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Structure, behavior, and market power in an evolutionary labor market with adaptive search☆

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Abstract

This study uses an agent-based computational labor market framework to experimentally study the relationship between job capacity, job concentration, and market power. Job capacity is measured by the ratio of potential job openings to potential work offers, and job concentration is measured by the ratio of work suppliers to employers. For each experimental treatment, work suppliers and employers repeatedly seek preferred worksite partners based on continually updated expected utility, engage in efficiency-wage worksite interactions modelled as prisoner's dilemma games, and evolve their worksite behaviors over time. The main finding is that job capacity consistently trumps job concentration when it comes to predicting the relative ability of work suppliers and employers to exercise market power.

JEL classification: C6; C7; J6; L1

Keywords: Labor market dynamics; Market power; Job capacity; Job concentration; Adaptive search; Networks; Endogenous interactions; Agent-based computational economics; Evolutionary game

1. Introduction

Market power refers to the ability of sellers or buyers to exert a perceptible control over market outcomes that enables them to attain higher individual

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welfare levels than they would achieve under competitive market conditions. Understanding the relationship between market structure, market behavior, and market power in markets with multiple agents engaged in repeated strategic interactions has been a major focus of analytical, empirical, and human-subject experimental researchers in industrial organization since the early 1970s. To date, however, definitive conclusions have been difficult to obtain.

For example, Tirole (1988, Part II) presents a unified theoretical treatment of oligopoly decision-making in terms of noncooperative game theory. He focuses on the choice of price, capacity, product positioning, research and development, and other strategic variables. Only equilibrium behavior is considered, however; and a common finding for his games with incomplete information is that multiple equilibria exist with widely differing characteristics. The question then arises: given agents with incomplete information and limited computational capabilities, under what conditions would these agents learn to coordinate on one type of equilibrium versus another, and what would be the resulting dynamic implications for market power?

In a survey of empirical work on market power in industrial organization, Bresnahan (1989, pp. 1051–1055) summarizes his overall findings as follows: 'although the (new empirical industrial organization) has had a great deal to say about measuring market power, it has had very little, as yet, to say about the causes of market power'. Holt (1995, Section VII) notes that, although the nonmonopolized double auction is widely used in experimental research with human subjects, whether market power has any efficiency effects in this context remains an open issue. For posted-offer auctions, Holt points out that capacity constraints and some forms of transactions costs have reliably produced supra-competitive prices in experiments performed by himself and several other researchers; but so far the number of experiments along these lines has been small.

This lack of definitive results reflects the complex nature of market power in actual real-world markets. Given this complexity, it would seem useful to complement these previous approaches to the study of market power with controlled computational experiments.

This paper investigates the evolution of market power in the context of a computational labor market framework with strategically interacting work suppliers and employers.[1] As will be clarified in Section 2, the labor market

[1] A preliminary version of this labor market framework was presented in Tesfatsion (1998) as a special case of the Trade Network Game (TNG) model developed in Tesfatsion (1997a,b) for studying the evolution of buyer–seller trade networks. A version of the framework with a different fitness measure is also used in Tesfatsion (1999) to examine hysteresis (path dependency) in labor markets. The framework is an example of agent-based computational economics (ACE), the computational study of economies modelled as evolving systems of autonomous interacting agents. For various ACE-related resources, including surveys, readings, software, and pointers to researchers and research groups, see the ACE web site at http://www.econ.iastate.edu/tesfatsi/ace.htm.