Dynamic adverse selection with a patient seller

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Received 16 August 2016; final version received 6 October 2017; accepted 26 October 2017
Available online 31 October 2017

Abstract

This paper considers dynamic bilateral trade with short-term commitment. We show that, when the seller is more patient than the buyer, there exist systematic differences between the optimal selling and renting mechanisms. While the former consists of simple price-posting, the latter induces the buyer to choose between a secure- and a random-delivery contract. Allowing for mechanisms more general than price-posting reduces the seller’s cost of learning the buyer’s valuation in the renting case. Renting leads to more learning than selling but (unless the horizon is sufficiently long) only when general mechanisms are available. Our results contrast with the common view that the restriction to price-posting is innocuous and that informational asymmetries are more persistent under renting than under selling.

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JEL classification: D82; D86; D42

Keywords: Dynamic adverse selection; Mechanism design; Price-posting

1. Introduction

In one of the most fundamental economic transactions, a monopolistic seller offers an indivisible durable product to a single (non-anonymous) buyer whose valuation constitutes his private information. An important insight of the literature on dynamic adverse selection holds that the seller’s inability to commit to the future terms of trade represents an obstacle for learning. Fudenberg and Tirole (1983) and Sobel and Takahashi (1983) show that, without commitment,
the seller will offer a decreasing sequence of prices, inducing him to learn the buyer’s type only gradually. When the product is rented rather than sold, informational asymmetries turn out to be even more persistent. Hart and Tirole (1988) argue that, due to the so-called ratchet effect, the seller cannot do better than by offering a rental price so low as to prevent himself from learning anything about the buyer’s type for most of the time horizon.1

More recent results suggest that allowing for more sophisticated mechanisms than simple price posting does not alter these conclusions. Indeed, using a selling model with a continuum of types, Skreta (2006) finds that price-posting constitutes the seller’s optimal selling mechanism. In this paper, we argue that in the renting case, learning can be improved by use of a mechanism whose outcome is not implementable via simple price-posting. In particular, we show that if general mechanisms are available, the seller’s optimal renting mechanism is random and induces more learning than the seller’s optimal selling mechanism. These results come at a surprise as they contrast with the view, suggested by the existing literature, that the restriction to price-posting is innocuous and that informational asymmetries are more persistent under renting than under selling.

Our setting resembles Hart and Tirole’s (1988) seminal model of dynamic bilateral trade with short-term commitment. In each of a finite number of periods, the buyer has a unit demand for the seller’s product. The buyer’s per-period valuation can be either high or low and remains constant across periods. Our analysis encompasses both the renting and the selling case. While in the former, the seller offers his product to the buyer in every period, in the latter the interaction ends once a delivery has taken place. We differ from Hart and Tirole (1988) in that we choose a general mechanism design approach.2 At the start of each period, the seller commits to a mechanism which, due to his lack of long-term commitment, must be optimal given his (potentially updated) belief about the buyer’s type. A mechanism specifies a probability with which the product is delivered to the buyer and a transfer from the buyer to the seller, both conditional on the buyer’s message.

Our analysis focuses on the case where the seller is more patient than the buyer. From a theoretical perspective, this case turns out to be the interesting one to consider. It is relevant from an applied viewpoint because in many markets sellers (firms) adopt a more long-term perspective or have access to cheaper credit than buyers (consumers).3

Applying the revelation principle of Bester and Strausz (2001), we find that with a patient seller there exists a range of (moderate) prior beliefs for which the seller induces the buyer to separate (in the first period) although pooling would be optimal in a static context. The reason for this result is straightforward and the same as in the price-posting models of Fudenberg and Tirole (1983) and Sobel and Takahashi (1983). When the seller is more patient, information about the

1 A similar conclusion is obtained by the dynamic incentive models of Laffont and Tirole (1987, 1988) which bear a certain resemblance to the renting framework of Hart and Tirole (1988). They show that full separation is not feasible (for a continuum of types) or might be dominated by pooling (for a binary type).
2 Their model allows for general mechanisms in the analysis of long-term contracting with renegotiation, but in their treatment of the non-commitment case they “restrict attention to deterministic offers” (Hart and Tirole, 1988, p. 512).
3 Although a common assumption in bargaining models (e.g., Fudenberg and Tirole, 1983; Sobel and Takahashi, 1983), the literature on dynamic mechanism design has abstracted from heterogeneous discounting. Heterogeneous discounting makes dynamic contracting problems ill-defined when parties are able to commit to inter-temporal transfers (Krähmer and Strausz, 2015). In order to facilitate comparisons with the commitment case (as in Hart and Tirole, 1988), the literature has maintained the assumption of homogeneous discounting even when, as in this paper, parties are unable to commit to future payments.
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