

DEPARTMENT OF ECONOMICS

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Enhancing Market Power by Reducing Switching Costs*

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Abstract

A proportional decrease in switching costs increases competition and social welfare. However, a lump sum decrease in switching costs softens competition and does not invariably increase social welfare.

1 Introduction

A decrease in switching costs reduces prices and lowers profits for firms (Farrell and Klemperer, 2007). Hence, firms have too low incentives to reduce consumers' switching costs, while public policy strives to minimize such costs. However, the effect on an industry's profits from a switching-cost reduction hinges crucially on *how* the reduction is achieved. We consider firms' incentives to *jointly* decrease consumers' switching costs in a *proportional* or a *lump-sum* fashion.¹

A proportional decrease arises when consumers with high switching costs enjoy a higher absolute decrease than other consumers. Borrowers, e.g., who are financially illiterate perceive switching to a more favorable mortgage prohibitively expensive. In contrast to borrowers with sufficient financial literacy,

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¹In a recent paper, Biglaiser et al. (2007) look at entry when the switching costs of the incumbent's consumers increase.

this group gains the most from a user-friendly guide on how to switch mortgages (Miles, 2004). A lump-sum decrease arises, for example, when enhanced compatibility cuts the adaptation cost by a certain fixed amount, irrespective of the initial level of switching costs (e.g. uniform industry standards for electronic equipment).

2 The model

Firms A and B decide about taking joint action to reduce switching costs before competing in price over two periods. Once the initial decision on the implementation of the action has been taken, our model closely follows Chen (1997). A unit mass of consumers buys one unit of a good from firm A or B per period. When consumers decide to switch firm in period two, they incur a switching cost s , with $s \in [\underline{s}, \bar{s}]$ drawn from a commonly known uniform distribution and $0 < 2\underline{s} < \bar{s}$. Consumers learn their switching cost at the end of period one. Firms price discriminate in period two between loyal customers (who previously bought from that firm) and switching customers (who previously bought from the rival firm). Both firms produce at zero marginal costs, and simultaneously set prices p_i^1 ($i = A, B$) in period one and prices p_i^L and p_i^S , for loyal and switching customers respectively, in period two. There is a common discount factor $0 < \delta < 1$ between both periods. In period one, consumers choose the product with the lowest expected expenditure, rationally anticipating second-period behavior. If consumers are indifferent between the two firms, a proportion $0 \leq \sigma \leq 1$ chooses firm A and the remainder opts for firm B . Our analysis looks at two switching-cost reductions. Switching costs decrease proportionally so that $s \mapsto \alpha s$, with $0 < \alpha < 1$. In other words, consumers with higher switching costs benefit more than others. Switching costs decrease by a lump-sum, so that $s \mapsto s - \gamma$, with $0 < \gamma < \underline{s}$.

3 Analysis

3.1 Second-period competition

Assume firm A (B) has served a fraction k ($1 - k$) of the market in period 1.²

Firms maximize their profit

$$\begin{cases} \Pi_i^L = p_i^L q_i^L; \\ \Pi_i^S = p_i^S q_{-i}^S, \end{cases}$$

from their loyal consumers and switchers, respectively. Firm i retains a fraction q_i^L of its first-period consumers. Firm i attracts q_{-i}^S customers from its competitor's first-period market. A consumer is indifferent between staying with firm i , or switching to its competitor $-i$ if the switching cost s^* is such that $p_i^L = p_{-i}^S + s^*$. A consumer remains loyal to her first-period choice when her $s > s^*$. Hence, firm i retains a fraction of its first-period market share

$$q_i^L = \frac{\bar{s} - s^*}{\bar{s} - \underline{s}} = \frac{\bar{s} - (p_i^L - p_{-i}^S)}{\bar{s} - \underline{s}},$$

where $\underline{s} \leq p_i^L - p_{-i}^S \leq \bar{s}$. Consequently, the remaining fraction $q_{-i}^S = 1 - q_i^L$ turns to firm $-i$. Of course, if $\bar{s} < p_i^L - p_{-i}^S$ then $q_i^L = 0$ and $q_{-i}^S = 1$. Similarly, $q_i^L = 1$ and $q_{-i}^S = 0$ if $p_i^L - p_{-i}^S < \underline{s}$. Upon substitution of q_i^L and q_{-i}^S , firm i 's best-response price curve yields

$$p_i^L = \begin{cases} 0.5(p_{-i}^S + \bar{s}) & \text{if } p_{-i}^S \leq \bar{s} - 2\underline{s} \\ p_{-i}^S + \underline{s} & \text{if } p_{-i}^S > \bar{s} - 2\underline{s}. \end{cases}$$

The p_{-i}^S -response function can be constructed analogously such that Nash equilibrium prices equal $p_i^L = \frac{1}{3}(2\bar{s} - \underline{s})$ and $p_{-i}^S = \frac{1}{3}(\bar{s} - 2\underline{s})$. Market shares amount to $q_i^L = \frac{2\bar{s} - \underline{s}}{3(\bar{s} - \underline{s})}$ and $q_{-i}^S = \frac{\bar{s} - 2\underline{s}}{3(\bar{s} - \underline{s})}$, and second-period profits are $\Pi_i^L = \frac{(2\bar{s} - \underline{s})^2}{9(\bar{s} - \underline{s})} > \Pi_{-i}^S = \frac{(\bar{s} - 2\underline{s})^2}{9(\bar{s} - \underline{s})}$.

Proportional decrease. Equilibrium prices reduce to $p_i^L = \frac{\alpha}{3}(2\bar{s} - \underline{s})$ and $p_{-i}^S = \frac{\alpha}{3}(\bar{s} - 2\underline{s})$. It does not affect the fraction of switchers as the indifferent consumer (s^*) does not alter. Hence, second-period profits are reduced by the same proportion as prices, so that $\Pi_i^L = \frac{\alpha(2\bar{s} - \underline{s})^2}{9(\bar{s} - \underline{s})} > \Pi_{-i}^S = \frac{\alpha(\bar{s} - 2\underline{s})^2}{9(\bar{s} - \underline{s})}$.

Lump-sum decrease. This results in switching costs over the range $[\underline{s} - \gamma, \bar{s} - \gamma]$. The relative dispersion of the highest switching cost to the lowest

²In equilibrium we have that $k = 1, 0$, or σ .

switching cost, $(\bar{s} - \gamma)/(\underline{s} - \gamma)$, increases in γ . Prices are $p_i^L = \frac{1}{3}(2\bar{s} - \underline{s} - \gamma)$ and $p_{-i}^S = \frac{1}{3}(\bar{s} - 2\underline{s} + \gamma)$. In words, a higher relative dispersion makes it easier to attract switchers in a more profitable way. The fractions attracted are $q_i^L = \frac{2\bar{s} - \underline{s} - \gamma}{3(\bar{s} - \underline{s})}$ and $q_{-i}^S = \frac{\bar{s} - 2\underline{s} + \gamma}{3(\bar{s} - \underline{s})}$, where the number of switchers increases in γ . Since both prices and market shares increase in γ for the switching segment, so do profits, as can be seen from $\Pi_i^L = \frac{(2\bar{s} - \underline{s} - \gamma)^2}{9(\bar{s} - \underline{s})} > \Pi_{-i}^S = \frac{(\bar{s} - 2\underline{s} + \gamma)^2}{9(\bar{s} - \underline{s})}$.

3.2 First-period competition

Since second-period markets are segmented, second-period pricing is independent of period-one market shares. Consumers' expectations with regard to second-period prices and switching costs coincide for both firms, such that the indifferent first-period consumer satisfies $p_A^1 = p_B^1$.

Total profit for firm i as a function of its own price p_i^1 and its competitor's price p_{-i}^1 equals

$$\Pi_i = \begin{cases} p_i^1 + \delta\Pi_i^L & \text{if } p_i^1 < p_{-i}^1 \\ \sigma_i p_i^1 + \delta(\sigma_i \Pi_i^L + (1 - \sigma_i)\Pi_i^S) & \text{if } p_i^1 = p_{-i}^1 \\ \delta\Pi_i^S & \text{if } p_i^1 > p_{-i}^1. \end{cases} \quad (1)$$

When firm i announces the lowest price, it attracts all customers in period one, makes a profit of p_i^1 , and becomes the incumbent in period two, yielding $\delta\Pi_i^L$. When both firms set equal prices, firm i has a period-one market share of σ_i (σ for firm A and $1 - \sigma$ for B). This makes firm i the incumbent for a fraction σ_i of the period-two market. The remaining fraction $1 - \sigma_i$ is the pool of potential switchers. When firm i charges the highest price it has no customers in period one. Its period-two profits arise only from switchers.

Proposition 1 *There is a unique Nash equilibrium in period-one prices with*

$$p_i^1 = -\delta(\Pi_i^L - \Pi_i^S).$$

Total equilibrium profits are

$$\Pi_i = \delta\Pi_i^S.$$

The reasoning behind this Proposition can be expressed as follows. Both firms compete for the discounted second-period incumbency rent $\delta(\Pi_i^L - \Pi_i^S)$.

Price competition results in both firms charging $p_i^1 = -\delta(\Pi_i^L - \Pi_i^S)$. Firm i 's profit becomes $\sigma_i[-\delta(\Pi_i^L - \Pi_i^S)] + \delta(\sigma_i\Pi_i^L + (1 - \sigma_i)\Pi_i^S) = \delta\Pi_i^S$. Thus, the profit that a firm can secure itself is the discounted profit $\delta\Pi_i^S$, independent of its first-period market share.

Period-one prices are $p_i^1 = -\delta(\bar{s} + \underline{s})/3$. Total discounted profits equal $\delta\Pi_i^S$, so that $\Pi_i = \delta(\bar{s} - 2\underline{s})^2/9(\bar{s} - \underline{s})$ and coincides with the second-period profits for an entrant on the entire market.

Proportional decrease. First-period prices are $p_i^1 = -\delta\alpha(\bar{s} + \underline{s})/3$ where a lower factor α (and thus higher proportional decrease in s) reduces the second-period profit difference between incumbent and entrant, raising period-one prices. The total discounted profit of firm i then equals $\Pi_i = \delta\alpha(\bar{s} - 2\underline{s})^2/9(\bar{s} - \underline{s})$, representing a fraction α of profits in the base case. Each firm's profit declines in α , as profitability on switchers decreases. Firms prefer not to implement measures that reduce switching costs proportionally.

Lump-sum decrease. First-period prices equal $p_i^1 = -\delta(\bar{s} + \underline{s} - 2\gamma)/3$. A reduction in switching costs leads to a higher p_i^1 . Total discounted profits are $\Pi_i = \delta(\bar{s} - 2\underline{s} + \gamma)^2/9(\bar{s} - \underline{s})$. When switching costs are reduced by a lump sum, total profits increase. This result stems from a greater relative dispersion of switching costs, so that serving switchers becomes more profitable. Firms find it easier to enter one another's market in the second period, which relaxes first-period competition.

Proposition 2 *Firms only adopt technologies whereby consumers' switching costs are reduced by a lump sum.*

4 Welfare analysis

Total discounted welfare cost TW , measured by the total switching costs in period two, equals

$$TW = \delta \frac{\bar{s} - 2\underline{s}}{3(\bar{s} - \underline{s})} \frac{\bar{s} + 4\underline{s}}{6}.$$

The first fraction equals the market share of switchers and the second fraction is their average switching cost $E(s|s < p_i^L - p_{-i}^S)$. Consumers' welfare cost CW

represents their total amount paid to firms and total discounted switching costs incurred TW , yielding

$$CW = TW + \Pi_A + \Pi_B = \frac{\delta \bar{s} - 2\underline{s}}{9 \bar{s} - \underline{s}} \left(\frac{5}{2} \bar{s} - 2\underline{s} \right).$$

Proportional decrease. The base case welfare measures are multiplied by α . Therefore, both total and consumer welfare will increase with the introduction of a proportional switching-cost reduction measure. While firms are not inclined to adopt such a strategy, the social planner would certainly favor its introduction.

Lump-sum decrease. When switching costs are reduced by a lump-sum γ , opposite forces affect social welfare. The total welfare cost TW' then becomes

$$TW' = \delta \frac{\bar{s} - 2\underline{s} + \gamma \bar{s} + 4\underline{s} - 5\gamma}{3(\bar{s} - \underline{s})} \frac{5\bar{s} - 5\gamma}{6},$$

where the first term is the market share of switchers and the second term the average switching cost they incur. The social planner only prefers a lump-sum switching cost reduction if $TW' < TW$. A too low lump-sum decrease ($\gamma < (14\underline{s} - 4\bar{s})/5$) increases dramatically the market share of switchers, outweighing the beneficial effect of the switching-cost reduction.

If the lump-sum decrease is implemented, consumer welfare cost CW' becomes

$$CW' = \frac{\delta \bar{s} - 2\underline{s} + \gamma}{9 \bar{s} - \underline{s}} \left(\frac{5}{2} \bar{s} - 2\underline{s} - \frac{1}{2} \gamma \right).$$

Consumers dislike the lump-sum decrease because $CW' > CW$ for all γ since $\gamma < \underline{s}$. If total welfare is increased by this lump-sum reduction, it stems from an increase in firm profits, not from consumer welfare.

Proposition 3 *A proportional switching-cost reduction increases total and consumer welfare. A lump-sum reduction decreases consumer welfare, and increases total welfare only if $\gamma > (14\underline{s} - 4\bar{s})/5$.*

5 Conclusion

Our analysis of reducing switching costs applies to many industries, like banking (Shy, 2007) and telecom (Viard, 2007). These industries have been reluctant

to introduce number portability, arguing that costs outweigh potential benefits. An alternative interpretation is that number portability implies a proportional decrease in switching costs. Without number portability, consumers who have numerous correspondents or who carry out many financial transactions need to inform more parties about their new phone number or bank account.

Several extensions are possible while our main insights remain robust. Switching-cost reducing technologies, for example, may increase firms' marginal costs. If switching costs are cut by a lump sum, an increase in marginal costs to serve switchers counterbalances the benefits of a switching-cost decrease. Switching-cost reductions may also involve a lump-sum as well as a proportional component. Obviously, their adoption depends on the size of the respective effects.

6 References

Biglaiser, G., Crémer, J., and G. Dobos, 2007, "The Value of Switching Costs", mimeo.

Chen, Y., 1997, 'Paying Customers to Switch', *Journal of Economics and Management Strategy*, 6, pp. 877-897.

Farrell, J. and Klemperer, P.D., 2007, 'Coordination and Lock-In: Competition with Switching Costs and Network Effects', *Handbook of Industrial Organization*, 3, eds. Armstrong, M. and Porter, R.

Miles, D., 2004, 'The UK Mortgage Market: Taking a Longer-term View', *Final Report and Recommendations*, HM Treasury.

Shy, O., 2002, 'A Quick-and-easy Method for Estimating Switching Costs', *International Journal of Industrial Organization*, 20, pp. 71-87.

Viard, V.B., 2007, 'Do Switching Costs Make Markets More or Less Competitive?: The Case of 800-Number Portability', *RAND Journal of Economics*, Spring (Volume 38-1), pages 146-163.