



Personalized pricing versus history-based pricing: implications for privacy policy[☆]



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ARTICLE INFO

Article history:

Received 6 July 2015

Accepted 20 October 2015

Available online 14 November 2015

JEL:

L40

L13

D43

Keywords:

Personalized pricing

History-based pricing

Customer recognition

Price discrimination

Privacy

Switching cost

ABSTRACT

We compare personalized and history-based pricing and show that personalized pricing harms consumer surplus and total welfare when evaluated over a two-period horizon. The model is characterized by two key features: (1) the discounted two-period profits are invariant to whether personalized or history-based pricing is applied because higher period-2 profits with personalized pricing are offset by lower period-1 profits. (2) Consumer mobility is invariant to whether history-based or personalized pricing is applied, but personalized pricing leads to a higher proportion of inefficient switching, and a lower proportion of efficient switching.

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1. Introduction

The progress of information technology, such as commercial internet applications with big data, has to an increasing extent facilitated the adoption of various degrees of personalized pricing by firms. This development has initiated a topical debate about the privacy issues regarding the exploitation of customer-specific information as a basis for advertising and pricing. As emphasized by [FTC \(2012\)](#) and [Brill \(2011\)](#), for instance, there are important interconnections between privacy policy and competition policy.

In this study we analyze the effects of privacy protection on consumer welfare and industry profits by comparing personalized pricing with history-based pricing within a

two-period model with switching costs. With personalized pricing firms are able to acquire customer-specific information regarding the preferences of the customers they have acquired in period 1, whereas with history-based pricing firms are able to condition period-2 prices only on consumer history, i.e. whether the consumer has an established customer relationship with the firm itself or with its rival.¹ As an analysis of privacy policy this builds on the view that pricing conditional on customer history alone is not a violation of privacy protection, but that the crucial issue of privacy protection is whether personalized pricing is allowed. The analysis is conducted with a two-period horizon so that we can distinguish the effects of personalized pricing on competition at the stage when customer relationships are formed

[☆] We are grateful to Thomas Gehrig, Oz Shy and participants at the Mannheim Competition Policy Forum in April 2015 for valuable comments.

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¹ [Chen \(1997\)](#) and [Fudenberg and Tirole \(2000\)](#) developed path-breaking models for the analysis of history-based or behavior-based pricing. [Fudenberg and Villas-Boas \(2007\)](#) and [Esteves \(2009\)](#) present surveys of the literature focusing on history-based or behavior-based pricing.

from those at the stage when firms exploit established customer relationships.

We analytically establish that the price equilibrium in an ex ante symmetric duopoly with switching costs is characterized by the feature that the period-1 competition for the formation of customer relationships is precisely so fierce as to neutralize the incumbency rents which can be made from customers locked-in by the switching costs in period 2 ir- respectively of whether firms apply personalized pricing or history-based pricing. In addition, we demonstrate that the discounted two-period profits are invariant to whether personalized pricing or history-based pricing is applied when evaluated over a two-period horizon. Moreover, the personalized pricing system leads to higher price fluctuations between periods.

Conducting the analysis with a two-period horizon with endogenous market segmentation has interesting implications for privacy policy. We establish analytically that the application of personalized pricing harms consumer welfare and total welfare compared with history-based pricing. Furthermore, with an endogenous distribution of customer relationships the consumers benefit from privacy protection, but this benefit to consumers is realized without sacrifice in terms of industry profits, since the discounted two-period profits are invariant to whether personalized pricing or history-based pricing is applied. In contrast, with a static analysis focusing on exogenously inherited market segments there is a distributional conflict between firms and consumers.

The beneficial effect of privacy protection on consumer surplus is neither due to lower total switching costs nor to a better initial allocation of the clientele. The gains from privacy protection to consumers are generated by the fact that personalized pricing promotes inefficient switching, i.e. switching from a preferred to a less-preferred brand, at the expense of efficient switching, i.e. switching in the opposite direction. The mechanism behind this feature is that personalized pricing leads to higher markups targeted to high-value customers and lower markups to the low-value customers in the second period. Since the poaching offers cannot be conditioned on these intrinsic preference characteristics, the second-period consumer surplus is lower under personalized pricing than under history-based pricing.

Seminal contributions to the literature focusing on the economic aspects of privacy policy include Posner (1978, 1981) and Stigler (1980). These researchers developed the “Chicago School” view, according to which there is no justification for government policies to protect consumer privacy because privacy protection creates inefficiencies. A number of subsequent studies, for example Hermalin and Katz (2006) and Taylor (2004), have challenged this view. Taylor and Wagman (2014) present a survey of the recent literature focusing on the effects of restrictions regarding the exploitation of customer-specific information for consumer and producer surplus. They characterize the winners and losers of privacy restrictions in oligopolistic industries and emphasize that the welfare effects of such restrictions are to a large extent industry-specific and sensitive to the prevailing nature of competition. There is also an extensive literature, summarized by Tucker (2012), focusing specifically on how privacy

concerns affect advertising markets. Our study does not focus on advertising markets.

Esteves (2010) has compared history-based pricing with uniform pricing in order to evaluate the effects of history-based pricing on profits and welfare within the framework of a two-period model. Shin and Sudhir (2010) designs a two-period duopoly model to evaluate whether a firm should offer lower prices to its own customers rather than to the rival’s customers. Their analysis also allows for a comparison of the profit under circumstances where firms can separate valuable consumers from non-valuable ones with the profit associated with uniform pricing. Relatedly, Jing (2015) explores the role of consumers’ ex ante valuation uncertainty in a two-period model where he compares the performance of history-based pricing in an experience good duopoly with that of an inspection good duopoly. Contrary to all these studies we present an analysis of personalized pricing compared with history-based pricing, therefore a comparison focusing precisely on the effects of privacy protection defined by whether personalized pricing is allowed or not.

Shy and Stenbacka (2016) present a static evaluation of the effects for profits and consumer welfare of different degrees of privacy protection in a static context, with inherited customer relationships as an exogenous feature. The present analysis is distinguished from Shy and Stenbacka (2016) along several dimensions, most importantly because it makes the inherited customer relationships endogenous. Of course, one could apply alternative mechanisms for information acquisition. For example, in Shy and Stenbacka (2013) the firms learn the preferences of their customers by investing a fixed amount.² More sophisticated models, capturing that firms have access to imperfect tests for the determination of customer types, are developed by Chen et al. (2001), Liu and Serfes (2004) and Esteves (2014b). However, these studies are not oriented towards an evaluation of personalized pricing from the perspective of privacy policy and they do not conduct comparisons of the regimes with personalized pricing and history-based pricing.

In our model firms keep the acquired customer-specific information as private information and consumers have access to no technology for “hiding” their generic preferences. Acquisti and Varian (2005) and Conitzer et al. (2012) have explored models where consumers can either avoid being detected as past customers or avoid revealing their individual characteristics. Taylor (2004) and Casadesus-Masanell and Hervas-Drane (2015) have explored the strategic implications of options to firms of selling consumer-specific information in secondary markets.

Finally, it should be emphasized that our evaluation of privacy protection is restricted to aspects purely related to economic efficiency. Privacy protection could also be defended by reference to its intrinsic value associated with the respect for individual integrity typical for the western democracies, but such considerations are outside the scope of the present study.

² Shy and Stenbacka (2013) explore the effects of information exchange between competitors regarding customer preferences on investments in information acquisition within the framework of a static model. Other aspects of information exchange have been studied in a related context by Jentzsch et al. (2013).

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