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An experimental study of price dispersion in an optimal search model with advertising☆

Timothy N. Cason *, Shakun Datta

Department of Economics, Krannert School of Management, Purdue University, West Lafayette, IN 47907, United States

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Abstract

This paper reports a laboratory experiment to study pricing and advertising behavior with costly buyer search. Sellers simultaneously post prices and may incur a cost to advertise this price. In the unique symmetric equilibrium, sellers either charge a high unadvertised price or randomize in an interval of lower advertised prices. Increases in search or advertising costs raise equilibrium prices, and equilibrium advertising intensity decreases with lower search costs and higher advertising costs. Our experimental results support these comparative static predictions, and sellers also post high unadvertised prices as predicted. In all treatments, however, sellers advertise more intensely than in equilibrium.

JEL classification: D43; D83; L13

Keywords: Laboratory; Posted offer; Market power; Mixed strategy; Uncertainty; Shopping

> Traditional models of competition with perfect information obviously cannot explain the widely observed phenomena of price distributions. . . . .; nor can they explain advertising. . .. . .. Attempts to characterize equilibrium in product markets in which information is costly can provide considerable insight into these phenomena. (Stiglitz, 1979, p. 339).

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* Corresponding author.
E-mail address: cason@purdue.edu (T.N. Cason).

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1. Introduction

Costly information acquisition has remained an important topic of economic research since Stigler (1961). One principal goal of this literature has been to explain nontrivial wage and price dispersion as a stable equilibrium outcome when one or both sides of the market have imperfect information. Economists have developed numerous versions of equilibrium search models citing the role of search frictions (Reinganum, 1979), information asymmetries (Varian, 1980), differing production costs (Salop, 1973), differing consumer search costs (Stahl, 1989, 1996) and ex post consumer heterogeneity (Burdett and Judd, 1983) and other reasons for the failure of the "law of one price".

Although theorists established the relationship between search, incomplete information and price distribution many years ago, these models are gaining renewed significance as search costs and technologies are being transformed by emerging Internet-based markets. Search models can provide an equilibrium explanation for the persistent price dispersion observed in essentially homogenous product markets (Baye and Morgan, 2001; Brynjolfsson and Smith, 2000; García-Gallego et al., 2004).[1] Search models can also provide guidance to help answer important public policy questions, both for formulating the basic principles of the policy and for allocating resources efficiently to implement them. For instance, various consumer protection regulations stipulated by the Federal Trade Commission are aimed towards curbing the harms of imperfect information.

Despite the normative and academic significance of these models, however, their application in actual policy resolutions has been somewhat limited. The reason is twofold (Grether et al., 1988). First, these models are highly sensitive to their assumptions of information acquisition and dissemination. As with many models in Industrial Organization, their assumptions tend to be quite stylized and often unrealistic. Second, the predictive power of many of these models has not been tested directly. The lack of suitable field data impairs traditional empirical analysis. Experimental methods, on the other hand, can provide some direct empirical evidence. They isolate the relevant parameters to assess their impact and therefore provide clear tests of the predictive properties of these models. Moreover, laboratory microeconomies are "real" economic systems that are behaviorally much richer than those parameterized in theory. Therefore, although a theory that performs well in the lab may not have complete external validity, it does pass what Smith (1982) refers to as a "nontrivial test". Laboratory data are also untainted from the various complicating factors that plague field data such as reputation formation, beliefs regarding delivery reliability or other quality attributes, and brand proliferation.

This paper reports a laboratory study of price advertising when consumers can engage in costly search. The basic framework for the study is derived from Robert and Stahl (1993), who introduced optimal search to Butters's (1977) advertising model. Our results support the model's comparative static predictions; for example, increases either in search costs or advertising costs are reflected in higher equilibrium prices. Prices are also dispersed as predicted, approximately in the equilibrium range. The proximity of the predicted and observed behavior is surprising in this environment not only because of the complexity of the decisions (both pricing and advertising) made by the sellers, but also because the equilibrium prediction involves dispersed prices. As discussed in the Conclusion, however, this strong support for the model does not extend to more challenging environments with nonoptimal search behavior exhibited by human buyers (reported in a companion paper, Cason and Datta, 2005).

[1] Baye et al. (2004) document that price dispersion exists even on price comparison sites on the Internet. For instance, the highest price for a consumer electronics product is on average 57 percent above the lowest available price.