Available online at www.sciencedirect.com

ScienceDirect

Journal of Economic Theory 158 (2015) 536–557

JOURNAL OF Economic Theory

www.elsevier.com/locate/jet

Information and strategic behavior ☆

Marzena Rostek, Marek Weretka *

University of Wisconsin–Madison, Department of Economics, 1180 Observatory Drive, Madison, WI 53706, USA

Received 2 October 2013; final version received 30 September 2014; accepted 16 December 2014

Available online 29 December 2014

Abstract

Does encouraging trader participation enhance market competitiveness? This paper shows that, when trader preferences are interdependent, trader market power does not necessarily decrease with greater participation, and traders need not become price takers in large markets. Thus, larger markets can be less liquid and associated with lower ex ante welfare. In the linear-normal model, the necessary and sufficient condition on the information structure is provided under which price impact is monotone in market size. A condition is given when the rational expectations equilibrium, which is typically not fully revealing within the considered class of preference interdependencies, is obtained in large markets.

JEL classification: D43; D44; D47; D82; G14; L13

Keywords: Double auction; Price impact; Price informativeness; Rational expectations; Market design

1. Introduction

Two central lessons from industrial organization and auction theory relate to the notion that markets with a larger number of traders are more competitive: (1) greater participation reduces

☆ We gratefully acknowledge the financial support of this research by the National Science Foundation (SES-0851876). We thank the Editors, Alessandro Pavan and Xavier Vives, and the referees for many helpful suggestions. We also thank James Jordan, Ricardo Serrano-Padial, Gábor Virág and seminar audiences at the University of Bonn, Paris School of Economics, the University of Rochester, and Washington University in St. Louis as well as participants at the SAET Meeting at Ischia and the Summer Sorbonne Workshop in Economic Theory for comments. An earlier version of this paper circulated under the title "Welfare tradeoffs and private information."

* Corresponding author.
E-mail addresses: mrostek@ssc.wisc.edu (M. Rostek), weretka@wisc.edu (M. Weretka).

http://dx.doi.org/10.1016/j.jet.2014.12.005

the impact of each individual trader on the market as a whole and (2) traders act as price takers in large markets. An implication of these results for market design is the recommendation to encourage market participation, which is viewed as an enhancement to competition, liquidity, and welfare. The two predictions hold robustly for markets with complete information or independent private values (e.g., Rustichini, Satterthwaite, and Williams [15]). This paper shows that, when trader values are interdependent, these two predictions need not hold in general. Relative to the existing literature on strategic trading with common values, we examine a richer class of interdependencies in preferences that are common in economic settings.

For markets with interdependent values, (non)competitiveness has been studied in a number of influential papers. In strategic settings, Wilson [21], Milgrom [10], Pesendorfer and Swinkels [11], Reny and Perry [12], and Vives [18] established the convergence of Nash equilibrium to the competitive rational expectations equilibrium. However, the question of monotonicity of price impact in finite markets with interdependent preferences has received less attention. Research on finite and large (infinite) markets with interdependent values has primarily focused on markets in which there is an underlying fundamental value that defines, for all agents, the values derived from the exchanged good. In particular, apart from idiosyncratic shocks, the preferences of all market participants are affected only by aggregate shocks to the fundamental value. In these markets, the effect of an additional trader on market competitiveness is unambiguous; that is, in this canonical information structure, where the correlations among values, induced by common and idiosyncratic shocks, are the same for all trader pairs for any market size, increasing the market size decreases market power, and the interdependence in trader values through aggregate shocks does not alter conclusions (1) and (2) about price impact.

MODEL. We examine the relationship between non-competitiveness and interdependencies in values in a market for a perfectly divisible good[1] with an arbitrary number of traders, based on the standard *uniform-price* double auction. The analysis is cast in a linear-normal setting; we analyze the unique symmetric linear Bayesian Nash equilibrium. Thus, relative to the large-market rational-expectations literature on information aggregation, we deal with a more modest class of quadratic utilities but are able to analyze a relatively rich class of interdependencies in trader values for markets of any size. Specifically, we adopt the class of information structures introduced in Rostek and Weretka ([13]; equicommonal information structures) to study information aggregation; here, we analyze market power and welfare. Beyond markets with aggregate and idiosyncratic shocks alone, the equicommonal class allows accommodation of a variety of environments with heterogeneously interdependent preferences, including group or spatial dependence in values and networks with size externalities on interdependence among values. Moreover, unlike models with aggregate and idiosyncratic shocks, negative dependence of values is allowed. All traders—buyers and sellers—are Bayesian and strategic in that they (endogenously) have price impact and take it into account in their trading decisions; in particular, there are no noise traders, uninformed or (by assumption) price-taking traders.[2]

[1] Examples of perfectly divisible goods include assets, electricity, gold, emission permits, etc.

[2] That all market participants are fully strategic is a feature of the model that is shared by the double-auction models of Dubey, Geanakoplos and Shubik [4], Reny and Perry [12], and Vives [18–20]. Dubey, Geanakoplos and Shubik [4] model a market as a dynamic strategic market game, in which during every period traders choose nominal spending that is not contingent on price. In a static strategic market game, information revealed in price cannot be incorporated into decisions; with multiple trading rounds, traders are able to use information contained in prices from prior trading rounds. A Walrasian (double) auction accounts for feedback between inference and market depth, even though the game is static. By allowing choices that are contingent on prices, downward-sloping demands enable traders to take advantage of the