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Behavior-based price discrimination and customer information sharing[☆]



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ABSTRACT

This article investigates the incentives and effects of rival firms sharing their customers' identities, using a two-period model with behavior-based price discrimination (BBPD). A unilateral information exchange between the two periods takes place in a subgame-perfect equilibrium. This exchange increases the ability of the firms to discriminate prices amongst consumers according to their profiles, and boosts the profitability of BBPD at the customers' expense.

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1. Introduction

In many markets, companies share individual-level customer information with their competitors. For example, in the grocery and drugstore markets, Catalina Marketing organizes the sharing of purchase history data amongst retailers to help them design their promotion campaigns (Pancras and Sudhir, 2007). Airline companies, through code-sharing agreements, exchange data on passengers to customize their services and prices

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(Czerny, 2009). One feature common to these examples¹ is that information sharing tends to facilitate price discrimination.

Inspired by these examples, this article investigates a model in which firms can share their proprietary customer data when they compete with price discrimination and then evaluates the effects of such exchanges on market functioning. More specifically, I consider a two-period model in which companies that engage in behavior-based price discrimination (BBPD) in the second period may share their private information regarding the identities of their previous customers. BBPD is a very simple and common form of price discrimination that consists in offering different prices to different customers according to their buying histories.

Information exchanges on consumer identities have two potential effects. A first, static effect occurs in the mature phase of a market: Information exchanges enable firms to more finely price-discriminate their customers and hence have *a priori* ambiguous effects on firms' profits. The second, dynamic effect is fostered by the prospect of information exchanges that modify the incentives of companies to initially acquire information on their consumers in a new market. I am interested in understanding these two effects of information exchanges and their consequences on company profits and consumer surplus.

To investigate these issues, I studied a two-period model with repeated purchases from three firms that compete on price to sell horizontally differentiated goods. Each company offers a product that matches a consumer's preferences with a certain probability. Consumers fall into four segments, depending on the number of products they value: consumers who value no product; captive consumers who value only one product; local shoppers who value two products; and global shoppers who value all three of the products. In the first period, there is no purchase history; therefore, firms use uniform prices set according to an absolutely continuous price distribution so that they can be ranked *ex post* according to said prices. The highest-price firm (hereafter the small firm) serves only its captive consumers. The intermediate-price firm (hereafter the medium firm) serves its captive consumers and the local shoppers of its product and that of the small firm. The lowest-price firm (hereafter the large firm) serves all the other consumers. In the second period, firms can recognize their past customers and charge them a different price than they charge their new customers. When information sharing is allowed, each firm decides between the two periods whether to sell its list of past customers and its price, as well as which of its rivals' databases it will buy. Depending on the customer lists a firm has acquired, the company can more finely discriminate prices amongst consumers in the second period.

I show that customer information sharing amongst rival firms takes place in a subgame-perfect equilibrium and that it increases the profitability of BBPD at the expense of consumers in both periods. In the terminology of Liu et al. (2006), there is a "*one-way information sharing*" from the medium or the large firm to the small one. The acquisition of this new information increases the surplus extraction power of the small firm, which

¹ Sen Chen et al. (2001) and Liu et al. (2006) for other examples.

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