Switching Costs and the foreign Firm's Entry

Kikuchi, Toru

2008

Switching Costs

and the Foregin Firm's Entry

Toru Kikuchi

Graduate School of Economics, Kobe University[*]

February 4, 2008

Abstract

This paper considers a two-period model of market entry with homogeneous products and switching costs. It is shown that the pro-competitive effect of a foreign firm's entry (i.e., unilateral trade liberalization) emerges before the entry. Also, conditions that are conducive to a competitive environment in the second-period are shown to yield a less competitive outcome in the first-period. That is, when the marginal cost of the foreign entrant is relatively low, the first-period

[*]Graduate School of Economics, Kobe University, Rokkodai 2-1, Kobe 657-8501, Japan; e-mail: kikuchi@econ.kobe-u.ac.jp; tel: 81-75-501-3801

output of a domestic monopolist is relatively low as well.

Keywords: switching costs, trade liberalization, cost competitiveness

JEL Classifications: D43, F12

1 Introduction

The proliferation of trade liberalization through both economic integration (e.g., the European Union) and preferential trade agreements (e.g., NAFTA) has spawned a vast literature on the implications of trade liberalization. In particular, in a single-period setting, pro-competitive gains from trade due to foreign firms' entry into the domestic market have been studied extensively.[1] It is well known that the entry of a cost-competitive (i.e., low marginal cost) foreign firm yields a highly competitive outcome. As yet, however, little attention has been paid to the implications of trade liberalization in the context of products with switching costs.

In a model with switching costs, it is more costly for consumers (or wholesalers) to buy from one producer in one period and from another producer in the next.[2] In the context of trade liberalization, switching costs include transaction and information costs for import wholesalers.[3] Important transaction costs result from differences in languages and customs. If a wholesaler has been buying a good (e.g., steel) from a domestic firm and decides instead to buy it from a foreign firm, then the wholesaler must hire new person-

---

[1]See, for example, Brander (1981), Markusen (1981).

[2]See Klemperer (1987a, 1987b, 1987c).

[3]See To (1994) for discussion.

nel that are familiar with that country's language and customs. Another transaction cost is that of negotiating a contract or agreement with the new supplier. Contracting costs with a new foreign supplier are usually higher than contracting costs with a domestic supplier. Switching costs are thus an important factor in any industry in which the product passes through a wholesaler's hands.[4]

Although the vitality of industries characterized by switching costs is closely related to trade liberalization, the literature on trade liberalization is almost exclusively focused on products without switching costs. Since the role of switching costs is amplified in the globalized world, it seems important to explore the impact of liberalization in the trade of products with switching costs.

As its primary contribution, this paper examines how trade liberalization (i.e., the entry of a foreign firm into the domestic market) affects the behavior of a domestic monopolist in the presence of switching costs. For these purposes I construct a simple two-period market-entrance model with switching costs. It will be shown that, for the home country, there are always gains from a foreign firm's entry. It will also be shown that a competitive environment in the second-period caused by the foreign entrant's relatively

---

[4]See Klemperer (1995) for surveys of the relevant literature. For the strategic export policy context, see To (1994).

4

low marginal costs is associated with a less competitive outcome in the first-period because the domestic monopolist produces less. The latter result differs from one obtained in standard single-period models of trade liberalization in that the inclusion of switching costs drastically changes the impact of trade liberalization.

2   The model

Consider a two-period market-entrance game with homogeneous products and switching costs. A home firm is present in the domestic market in both periods, and producing output x_t in each period t. A foreign entrant observes the home firm's first-period output and enters market in the second-period with output y_2. The firms' products are functionally identical, that is, we assume they are undifferentiated except by switching costs. Demand in period t is $f_t(q)$, to be interpreted as the q-th consumer having reservation price $f_t(q)$ for one unit of either firm's product in period t, net of any switching costs. Each consumer has a 'switching cost' s, which we take as given, of buying either firm's product for the first time. Products cannot be stored between periods. We assume no discounting.

We assume Cournot equilibrium in the second-period leading to market prices p_2 and p_2^* for the home firm's and the foreign firm's products respec-

tively. Thus in the second-period

$$p_2^* = f_2(x_2 + y_2) - s,$$

$$p_2 = f_2(x_2 + y_2), \quad if \ \ x_2 \leq x_1,$$

$$p_2 = f_2(x_2 + y_2) - s, \quad if \ \ x_2 > x_1.$$

In what follows, to simplify the argument, we assume linear demand curve: $f_t(q) = a - bq$.

Firms have no fixed costs and have constant marginal costs. The home firm's marginal costs are normalized to zero, while c^* represents the foreign firm's marginal costs.

Before moving to trading equilibrium, let us examine the equilibrium without the foreign firm's entry briefly. In this case, the home firm's profit is represented by $\bar{\Pi} = \bar{\Pi}_1 + \bar{\Pi}_2 = (a - bx_1 - s)x_1 + (a - bx_2)x_2$, where Π_t represents profits in period-t. We can obtain the equilibrium output as

$$\bar{x}_1 = \bar{x}_2 = \frac{2a - s}{4b}, \tag{1}$$

where 'bar' indicates the equilibrium value without the foreign firm's entry. Consumer surplus $\bar{CS} = \bar{CS}_1 + \bar{CS}_2$, total profits, and welfare are given as follows:

$$\bar{CS} = \bar{CS}_1 + \bar{CS}_2 = \frac{(2a - s)^2}{16b}, \tag{2}$$

6

$$\bar{\Pi} = \bar{\Pi}_1 + \bar{\Pi}_2 = \frac{(2a-s)^2}{8b}, \tag{3}$$
$$\bar{W} = \bar{CS} + \bar{\Pi} = \frac{3(2a-s)^2}{16b}.$$

Now, let us move to the case with the foreign firm's entry. In this case, the analysis is simplified by considering the firm's second-period reaction curves. We write $R(y_2)$ for the home firm's reaction curve if consumers had no switching costs, and $R'(y_2)$ and $R^*(x_2)$ when consumers have a switching cost s. The heavy line in Figure 1 is the home firm's reaction curve given $x_1 > 0$. To derive it, we first recall that for $x_2 \leq x_1$, the home firm's residual demand is $f_2(x_2 + y_2)$, whereas for $x_2 > x_1$, the residual demand is $f_2(x_2 + y_2) - s$, as if all its consumers had to pay a switching cost s.

The second-period Cournot-Nash equilibrium is at the intersection E. In this case, a small increase in x_1 increases the home firm's second-period output and decreases the foreign firm's second-period output, that is,

$$\frac{dx_2}{dx_1} > 0, \ \frac{dy_2}{dx_1} < 0.$$

Decreasing y_2 raises the home firm's second-period residual demand everywhere and so increases the home firm's second-period profits. Therefore, the home chooses x_1 at a higher level than if it simply maximised its long-run profits ignoring the effect of x_1 on y_2. In other words, the home firm can create customer base x_1 strategically in order to affect the second-period

7

equilibrium.

Considering Figure 1, the second-period equilibrium outputs become as follows:

$$x_2 = x_1, \quad y_2 = \frac{a - bx_1 - c^* - s}{2b}. \tag{4}$$

The home firm's total profits are

$$\Pi = \Pi_1 + \Pi_2 = (a - bx_1 - s)x_1 + [a - b(x_2 + y_2)]x_2. \tag{5}$$

Substitute (4) into (5) and maximising yields the equilibrium output:

$$\tilde{x}_2 \quad = \quad \tilde{x}_1 = \frac{3a + c^* - s}{6b}, \tag{6}$$

$$\tilde{y}_2 \quad = \quad \frac{3a - 7c^* - 5s}{12b}, \tag{7}$$

where 'tilde' indicates the equilibrium value with the foreign firm's entry. Consumer surplus and total profits are given as follows:

$$\tilde{CS} \quad = \quad \tilde{CS}_1 + \tilde{CS}_2$$

$$= \quad \frac{(3a + c^* - s)^2}{72b} + \frac{(9a - 5c^* - 7s)^2}{288b}$$

$$= \quad \frac{4(3a + c^* - s)^2 + (9a - 5c^* - 7s)^2}{288b}, \tag{8}$$

$$\tilde{\Pi} \quad = \quad \tilde{\Pi}_1 + \tilde{\Pi}_2 = \frac{(3a + c^* - s)^2}{24b}. \tag{9}$$

Since the welfare of the home country is equal to the sum of the consumer surplus and the profits of the home firm, welfare under the foreign firm's

entry can be shown to be

$$\tilde{W} = \frac{4(3a + c^* - s)^2 + (9a - 5c^* - 7s)^2}{288b}. \qquad (10)$$

Using (1) and (6), one can obtain the change of the home firm's output level by the announcement of the foreign firm's entry.

$$\tilde{x}_1 - \bar{x}_1 = \frac{2c^* + s}{12b} > 0. \qquad (11)$$

It is important to note that the anticipation of the foreign firm's entry in the second period increases the home firm's equilibrium output in both periods. Note that this result occurs because the home firm has a strategic incentive to create the customer base in order to affect the second-period equilibrium.

Proposition 1: *Anticipation of the foreign firm's entry in the second period increases the home firm's first-period output level.*

In other words, given that there are switching costs, the pro-competitive effect of the foreign firm's entry (i.e., unilateral trade liberalization) emerges before the entry. This result seems to reinforce the argument for pro-competitive gains from trade liberalization, which was emphasized by both Brander (1981) and Markusen (1981). To see this point precisely, let us consider welfare changes by the foreign firm's entry. Suppose that $c^* = 0$ holds ini-

tially. In this case, welfare changes can be calculated as follows:

$$\tilde{W}_{c^*=0} - \bar{W} = \frac{1}{288b}[9(a - \frac{s}{3})^2 + 10s^2] > 0. \tag{12}$$

Also, by differentiating $\tilde{W}$ with respect to c^*, one can obtain

$$\frac{d\tilde{W}}{dc^*} = \frac{(6a + 82c^* + 38s)}{288b} > 0. \tag{13}$$

Combining these two conditions, one can state the following proposition on welfare gains from the foreign firm's entry.

Proposition 2: *Given that $c^* > 0$ holds, there are always gains from the foreign firms' entry.*

Before closing this section, it is worthwhile to note that the impact of changes in the foreign firm's marginal costs. Equation (6) implies the interesting impact of trade liberalization in the presence of switching costs.

Proposition 3: *As the foreign entrant's marginal costs becomes higher, the larger the home firm's first-period output.*

In other words, the more cost-competitive the foreign entrant is, the lower the incentive to capture consumers in the first-period [i.e., $(d\tilde{x}_1/dc^*) > 0$]. This result differs from those obtained in trade models without switching costs. In those models, trade with cost-competitive foreign firms makes the

10

market more competitive. In this model with switching costs, however, the promise of competitive market conditions in the future period makes the current period less competitive. The principle involved is that, since the motivation to capture consumers in the first-period is to shift profits away from the foreign entrant in the second-period, a less-competitive domestic firm (which has a lower incentive to shift profits) will choose a lower output level in the first-period.[5]

3 Conclusion

In a two-period market-entry model with switching costs, it has been shown that the anticipation of the foreign firm's entry increases the home country's welfare. Also, it has been shown that conditions that cause a more competitive environment in the second period (i.e., relatively low marginal costs for a foreign entrant) yield a less competitive outcome in the first-period.[6] The interaction between trade liberalization and firm behavior in the presence of switching costs is crucial: if the magnitude of switching costs is substantial, some of pro-competitive gains from trade liberalization in the future period

---

[5]A related argument can be found in the strategic trade policy literature. See, for example, Collie and de Meza (2003).

[6]A similar result is found in the analysis of horizontally differentiated duopoly with switching costs. See Kikuchi (2007).

must be offset by a less-competitive outcome in the current period.

Throughout this paper, we have concentrated on the case of *unilateral* trade liberalization: only the foreign firm's entry into the home market was considered. The model could be enriched with the inclusion of *multilateral* trade liberalization: the home firm's entry into the foreign market. Further research should focus on the comparison of these two cases.[7]

References

[1] Brander, J. A. (1981) 'Intra-Industry Trade in Identical Commodities,' *Journal of International Economics,* Vol.11, pp. 1–14.

[2] Clark, R., and D. Collie (2003) 'Product Differentiation and the Gains from Trade under Bertrand Duopoly,' *Canadian Journal of Economics,* Vol. 36, pp. 658–673.

[3] Collie, D. (1996) 'Gains and Losses from Unilateral Free Trade under Oligopoly,' *Recherches Economiques de Louvain,* Vol. 62, pp. 191–202.

---

[7]For example, Collie (1996) analyzes the welfare effects of unilateral trade liberalization under Cournot duopoly. Also, see Clark and Collie (2003) for unilateral trade liberalization under Bertrand duopoly.

[4] Collie, D., and D. de Meza (2003) 'Comparative Advantage and the Pursuit of Strategic Trade Policy,' *Economics Letters,* Vol. 81, pp. 279–283.

[5] Kikuchi, T. (2007) 'Switching Costs and the Impact of Trade Liberalization,' unpublished manuscript, Kobe University.

[6] Klemperer, P. (1987a) 'The Competitiveness of Markets with Switching Costs,' *RAND Journal of Economics,* Vol. 18, pp. 138–150.

[7] Klemperer, P. (1987b) 'Market with Consumer Switching Costs,' *Quarterly Journal of Economics,* Vol. 102, pp. 375–394.

[8] Klemperer, P. (1987c) 'Entry Deterrence in Markets with Consumer Switching Costs,' *Economic Journal,* Vol. 97, Supplement, pp. 99–117.

[9] Klemperer, P. (1995) 'Competition when Consumers have switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade,' *Review of Economic Studies,* Vol. 62, pp. 515–539.

[10] Markusen, J. R. (1981) 'Trade and Gains from Trade with Imperfect Competition,' *Journal of International Economics,* Vol. 11, pp. 531–551.

[11] To, T. (1994) 'Export Subsidies and Oligopoly with Switching Costs,' *Journal of International Economics,* Vol. 37, pp. 97–110.
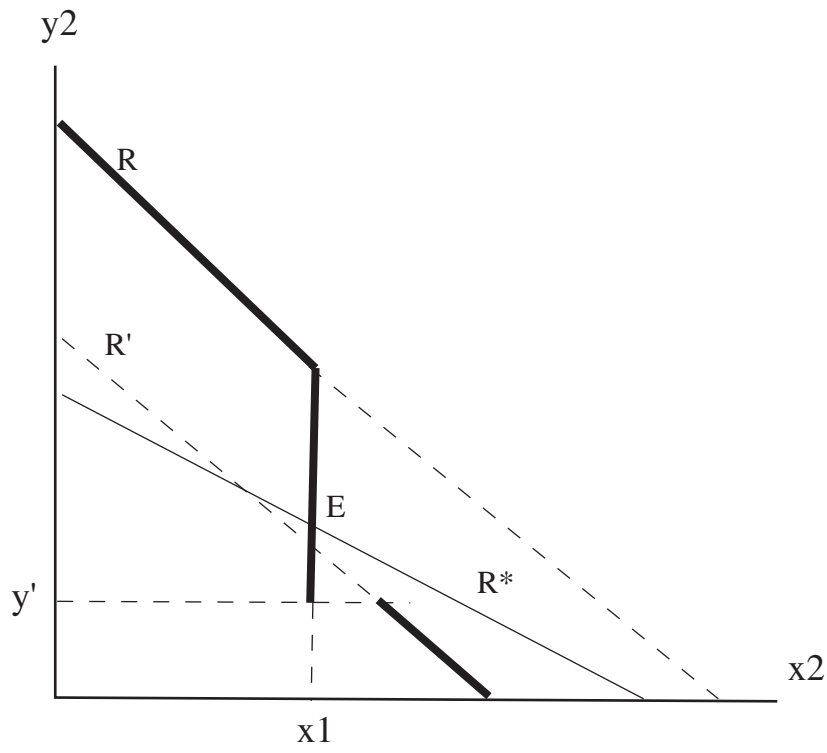
FIGURE 1