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Optimal pricing strategy for durable-goods monopoly☆

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Abstract

In this paper, we reconsider the profitability of a durable-good monopoly when the seller's discount rate may be different from the buyers'. In an infinite-horizon continuous-time full-commitment model, the monopoly can achieve more than the static monopoly profit if and only if the seller is more patient than the buyers. Under this condition, the price function is strictly decreasing over time. These results remain valid in models with buyers arriving sequentially, where the seller may have only one unit to sell or can produce more at constant marginal cost. © 2001 Elsevier Science B.V. All rights reserved.

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1. Introduction

The issue of durable-goods monopoly has been studied extensively in the literature. The focus has been on whether and how the monopoly earns its static

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monopoly profit in a dynamic model.[1] There is a presumption that the static monopoly profit is the maximal profit a (static or dynamic) monopoly can obtain. This paper shows that this speculation is true only in some cases. The condition for its validity closely associates with the relative discount rates of the monopoly and the buyers.

In most of the literature, it is assumed that the discount rates for the buyers and the seller are exactly the same. Evidence indicates otherwise. One can argue that a firm has better access to low-interest-rate loans than the consumer, and therefore the firm's discount rate is often lower than the consumer's.[2] While it is not the focus of this paper to examine how to measure the discount rates and who have the higher numbers, the effects of different discount rates still need to be investigated. The issue then becomes how much more the monopoly can earn in a dynamic model when its discount rate is different than its buyers?

In this paper, we answer this question in an infinite horizon model with a continuum of buyers where the monopoly has full commitment power. It is easy to see that the monopolist can earn at least the static monopoly profit by offering the monopoly price at all times. Is that the maximum profit the monopolist can earn? The answer is no. We find that when the monopolist is more patient than the buyers, which is usually the case, the monopolist can extract more profit from the buyers by offering a strictly declining pricing path. Even though delay is costly to the seller, it is even more costly to the buyers. A monopolist can exploit this property to discriminate among buyers with different willingnesses to pay. This result justifies the conventional wisdom: a dynamic monopoly ought to do 'better' than a static monopoly. If we consider the extreme case where the buyers are infinitely impatient, the seller can discriminate perfectly between each buyer and earn all the surplus.

The property that a dynamic monopoly can earn more than a static monopoly is first exhibited in Sobel and Takahashi (1983) in a discrete-time model for the class of demand functions: $q = 1 - F(p)$, where $F(p) = p^{\mathrm{m}}$. When the seller and the buyers' discount rates are equal, Gul (1987) and Ausubel and Deneckere (1987) show that the static monopoly profit is the maximum a dynamic monopoly can get. This paper generalizes these results to a general demand function and different discount rates in a continuous-time model. A simple necessary and

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[1] See representative work by Coase (1972), Gul et al. (1986), and Ausubel and Deneckere (1992a). One of the exceptions is Bagnoli et al. (1989), where perfect discrimination by the monopoly is facilitated in a dynamic model.

[2] This is evidenced in the advertisement of some furniture stores: 'Do not pay for one full year.' It is argued in Sobel (1991) that the seller can make a profit by lending money to consumers in this case. Given the risks involved, other firms usually do not engage in this practice. In the case of furniture stores, it seems likely that furniture purchasers usually stay in the local area longer and have higher incomes and a lower risk of defaulting than other groups of consumers.