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What types of switching costs to create under behavior-based price discrimination?☆

Ki-Eun Rhee *

KAIST College of Business, 85 Hoegiro, Dongdaemun-gu, Seoul, Republic of Korea

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ABSTRACT

We study firms' incentives to create switching costs using a four-period model consisting of two consecutive price-competing stages intervened by options to create switching costs early (before price competition) and late (during price competition). Acknowledging that many real/social switching costs need to be created early while many contractual/pecuniary switching costs are set up late during the competition, we show that firms are better off minimizing real/social switching costs while maximizing contractual/pecuniary switching costs. The results highlight the importance of timing of creation that is embedded in different types of switching costs. We also show that switching costs can actually benefit consumers when firms practice behavior-based price discrimination because consumers can enjoy benefits of deep price discounts without the hassle of actually switching. Therefore, an observed lack of consumer switching should not be immediately interpreted as lack of competition in markets where both switching costs and behavior-based pricing exist.

1. Introduction

Switching costs arise when buyers who purchase products repeatedly or who purchase follow-on products find it costly to switch from one supplier to another. Examples are numerous and there are various types of switching costs that arise from different sources depending on the nature of the product. In this paper, we ask which types of switching costs, among those that are commonly observed, enhance firms' profits provided that firms can i) endogenously influence the magnitude of switching costs and ii) adopt behavior-based price discrimination based on consumers' past purchase history, a strategy that is being widely adopted these days. We present a simple yet versatile model that treats switching costs in a broad sense. Nonetheless, the model is capable of reflecting many different types of switching costs by adding context to how switching costs arise endogenously without changing the model fundamentally. The model thus allows us to compare switching costs of different natures within one base model.

We first acknowledge that there is a link between different types of switching costs and the timing when they need to be created. Here are two well-known examples of switching costs with different timing structures. First consider product (in)compatibility. Firms can easily control the degree of compatibility between their products with other firms' products. The more incompatible a product is with other products, the larger the switching cost on the part of consumers. Now think about the timing when firms must decide to create this type of switching cost. It is reasonable to assume that such decision is made during the product design or manufacturing stage, before any price competition begins. This is especially true because although designing a product to be more or less compatible with other products may be costless initially, changing the design in the middle of price competing stages may involve significant costs that arise from establishing a new manufacturing line, advertising a new product, or from discarding the old products.

Now consider product customization as another example of switching cost. Firms can tailor their products to fit the needs of consumers by saving a consumer's shipping address or credit card information to expedite checkout on the next purchase, by designing a payment plan timed to coincide with a customer's cash flow, or by offering double frequent flyer miles on a month when a customer flies most often. All such services increase the value of the product in the subsequent buying period and thus act as switching cost on the part of consumers. Notably, there is another common element among all examples of customization mentioned above. Firms can customize the product only after consumer preferences are revealed (via first-period purchases). Therefore, the timing when this type of switching cost can be created is in between price competing stages.

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* Corresponding author.
E-mail address: krhee@business.kaist.ac.kr.

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Most types of switching costs share the same timing structure with either the first or the second example above. Indeed, most literature on endogenous creation of switching costs take either of the two timing structures as well. We accordingly study the effects of different types of switching costs by allowing firms to create switching costs in two separate timing occasions. Amid price competing stages, firms may set up switching costs (i) in the initial period before price competition begins, and/or (ii) in between price competing stages. We call the former type early switching cost and the latter, late switching cost, conforming to the timing of commitment. Examples of early switching costs include many real or social costs of switching such as product incompatibility, learning costs that arise from different standards, and set-up costs for product installments. On the other hand, late switching costs reflect many types of contractual or pecuniary switching costs. Examples are on-pack coupons, targeted defensive coupons that are distributed to past customers in order to lure repeat purchases, and various loyalty programs that allow consumers to accumulate points or miles upon initial purchases.

Using a four-period model consisting of two consecutive price-competing stages intervened by options to create early switching costs (in period zero) and late switching costs (in period two), we show that firms find it optimal to create maximal late switching costs while preferring not to create any early switching costs. The result is driven by how the timing of commitment interacts with firms' incentives during the intertemporal price competition. Traditionally it has been found in the switching cost literature that firms intertemporally adopt 'bargains-then-ripoff' price trend: firms offer a low 'bargain' price in the first period to acquire as many customer base as possible, and later charge a high 'ripoff' price to take advantage of the locked-in customers. Behavior-based price discrimination (hereafter BBPD), however, prevents firms from fully harvesting their locked-in customers because low poaching prices of competing firms trigger prices to loyal customers to drop as well. This deteriorates incentives to create early switching costs as they intensify first-period competition without much benefit in subsequent periods. Late switching costs, on the other hand, are less burdened from this concern as they are created after initial market shares are settled. Consequently, firms create maximal late switching costs rendering poaching by competing firms unsuccessful. Both firms' profits, however, decrease due to late switching costs as they prompt deeper price discounts to new customers.

It turns out that firms' aversions to create early switching costs are rather strong in the sense that firms choose not to create early switching costs even when they do not have the opportunity to create late switching costs. Thus, firms are not simply deferring the creation of switching costs to a later stage, but rather, strictly prefer to create only late switching costs. When consumers are sufficiently more myopic than firms, however, firms may find it optimal to maximize early switching costs. Consumer myopia alleviates intertemporal tension because myopic consumers do not anticipate future lock-in caused by switching costs and respond primarily to current period's prices. Our results carry a strategic implication that creating switching costs through real/social costs is not profit maximizing unless consumers are very myopic while it is desirable to lock in customers through contractual/pecuniary switching costs.

Following policy implications can be obtained from our results. First, BBPD tends to be pro-competitive in environments with switching costs in the sense that consumer surplus is higher and profits are lower with BBPD than without it. In addition, prices to all customers decrease with BBPD. Thus, there seems to be no reason for an anti-trust authority to be concerned with this type of price discrimination. Second, and more surprisingly, consumers benefit from switching costs when BBPD is practiced: consumer surplus is higher when firms create maximal switching costs than when firms do not set up switching costs. This is because maximal switching costs prevent consumers from switching inefficiently while anti-competitive effects of switching costs are dissipated by BBPD. In other words, consumers enjoy the benefits of poaching activity (via low prices) without the hassle of actually switching. Therefore, an observed lack of customer switching should not be immediately interpreted as lack of competition.

Compared to the vast amount of literature on exogenous switching costs, studies on endogenous creation of switching costs are rather limited. Most studies so far have focused on one specific type of switching cost and found varying results. Mariñoso (2001), Bouckaert and Degryse (2004) and Villas-Boas (2004) demonstrated that switching costs reduce profits when they arise from product incompatibility, from informational disadvantage, and from consumer learning, respectively.[1] On the other hand, Caminal and Matutes (1990), Gehrig and Stenbacka (2004), and Wallace (2004) found that switching costs can enhance profits when they arise from price commitment or coupons, from product differentiation, and from product customization, respectively. In this paper, we present a unifying model that highlights an insightful criterion — a timing structure — that determines whether a particular type of switching cost enhances a firm's profit or not.

Whether switching costs make markets more or less competitive has been a long-lasting question in the exogenous switching cost literature, commencing from Klemperer (1987a, 1987b) and Farrell and Shapiro (1988) to Caminal and Claici (2007) and Cabral (2009, 2013). The answer is theoretically ambiguous and is dependent on the specifications of the model. We contribute to this literature by changing the focus from switching costs in general to comparison of different types of switching costs. Acknowledging that different types of switching costs are established at different timings, we demonstrate that the effects of switching costs can be quite opposite dependent on the timing of creation. To that effect, Nilssen (1992) also examines the effects of two different types of switching costs. Nilssen distinguishes transaction costs from learning costs by how often switching costs are incurred. Our setup differs from Nilssen in two important ways. First, we analyze the optimal size of switching costs provided that switching costs are endogenously created while the total extent of switching costs is fixed in Nilssen. Second, our model addresses many different types of switching costs that can be categorized by the timing of creation, while Nilssen only considers two specific types of switching costs.

This paper is closely related to the growing literature on behavior-based price discrimination, wherein firms discriminate their customers based upon past purchase behaviors.[2] BBPD is especially important in relation to the switching cost literature because models with BBPD explain customer switching as an equilibrium outcome whereas switching does not occur in equilibrium in many traditional switching cost models. Chen (1997) is the pioneering paper to show customer switching as an equilibrium behavior using BBPD under a homogeneous duopoly market where customers are differentiated by switching costs. Fudenberg and Tirole (2000) study a Hotelling duopoly model where past purchases of customers matter only for informational values and call the practice of BBPD "poaching" since firms offer low prices selectively to the customers of rival firms. Neither Chen (1997) nor Fudenberg and Tirole (2000) studies endogenous creation of switching costs although Fudenberg and Tirole (2000) extend the firm's strategy set to include long-term price commitments in a manner similar to Caminal and Matutes (1990). Furthering the research on BBPD, Chen and Pearcy (2010), Shin and Sudhir (2010) and Shaffer and Zhang (2000) showed conditions under which BBPD led to lower prices to own customers than to rival's customers while Chen (2008), Esteves (2010) and Jentzsch et. al (2013) study the effects of BBPD when firms are asymmetric or when customers have multi-dimensional attributes. Bouckaert et al. (2012) compare anti-competitive effects of proportional versus lump-sum switching costs. Villas-Boas (1999), Taylor

[1] Economides (1989) and Einhorn (1992) also showed firms' preferences for product compatibility in different market settings, although they did not explicitly model incompatibility as switching costs.

[2] See Fudenberg and Villas-Boas (2006) for a recent survey on BBPD.