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# Consumer heterogeneity, incomplete information and pricing in a duopoly with switching costs

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## Abstract

It is well known that switching costs may facilitate monopoly pricing in a market with price competition between two suppliers of a homogenous good, provided the switching cost is above some critical level. With heterogeneous consumers and incomplete information about individual consumers' types, monopoly pricing entails second-degree price discrimination with inefficient contracts for low demand types. We show that introducing consumer heterogeneity may increase the critical switching cost needed to sustain a pure-strategy equilibrium involving monopoly pricing.

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## 1. Introduction

A wave of privatization and deregulation has rolled over the world in recent years. The old national monopolies—be it railroad services, airlines, telecommunication or electricity provision or distribution—now typically have been forced to share their markets with one or more entrants. This gives rise to numerous interesting issues of competition in general and pricing behavior in particular. A particular problem facing firms is how to escape the Bertrand paradox: they compete in markets for more or less homogeneous goods, with prices as the main

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strategic variable. In our view, the most compelling solution to the paradox is the existence of switching costs: the fact that even if consumers do not care about which product they start to buy, there may be costs associated with switching suppliers.<sup>1</sup> These costs dampen competition in mature markets in a variety of settings, as shown by Paul Klemperer in numerous articles (see his 1995 survey). Recent efforts to raise barriers for consumers who might consider to switch supplier must be seen in light of this theory.<sup>2</sup>

Despite the large theoretical literature on the importance of switching costs on pricing in a variety of markets, there are only a limited number of empirical analyses on the measurement of switching costs. Notable exceptions are Elzinga and Mills (1998), who study the wholesale distribution of cigarettes; Kim et al. (2001), who study bank loans; and Chen and Hitt (2002), whose focus is on what they call internet-enabled businesses.<sup>3</sup> They all agree that switching costs are an important source of market power.

Another characteristic of some of the industries in question—telecommunications in particular—is the degree of sophistication in pricing behavior: the typical tariff is non-linear, and normally consumers are offered the choice between a variety of schemes, with the purpose of price discrimination between heterogeneous consumers.<sup>4</sup> The aim of the present paper is to study the interplay between switching costs and pricing behavior in a market where consumers differ in some respect relevant for price discrimination, and where the firms lack information about these consumer differences. In addition to the already mentioned literature on switching costs and non-linear pricing, there are also many contributions studying non-linear pricing in more or less competitive settings. What these contributions have in common, however, is that they model sources of market power other than switching costs. Wilson (1993, Part 12.3) considers Cournot

<sup>1</sup> An early contribution to the analysis of markets with switching costs is von Weizsäcker (1984), who also provides a thorough discussion of how switching costs relate to incomplete information. Other proposed solutions to the Bertrand paradox include product differentiation (physically or informationally) and tacit collusion, as laid out in any modern treatments of Industrial Organization, e.g. Tirole (1988).

<sup>2</sup> Examples of such barriers include frequent-flyer's programs used by airlines (for some Norwegian evidence, see Risvold, 2000) and subsidizing new mobile phone customers' purchase of the phone if they sign up for a minimum period of one year (for some Norwegian evidence, see Seime, 1999). See also Nilssen (1992) for some important distinctions between different types of switching costs.

<sup>3</sup> In addition, there are many attempts to measure the related notion of 'consumer loyalty' (for a discussion, see Chen and Hitt, 2002, and references therein).

<sup>4</sup> Such pricing behavior reflects the fact that the products in question are typically non-transferable services, effectively limiting the possibilities for arbitrage. Moreover, the firms have incomplete information about different consumers' tastes, or they are (explicitly or implicitly) restricted from exploiting the little information they have about tastes in different sub-markets (one could, for instance, imagine prices that differ according to gender, age and location), leaving second-degree price discrimination as the only viable price discrimination option. (See Wilson, 1993, for a survey of non-linear pricing.)

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