"Retention Strategies in a Switching Cost Model"

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Abstract

With the developments in technology, firms can gather information about consumers' purchase history which can be use to price discrimination accordingly. This type of price discrimination is designed in economic literature as *Behaviour-Based Price Discrimination* (BBPD) or *dynamic pricing*. This work is motivated by a recent report of the UK regulator for the communication markets (Ofcom (2010)), that raises concerns about the competitive and welfare effects of retention strategies. The aim of this paper is to analyze the effects of BBPD where firms apply retention strategies under a switching costs approach considering asymmetry on the switching costs of consumers (consumers have different switching costs) and the existence of a dominant firm.

1 Introduction

With the developments in technologies, firms are able to gather information about consumers' past purchase history. This information can be used to charge different price to

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different customers according to their consumer decisions. This type of price discrimination is designed as *Behaviour-Based Price Discrimination* (BBPD) or *dynamic pricing.* The economics literature offers important insights on the economic and welfare effects of BBPD. As underlined by Chen (2005), these pricing practices are employed as an equilibrium strategy of oligopoly firms either in markets where firms offer an ex-ante differentiated product (Fudenberg and Tirole (2000), Esteves (2009), Esteves (2010), Esteves (2014a), Esteves (2014b), Esteves and Reggiani (2014)) or in markets where firms compete with an ex-ante homogenous good but there is ex-post product differentiation due to consumer switching costs[1] (Chen (1997), Taylor (2003)). In both economic approaches, BBPD tends to lower industry profits, but may or may not increase consumer welfare. This work follows the assumption that customers have to incur a switching cost if they decide to change supplier in the second period as presented in Chen (1997). "Paying customers to switch"[2] is a pricing strategy that we can find in many competitive markets as communication markets and banking services. For example, it is usual that telecommunications firm offers a lower price to all customers who switch supplier or a bank that lower the interest rate for customers from competitor's bank. Social networks such as Facebook and Twitter base their business models on future revenues generated from a large base of user and developers that won't switch to another social network due to real or "artificial" switching costs. Thus, the more users of a communication service such as Skype or Facebook, the more valuable the service is to each user and the higher the switching cost to switch to another communication service bringing all users or friends. A classical example is Microsoft Office that is believed to have a perceived switching cost of over $1000 thus buyers are paying hundreds of dollars for Microsoft Office even when free alternatives exists. In the case of Microsoft Office almost all different forms of switching costs occur. What would be the alternative? Would this be compatible with everyone

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[1]Switching costs are costs that consumers must incur if they decide to change supplier. There are three types of switching costs: "transaction costs, learning costs and artificial or contractual costs". (Klemperer (1987))

[2]Chen (1997).

else that are using Microsoft Office? Can I transfer my templates? Would I learn fast enough to work in the same pace? Would I miss any functions or features? Each value provider faces a trade-off between investing in adoption by charging a low price or give away something for free to attract new value recipients or on the other hand charging a higher price reflecting the value of what is being offered. Lock-in is seldom absolute but when lock-ins is created by dominant companies and there are too high barriers to market entry, it may result in antitrust action. And if firms can retain its customers?

With the exception of Esteves (2014) the literature on BBPD has not looked at the possibility of firms responding to the competitors' poaching offers as an attempt to avoid the switching of their loyal customers. A report by the United Kingdom regulator for the communication markets (Ofcom, (2010)) makes a reminder to the practice of firms implementing retention strategies as a way to discourage customers to change the current supplier by offering them a special discount. Under a Losing Provider Led (LPL)[3] process, for the consumers' switching process to be completed, customers have to validate a code that has to be requested from the existing firm. In the United Kingdom, customers who want to switch their mobile telephone service must contact their existing provider and request a Porting Authorization Code (PAC) which they then put through to their new provider in order to complete the switching process. So, this code request provides firms with the information that the consumers are willing to switch and allows firms to offer advantageous deals to those customers with the objective of retaining them. Since save activity can potentially make more difficult the switching processes, it is important to understand the economic and welfare effects of this business practice.

Esteves (2014) investigates the impact of retention discounts when product differentiated firms engage in BBPD. Amorim (2012) revisits the same question in a homogeneous

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[3]An alternative to the LPL process is the Gaining Provider Led (GPL) process. Under the GPL process, customers only need to agree to a deal with their new provider who then contacts the customer's existing provider to complete the switching. In contrast with the LPL process, under the GPL process the switching process is easier but the risks of mis-selling are higher because customers have less information about the implications of the switching process.

product market with switching costs. In both approaches BBPD with retention strategies boost consumer surplus and social welfare at the decrease of industry profits.

The main objective of this work is to extend the model presented in Amorim (2012) considering different switching costs among consumers. When the switching is done, there are some transaction costs or learning costs or some psychological costs of switching. Each firm has its own conditions to the switching process. Suppose that there are two different firms that offer the same good. One firm can charge a higher price when one customer wants change supplier. Or customers do not want to learn how to use the product of the other firm, even if the products are similar. Or just because, for no clearly identifiable economic reasons, customers prefer one firm (brand-loyalty).

This asymmetry in the market is analysed in the paper of Shaffer and Zhang (2000) where it is consider an asymmetric demand measured by consumer's loyalty to each firm brand. In this study the results suggest that price discrimination leads to lower prices to all consumers, even for existing customers (to retain them).

In this work is also assumed that there is a firm with a dominant position[4] in the market. This assumption is quite relevant due the competition issues and antitrust policies. Consumers with high switching costs are unlikely to switch and firms charge to them a higher price in order to exploit their locked-in customers. Thus, market share gain from the initial purchase decisions are an important determinant of future profits (Klemperer, 1995). Moreover, the existence of a dominant firm can lead to an exclusionary effect from its rival firm. Chen (2008) analysed the effects of dynamic pricing when one firm "has a stronger market position than its competitor", and with this assumption BBPD benefits consumers if the weaker firm do not exit the market. Esteves (2014) infers that firms only have incentives to apply retention strategies if their customer base is higher than 33%.

This work is organized as follows. In Section 2 is presented the model and then at Section 3 and 4 the benchmark cases, the uniform pricing and no retention strategies, respectively. Section 5 is consider the model with retention strategies and Section 6 the

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[4]A dominant firm is one which accounts for a significant share of a given market and has a significantly larger market share than its next largest rival.

optimal pricing strategies.

2   Model

In the market there are two firms, A and B, that produces a non-durable homogenous good produced at a same and constant marginal cost, c. Without loss of generality it is assumed that $c = 0$. Each consumer wants to buy one unit of the product, either from firm A or firm B and have an identical reservation value, v.

At the beginning, consumers are indifferent between two firms. The product is homogeneous and consumers choose the firm with lowest price. Market is divided into an unequal size. Firm A get a portion of α consumers, with $\alpha \in \left]\frac{1}{2}, 1\right]$. and firm B gets the remain demand, $(1 - \alpha)$.

The introduction of retention strategies is motivated by the Ofcom report (Ofcom (2010)) that analyses the economic effects of saving activity in the UK telecommunication markets. When firms are able to identify their potential switchers, then they are able to implement retention strategies in order to discourage the switching process. Retention strategy is a new form of pricing strategy that firms use in order to not lose their market share.

The game is divided in two stages. In the first stage, firms are able to price discriminate among customers and set two different prices, one for old customers, $p_i^{o,R}$, and another for rival's customers, $p_i^{r,R}$, for $i = A, B$. After observing the set of prices of each firm, consumers can continue to buy to the same firm (customers with high switching costs) or change supplier (with lower switching costs). Following the Ofcom report and the LPL process, all consumers who want to change supplier must contact their existing provider in order to complete the switching process, giving information about their willingness to switch provider. Given this information, in the second stage, firms are able to implemented retention strategy, giving a discount, d_i, $i = A, B$, for all customers who show an intention to switch. If a customer decides to switch from his current provider he has to incur a switching cost s, uniformly distributed on $[0, \phi_i]$. Here it is consider that customers that

buy from firm A and from firm B have different costs of switching, such that $s_A \sim U\left[0, \phi_A\right]$ and $s_B \sim U\left[0, \phi_B\right]$, with $\phi_A \neq \phi_B$.

It is identified two kind of consumers: the passive and the active consumers. Passive consumers do not show any intention to switch and thus do not receive a discount. In this category is included all the consumers with high switching costs. Active consumers express an intention to switch and receive a discount by firm. However, within this group of consumers there are some that conclude the switching process (switchers, with lower switching costs) and some that are retain by firm through the discount (saved/retain customers, for which the discount is not sufficiently high to make the switching).

3 Uniform Pricing Benchmark

In this section we present the case when price discrimination is not feasible, either because it is prohibited or firms cannot segment their customers.

Then, consider that firms cannot price discriminate between customers and set an uniform price for all consumers p_i^u, $i = A, B$. All customers who want to change supplier must incur a switching cost, ϕ_i. From the initial purchase decisions, there are three possible cases: firm A charges a higher price than firm B, the price of the two firms is the same and, firm A charges a lower price than its rival's. Firms compete *a la* Bertrand, deciding simultaneously the prices. Since $\alpha > \frac{1}{2}$, firm A has the weakly higher Bertrand price and only customers from firm A will switch (those that pay a higher price at the beginning).

Given $\widetilde{s}_A$ the level of switching cost such that the consumer is indifferent between buy again from firm A and change for firm B,

$$v - p_A^u = v - p_B^u - \widetilde{s}_A$$

and

$$\widetilde{s}_A = p_A^u - p_B^u. \tag{1}$$

There are a part of consumers from firm A that change supplier while consumers from

firm B does not change. Thus, the demand of firm A is

$$q_A^u = \alpha \int_{\widetilde{s}_A}^{\phi_A} \frac{1}{\phi_A} d_A = \frac{\alpha}{\phi_A} \left(\phi_A - p_A^u + p_B^u \right).$$

And the demand of firm B is

$$q_B^u = \alpha \int_0^{\widetilde{s}_A} \frac{1}{\phi_A} ds + (1 - \alpha) \int_0^{\phi_B} \frac{1}{\phi_B} ds = \frac{\alpha}{\phi_A} \left(p_A^u - p_B^u \right) + (1 - \alpha)$$

Each firm wants to maximize their profits. Then,

$$\max_{p_A^u} p_A^u \left[\frac{\alpha}{\phi_A} \left(\phi_A - p_A^u + p_B^u \right) \right]$$

and

$$\max_{p_B^u} p_B^u \left[\frac{\alpha}{\phi_A} \left(p_A^u - p_B^u \right) + (1 - \alpha) \right]$$

Solving the first-order conditions for the maximization problem of each firm and solving for p_A^u and p_B^u, it is obtained the Nash equilibrium prices and corresponding profits.

Proposition 1 *When firms cannot price discriminate between their existing customers and rival's customers, the uniform Nash equilibria prices and profits are given by:*

$$p_A^{u*} = \frac{(\alpha+1)}{3\alpha} \phi_A \qquad p_B^{u*} = \frac{(2-\alpha)}{3\alpha} \phi_A$$

$$\pi_A^{u*} = \frac{(\alpha+1)^2}{9\alpha} \phi_A \qquad \pi_B^{u*} = \frac{(2-\alpha)^2}{9\alpha} \phi_A$$

for all $\alpha > \frac{1}{2}$.

Without price discrimination, firms' prices depend on the market share: a firm's second-period price is an increasing function of its previous market share. A firm with a higher market share will set a higher price. Because only customers of firm A will change supplier, prices of each firm depend only on A's switching costs - firm A's baseline market share.

Profits and prices at the uniform pricing benchmark are decreasing in firm A's market share. The intuition is the following. For firm B is indifferent to charge a higher price for its customers in order to exploit them or charge a lower price to capture some of firm A's

customers. The lower is $(1 - \alpha)$, less consumers firm B has to exploit and lower is the price charged from firm B. Given that, lower will be the price of firm A.

Moreover, profits and prices are increasing in switching costs of consumers (in this case, the switching costs of consumers from firm A). Higher is the switching costs for consumers from firm A, more difficult is for firm B capture these customers and then both firms compete less aggressively.

4   No Retention Strategies Benchmark

In this section it is consider the case where firms can price discriminate among its customers but retention strategies are not feasible. This model is similar to the static analysis presented in Shaffer and Zhang (2000).

In firm A's turf the indifferent consumer between buying again from A or switching to firm is located at $\overline{s}_A$ such that

$$v - p_A^o = v - p_B^r - \overline{s}_A$$

where,

$$\overline{s}_A = p_A^o - p_B^r. \tag{2}$$

The number of consumers who switch to firm B, q_{BA} are those with lower switching costs. q_{BA} is given by

$$q_{BA} = \alpha \int_0^{\overline{s}_A} \frac{1}{\phi_A} ds$$

$$q_{BA} = \frac{\alpha}{\phi_A} (p_A^o - p_B^r).$$

And, the number of consumers who buy again from firm A have the highest switching costs. q_{AA}, is

$$q_{AA} = \alpha \int_{\overline{s}_A}^{\phi_A} \frac{1}{\phi_A} ds$$

$$q_{AA} = \frac{\alpha}{\phi_A} \left(\phi_A - p_A^o + p_B^r \right).$$

Similarly, the intuition is the same when we look at the firm B's turf. The number of consumers that change suppliers are

$$q_{AB} = \frac{(1-\alpha)}{\phi_B} \left(p_B^o - p_A^r \right)$$

and, the consumers that continue to buy from firm B are

$$q_{BB} = \frac{(1-\alpha)}{\phi_B} \left(\phi_B - p_B^o + p_A^r \right).$$

Given the results above, the demand of each firm, D_i, $i = A, B$ is

$$D_A = \frac{\alpha}{\phi_A} \left(\phi_A - p_A^o + p_B^r \right) + \frac{(1-\alpha)}{\phi_B} \left(p_B^o - p_A^r \right)$$

$$D_B = \frac{(1-\alpha)}{\phi_B} \left(\phi_B - p_B^o + p_A^r \right) + \frac{\alpha}{\phi_A} (p_A^o - p_B^r)$$

Each firm wants to maximize its profits with each type of consumers. Thus, at the firm A's turf:In the firm A's turf, each firm wants to maximize their return with each type of consumers. Thus the maximization problem, for firm A, is

$$\max_{p_A^o} \frac{\alpha p_A^o}{\phi_A} \left(\phi_A - p_A^o + p_B^r \right)$$

and, for firm B

$$\max_{p_B^r} \frac{\alpha p_B^r}{\phi_A} \left(p_A^o - p_B^r \right).$$

And in the firm B's turf, each firm wants to

$$\max_{p_A^r} \frac{(1-\alpha)p_A^r}{\phi_A} \left(p_B^o - p_A^r \right)$$

and, for firm B

$$\max_{p_B^o} \frac{(1-\alpha)p_B^o}{\phi_A} \left(\phi_B - p_B^o + p_A^r \right).$$

Solving the model, it is obtained the following results.

Proposition 2 *When firms cannot implement retention strategies, the Nash equilibria prices and profits are given by:*

$$p_A^o = \tfrac{2}{3}\phi_A \qquad\qquad p_B^o = \tfrac{2}{3}\phi_B$$

$$p_A^r = \tfrac{1}{3}\phi_B \qquad\qquad p_B^r = \tfrac{1}{3}\phi_A$$

$$\pi_A = \tfrac{4\alpha}{9}\phi_A + \tfrac{(1-\alpha)}{9}\phi_B \qquad \pi_B = \tfrac{4(1-\alpha)}{9}\phi_B + \tfrac{\alpha}{9}\phi_A$$

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5 Retention Strategies

In this section we analyse the possibility of retention strategies. Following Chen (1997) and introducing an asymmetric demand given by the differences in customers' switching costs, the objective is to analyse the impact of retention strategies on welfare, profits and consumer surplus.

As usual we solve the game by backward induction.

5.1 Second stage

In the second stage, firms can implement a retention strategy by offering to all potential switchers a discount, d_i, $i = A, B$.

In firm A's turf the indifferent consumer between buying again from A at price $p_A^{o,R} - d_A$ or switching to firm B at price $p_B^{r,R} + s_A^*$ is located at s_A^* such that

$$p_A^{o,R} - d_A = p_B^{r,R} + s_A^*$$

where,

$$s_A^* = p_A^{o,R} - d_A - p_B^{r,R}. \tag{3}$$

At s_A consumers are indifferent between acting as passive and active consumers and $d_A = 0$. Thus,

$$s_A = p_A^{o,R} - p_B^{r,R}. \tag{4}$$

Given firm A's market share, α, the number of consumers who bought from firm A and switch to firm B, q_{BA}^R, is given by

$$q_{BA}^R = \alpha \int_0^{s_A^*} \frac{1}{\phi_A} ds$$

$$q_{BA}^R = \frac{\alpha}{\phi_A} (p_A^{o,R} - d_A - p_B^{r,R}).$$

The number of consumers who are saved and accept the discount d_A, q_{AA}^s, is given by

$$q_{AA}^s = \alpha \int_{s_A^*}^{s_A} \frac{1}{\phi_A} ds$$

$$q_{AA}^s = \frac{\alpha}{\phi_A} d_A.$$

And, the number of consumers who buy again from firm A and do not receive the discount (passive consumers), q_{AA}^R, is

$$q_{AA}^R = \alpha \int_{s_A}^{\phi_A} \frac{1}{\phi_A} ds$$

$$q_{AA}^R = \frac{\alpha}{\phi_A} \left(\phi_A - p_A^{o,R} + p_B^{r,R} \right).$$

In the second stage, firm A wants to maximize the profit obtained with saved consumers. Thus, firm A solves the following problem:

$$\max_{d_A} \left(p_A^{o,R} - d_A \right) \frac{\alpha}{\phi_A} d_A$$

Solving the first order condition, yields

$$d_A = \frac{p_A^{o,R}}{2}$$

The second-order condition is satisfied for this result. The optimal discount for firm A is given by $d_A^* = \frac{p_A^{o,R}}{2}$.

Following the same analysis for firm B, is straightforward to see that we can get a similar result. Thus, the optimal discount for firm i is given by

$$d_i^* = \frac{p_i^{o,R}}{2}$$

for $i = A, B$.

5.2   First stage

In the first stage firms can price discriminate between their existing customers and rivals' customers setting two different prices for each group of consumers, $p_i^{o,R}$ and $p_i^{r,R}$, $i = A, B$. After observing prices, consumers choose to stay or switch depending on their switching costs.

In firm A's turf, each firm wants to maximize their return with each type of consumers. Thus the maximization problem, for firm A, is

$$\max_{p_A^{o,R}} \frac{\alpha p_A^{o,R}}{\phi_A}(\phi_A - p_A^{o,R} + p_B^{r,R}) + \frac{\alpha}{\phi_A}(p_A^{o,R} - d_A)d_A$$

and, for firm B

$$\max_{p_B^{r,R}} \frac{\alpha p_B^{r,R}}{\phi_A}\left(p_A^{o,R} - d_A - p_B^{r,R}\right).$$

For the second-stage equilibrium result, $d_A^* = \frac{p_A^{o,R}}{2}$ the first-order conditions yields,

$$p_A^{o,R} = \frac{2}{3}\left(\phi_A + p_B^{r,R}\right)$$

$$p_B^{r,R} = \frac{p_A^{o,R}}{4}$$

where,

$$p_A^{o,R} = \frac{4}{5}\phi_A \tag{5}$$

and,

$$p_B^{r,R} = \frac{1}{5}\phi_A \tag{6}$$

Looking now for firm B's turf, the maximization problem for each firm as in the firm A's turf, each firm wants to maximize their return with each type of consumers. Thus the maximization problem, for firm A, is

$$\max_{p_A^{r,R}} \frac{(1-\alpha)p_A^{r,R}}{\phi_B}\left(p_B^{o,R} - d_B - p_A^{r}\right)$$

and, for firm B

$$\max_{p_B^{o,R}} \frac{(1-\alpha)p_B^{o,R}}{\phi_B}(\phi_B - p_B^{o,R} + p_A^{r,R}) + \frac{(1-\alpha)}{\phi_B}(p_B^{o,R} - d_B)d_B$$

Solving the first-order conditions and with $d_B^* = \frac{p_B^{o,R}}{2}$,

$$p_A^{r,R} = \frac{1}{5}\phi_B \tag{7}$$

and,

$$p_B^{o,R} = \frac{4}{5}\phi_B \tag{8}$$

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Proposition 3 *With retention strategies and asymmetric demand, the Nash equilibria prices and profits are given by:*

$$p_A^{o,R*} = \tfrac{4}{5}\phi_A \qquad p_B^{o,R*} = \tfrac{4}{5}\phi_B$$

$$p_A^{r,R*} = \tfrac{1}{5}\phi_B \qquad p_B^{r,R*} = \tfrac{1}{5}\phi_A$$

$$d_A^* = \tfrac{2}{5}\phi_A \qquad d_B^* = \tfrac{2}{5}\phi_B$$

and,

$$\pi_A^R = \tfrac{12\alpha}{25}\phi_A + \tfrac{(1-\alpha)}{25}\phi_B \qquad \pi_B^R = \tfrac{12(1-\alpha)}{25}\phi_B + \tfrac{\alpha}{25}\phi_A$$

As Proposition 3 shows, with retention strategies prices do not depend on market share. For any ϕ_A, ϕ_B, it can be inferred that for rival's customers, the price is lower with retention strategies, while the price for old customers, $p_i^{o,R}$, is higher with retention. However, there is a portion of old customers (saved customers) who receive a discount and pay a lower price.

Corollary 4 *With $\phi_A = \phi_B = \phi$, the results are $\pi_A^R = \tfrac{\phi}{25}(11\alpha + 1)$ and $\pi_B^R = \tfrac{\phi}{25}(12 - 11\alpha)$.*

From Corollary 4, π_A^R is greater than π_B^R for any $\alpha > \tfrac{1}{2}$.

While prices do not depend on market share, profit of each firm does depend on market share and the relative switching costs (ϕ_A and ϕ_B). The higher is the market share and/or the switching costs of each type of consumers, the higher is the profit of each firm. Thus, it is important to analyse the effects of market share, α, and relative switching costs on the profits and the demand of each firm.

The demand of firm A (dominant firm) with retention strategies, D_A^R, is given by

$$D_A^R = q_{AA} + q_{AA}^s + q_{AB}$$

$$D_A^R = \frac{3}{5}\alpha + \frac{1}{5} \qquad (9)$$

The total demand of firm A without retention strategies, D_A, is

$$D_A = \frac{1}{3}\alpha + \frac{1}{3}$$

With BBPD the demand of firm A does not depend in switching costs level, even when it is consider retention strategies and when retention strategies are not allowed. The demand of firm A after implement BBPD only depend on its baseline of consumers from the beginning of the period, α.

Without loss of generality it is consider that firm A is the dominant firm in the market, such that $\alpha > \frac{1}{2}$. The bigger firm will always lose its dominance with and without retention strategies. However, firm A (dominant firm) will continue with the high demand in the market. Let us suppose that firm A departs with an initial market share of 75% of the market, $\alpha = 0.75$. BBPD with retention strategies reduce the market share to 65%, $D_A^R = 0.65$. BBPD with no retention reduce market share to 58%, $D_A = 0.58$. Firm A loses dominance but still have the higher market share of the market. Because of the retention offers, firms can retain some consumers and allow firms to not lose so much market share.

Let us look at the profits of each firm. Remember that

$$\pi_A^R = \frac{12\alpha}{25}\phi_A + \frac{(1-\alpha)}{25}\phi_B$$

$$\pi_B^R = \frac{12(1-\alpha)}{25}\phi_B + \frac{\alpha}{25}\phi_A$$

Depending on the values of switching costs, ϕ_A and ϕ_B, it is important to analyse the behaviour of profits with market share, α. For that, let us take the derivative of profits in order to α.

$$\frac{\partial \pi_A^R}{\partial \alpha} = \frac{12}{25}\phi_A - \frac{1}{25}\phi_B \tag{10}$$

and,

$$\frac{\partial \pi_B^R}{\partial \alpha} = \frac{1}{25}\phi_A - \frac{12}{25}\phi_B \tag{11}$$

From the above equations,

- If $\frac{\phi_A}{\phi_B} < \frac{1}{12}$, profits for firm A and firm B are decreasing in α

- If $\frac{1}{12} < \frac{\phi_A}{\phi_B} < 12$ profit of firm A is increasing in α (while profit of firm B is decreasing);

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- And, if $\frac{\phi_A}{\phi_B} > 12$ both profits are increasing in α.

Profits of each firm is a weighted of their market share and the switching costs of each group of consumers: the losses in market share can be compensated by the relative switching costs. Imagine, for example, that firm A increases its market share, α, which can be translated in a profit gain of firm A if $\frac{\phi_A}{\phi_B} > \frac{1}{12}$. However, firm B can gain as well. With $\frac{\phi_A}{\phi_B} > \frac{1}{12}$ this means that the switching costs of firm A's customers are relative smaller than firm B's customers. In this case if the market share of firm B decreases this can be compensated by the larger relative switching costs: gain in the per-unit profit with the old customers given by the higher price than firm A. Thus, retention strategies are a good tool for the dominant firm (firm A) to maintain its dominance in the market.

The effect of an increase in α on each firm's profit depends on the level of switching costs. Over a large region of parameter values an increase in α will benefit firm A and harm firm B. However, if ϕ_A is extremely high compared to ϕ_B, firm B can benefit from an increase in α.

Moreover, with retention strategies, the profit of firm A is higher than the profit of firm B, i.e., $\pi_A > \pi_B$, iff

$$\frac{\phi_A}{\phi_B} > \frac{(1-\alpha)}{\alpha}.$$

As by definition $\alpha > \frac{1}{2}$ as long as $\phi_A > \phi_B$ it is always true that $\pi_A > \pi_B$. When ϕ_B is large enough compared to ϕ_A the smaller firm can earn the higher profit. Since firm B has more locked-in customers less customers change supplier and firm B have a higher proportion of consumers that charge a higher price. Then, firm B can have a higher profit even with a lower market share.

6 Pricing Strategies

As it was presented above, firms can be different pricing strategies. In some cases, depending on the relative switching costs, it is better for firm "pay to stay" or in some cases

it is better "pay to switch"[5].

In this section it is analysed the optimal pricing strategies for each firm according with the relative switching costs of each type of consumers, $\frac{\phi_A}{\phi_B}$. Depending on relative switching costs, it is probably that each firm can be different incentives in their pricing strategies: is it better to implement retention strategies or it is better to poach consumers from the rival firm?

Firm i will choose to implement retention strategies if $p_i^{o,R} - d_i < p_i^{r,R}$, with $i = A, B$; otherwise, it is better to poach customers from rival's firm.

- If $\phi_A < \frac{1}{4}\phi_B$: $\quad p_A^{o,R} < p_A^{r,R}$ and $p_A^{o,R} - d_A < p_A^{r,R}$, firm A will offer a better deal to its previous customers (passive and saved) rather than to the rival's previous customers

- If $\frac{1}{4}\phi_B < \phi_A < \frac{1}{2}\phi_B$: $\quad p_A^{o,R} > p_A^{r,R}$ and $p_A^{o,R} - d_A < p_A^{r,R}$, firm A's inactive consumers pay more than those switching from B but firm A's saved consumers will pay less

- and, if $\phi_A > \frac{1}{2}\phi_B$: $\quad p_A^{o,R} > p_A^{r,R}$ and $p_A^{o,R} - d_A > p_A^{r,R}$, firm A always charges a lower price to its rival's customers

7 Welfare Analysis

In this section it is analysed the welfare effects of retention strategies with asymmetric demand under switching costs model. Because some customers change supplier, BBPD can lead to some inefficient switching. However, the goal is compared the case when retention strategies are not allowed with the case when firms are able to implement retention strategies and compared the results in terms of welfare.

Overall profit, Π^R, with retention strategies is given by

$$\Pi^R = \frac{13}{25}\left(\alpha\phi_A + (1-\alpha)\phi_B\right)$$

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[5] Shaffer and Zhang (2000).

When firms cannot implement retention strategies, the overall profit, Π, is

$$\Pi = \frac{5}{9}\left(\alpha\phi_A + (1-\alpha)\phi_B\right)$$

In this way, it can be inferred that with retention strategies the overall profit of industry is lower when compared with the case when retention is not allowed. Average prices decreased because firms offer a discount in order to retain customers and industry profit decreases.

And, the overall profit when firms practice an uniform pricing, Π^u, is

$$\Pi^u = \frac{\phi_A}{9\alpha}\left(2\alpha^2 - 2\alpha + 5\right)$$

When we look at the consumer surplus with retention strategies, CS^R, we need to consider the consumers of type A and the consumers of type B. The A's consumer surplus, CS_A^R, is given by

$$CS_A^R = v - \frac{1}{25}\phi_B - \frac{15}{25}\phi_A$$

And B's consumer surplus, CS_B^R, is

$$CS_B^R = v - \frac{1}{25}\phi_A - \frac{15}{25}\phi_B$$

With retention strategies, consumer surplus, CS^R, is given by

$$CS^R = 2v - \frac{16}{25}\phi_A - \frac{16}{25}\phi_B$$

Similarly, with no retention, consumer surplus, CS, is

$$CS = 2v - \frac{2}{3}\phi_A - \frac{2}{3}\phi_B$$

Comparing the results it is inferred that consumers are better off with retention strategies. There are a higher proportion of consumers who pay a lower price - switchers and saved consumers. In general, consumers pay a lower price under retention strategies and consumer surplus boosts.

The overall welfare, W^R, is the sum of industry profits, Π^R, and consumer surplus, CS^R. Then, with retention the welfare is given by

$$W^R = 2v - \frac{16}{25}\phi_A - \frac{3}{25}\phi_B + \frac{13}{25}\alpha\phi_A - \frac{13}{25}\alpha\phi_B$$

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Without retention strategies, the overall welfare, W, is

$$W = 2v - \frac{16}{25}\phi_A - \frac{19}{25}\phi_B + \frac{5}{9}\alpha\phi_A - \frac{5}{9}\alpha\phi_B$$

It is straightford that welfare with retention strategies is higher than the welfare without retention strategies. The decrease in industry profit is compensated by an increase in consumer surplus and social welfare increases. Also, because less consumers make the switching, the deadweight loss due to the decrease in inefficient switching.

References

[1] Amorim, A. (2012), Behaviour Based Price Discrimination, Master Dissertation, University of Minho.

[2] Armstrong, M. (2006), "Recent Developments in the Economics of Price Discrimination", in Advances in Economics and Econometrics: Theory and Applications, 9th World Congress of the Econometric Society, ed. by R. Blundell, W. Newey and T. Persson. Cambridge University Press, Cambridge, UK.

[3] Chen, Y. (1997), Paying Customers to Switch, Journal of Economics and Management Strategy, 6(4): 877-897.

[4] Chen, Y. (2005), Oligopoly Price Discrimination by Purchase History, In: The Pos and Cons of Price Discrimination, The Swedish Competition Authority, Stockholm, pp. 101-130.

[5] Chen, Y. and Zhang, Z. (2009), Dynamic Targeted Pricing with Strategic Consumers, International Journal of Industrial Organization, 27, 43-50.

[6] Corts, K. (1998), Third-degree price discrimination in oligopoly: all-out competition and strategic commitment, RAND Journal of Economics, 29 (2): 306-323.

[7] Esteves, R. B. (2009), Customer Poaching and Advertising, International Journal of Industrial Organization, 57 (1), 112-146.

[8] Esteves, R. B. (2010), Pricing with Customer Recognition, International Journal of Industrial Organization, 28: 669-681.

[9] Esteves, R. B.(2014), Behaviour-Based Price Discrimination with retention offers, Information Economics and Policy, 27, 39-51.

[10] Esteves, R. B. (2014a), Price Discrimination with Private and Imperfect Information , The Scandinavian Journal of Economics, vol 116 (3), July 2014, 766–796.

[11] Esteves, R. B. and Reggiani, (2014), C. "Elasticity of Demand and Behaviour-Based Price Discrimination, International Journal of Industrial Organization, vol 32, 46-56.

[12] Fundenberg, D. and Tirole, J. (2000), Customer poaching and brand switching, RAND Journal of Economics, 31(4): 634-657.

[13] Fundenberg, D. and Villas-Boas, J. M. (2006), Behavior-Based Price Discrimination and Customer Recognition, In Hendershott, T. J. (ed.) Handbook on Economics and Information Systems, Elsevier, pp. 377-433.

[14] Ofcom, "Strategic review of consumer switching", September 2010.

[15] Shaffer, G. and Zhang, Z. (2000), Pay to Switch or Pay to Stay: Preferences-Based Price Discrimination in Markets with Switching Costs, Journal of Economics & Management Strategy, Vol. 9, No. 3, pp 397-424.

[16] Stole, L. (2007), Price Discrimination in Competitive Environments, in Armstrong, M. and R. Porter, eds., The Handbook of Industrial Organization, Vol. 3, Amsterdam: North-Holland.

[17] Taylor, C. (2003), Supplier surfing: competition and consumer behavior in subscription markets, RAND Journal of Economics, 34(2): 223-246.

[18] Villas-Boas, M. (1999), Dynamic competition with customer recognition, RAND Journal of Economics, 30 (4), 604-631.

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