agent's position in the network, or more precisely the advantage of central positions. Analyzing the network of biotech firms, Powell et al. (2005) show the influence of different attachment strategies on the dynamics of investments.

The present paper proposes an empirical analysis of the role of pairwise individual links in the formation of transaction prices. We consider a homogeneous seller–seller network, where two sellers are linked when they share at least one buyer at a certain time. This network results from the projection of a buyer–seller network when both buyers and sellers are heterogeneous. Our field of application is the fish market of Marseilles. The fish market has a long tradition in the economic literature. This market represents a kind of economic paradox in the sense that, at first glance, one might conclude that it is a pure competitive market. And yet empirical analyses always reveal strong price dispersion for homogeneous or very similar goods. There have been a number of attempts to explain such a persistent result. Thornton (1869) sought to explain the discrepancy in terms of differences in trade mechanisms. For Pareto (1906), price dispersion is mainly explained by the fact that the good is perishable and cannot be stocked. Marshall (1930) notes that even in a market of very short period and with perishable goods, the cost of production has no perceptible influence on the day's bargaining. The quantity of the commodity, which cannot be stored, will be used as data by the dealers, and prices will be set so as to clear the market. Breaking with this literature, Graddy (1995, 2006) show that the Fulton fish market in New York is characterized by imperfect competition, demonstrated by the presence of price discrimination. In line with the approach pioneered by Thornton and Marshall, focusing on both the characteristics of the good and the organization of the market, Kirman and Vignes (1991) and Weisbuch et al. (2000) highlight the role of non-anonymity on daily markets. Because people know each other, they establish different strategies depending on the intrinsic characteristics of others.

Going a little further along the same path, our paper sets out to explain, through econometric and network analysis, why a decentralized market, where the main assumptions of pure competition are present and where there is no evident possibility of arbitrage, should exhibit a stable daily dispersion of prices for different units of a homogeneous good. We seek to determine whether this dispersion is due to pure market interactions (because people arrive on the market with individual reservation prices and adopt search processes shaped by their specific constraints) or to the existence of particular pairwise links. Our rich and detailed data set allows us to empirically verify some of the theoretical or experimental results quoted above. While most of the literature we have mentioned focuses on the exclusive influence of network connections in the exchange outcome, we particularly emphasize the significance of both market and non-market interactions in the formation of prices in an exchange market. The role of centrality in a homogeneous network is explored and our study gives evidence that here, a more central position ensures higher prices, as suggested by Corominas-Bosch (2004), Sorenson and Stuart (2001) or Hochberg and Ljungqvist (2007). But we also point out that sellers who are more central have a riskier position. The originality of our contribution then consists in considering a seller–seller network in which the most central agents are those who experience the highest level of competition. In this network, two agents are linked when they share the same buyers. Econometric estimations reveal firstly the fact that the price of one transaction is not entirely dependent on the prices and quantities of the other transactions, and secondly the importance of the agent's position in the network. An important result is that people who experience the higher level of competition are the ones who ask higher prices. In this market, for a buyer, being linked to a lot of different sellers has a cost: we obtain a result closed to those of Kranton and Minehart (2001) and Jackson (2003). Exploiting a sample of daily transactions, we demonstrate the stable co-existence of two

[1] A negatively connected network is, according to the authors, one where an exchange in one relation is contingent on non-exchange in another.