Loyalty Inducing Programs and Competition with Homogeneous Goods

Nicolás Figueroa, Ronald Fischer and Sebastián Infante

CEA-DII-Universidad de Chile, Stanford GSB

June 3, 2009
Introduction
Empirical Motivation

- Cell Phone companies give a free phone, which must be returned if the user changes providers.
- Airlines use mileage programs, which reward loyal users.
- Retailers give reward points that can be redeemed only if users repeatedly use the same provider.
- Why do providers do that?
These bonuses introduce endogenous switching costs. Switching costs create market power.

In a market with homogeneous goods, and no exogenous switching costs, can these strategies help providers to avoid the Bertrand trap?

Are these strategies harmful for perfectly rational and forward-looking consumers?

What equilibria are sustainable in this context?
The Model

Loyalty Inducing Programs and Competition with Homogeneous Goods
The Model

- There is a measure 1 unit of consumers, which has a valuation 1 for an homogeneous good (in two periods). There are two identical providers with zero marginal cost.
- In the first stage, firms announce bonuses $B_i$, and then prices $p_{i1}$.
- Then, consumers choose a provider.
- In the second stage, firms choose prices $p_{i2}$.
- Consumers choose again. They must return the bonus if they switch providers.
Solution Strategy

- We use SPE as a solution concept, therefore we assume that consumers and firms are perfectly rational and forward-looking.

- Backwards Induction. The last stage, where firms choose prices in the presence of potentially asymmetric switching costs is particularly challenging.
Literature Review

- Exogenous Switching Costs (Klemperer, Shilony). Asymmetric Switching Costs (Infante, Figueroa and Fischer)
- Exogenous loyalty with competition à la Hotelling (Fudenberg-Tirole, Chen)
- Asymmetric consumers or firms.
Solution
Last Stage

If the market structure is \((\mu_i, \mu_j) = (1, 0)\) then

- Consumers choose \(\min\{p_{2i}, p_{2j} + B_i\}\).
- \(p_{2i} = B_i, \ p_{2j} = 0\).
- Firm \(i\) retains the whole market, but faces an aggressive competitor that does his best to “poach” his consumers.
If the market structure is \((\mu_i, \mu_j) = (\frac{1}{2}, \frac{1}{2})\) and \(B_i, B_j \geq \frac{1}{2}\), then

- Consumers choose \(\min\{p_{2i}, p_{2j} + B_i\}\).
- \(p_{2i} = p_{2j} = 1\)
- Consumers are effectively locked in. Both firms can charge a monopoly price.
If the market structure is \((\mu_i, \mu_j) = (\frac{1}{2}, \frac{1}{2})\) and \(B_i < \frac{1}{2}\) or \(B_j < \frac{1}{2}\) then

- Two types of equilibria may appear: single-sided and double-sided poaching.
- Both include mixing strategies, there is no pure strategy equilibria due to discontinuities in the payoff function.
- Moreover, there are three types of double-sided poaching equilibria.
Loyalty Inducing Programs and Competition with Homogeneous Goods

\[ \left( 1 - \frac{2V_i - B_i}{1 - B_i} \right) \]
$2\left(1 - \frac{V_j}{1 - B_i}\right)$
The Model

Solution

Last Stage

Consumers After the First Stage

Pricing Decision in Stage 1

Bonus Decision in Stage 1

$\left(1 - \frac{2V_i - B_i}{\bar{p}_1 - B_i}\right)$
Subset of Switching Cost Space for Pure Strategy Equilibria
Loyalty Inducing Programs and Competition with Homogeneous Goods

Subset of Switching Cost Space for Single Sided Poaching Equilibria

- j poaches
- i poaches
Introduction

The Model

Solution

Results

Conclusions

Last Stage
Consumers After the First Stage
Pricing Decision in Stage 1
Bonus Decision in Stage 1

Loyalty Inducing Programs and Competition with Homogeneous Goods
Consumers who choose firm $i$ will pay a total price of $p_{1i} - B_i + E \min\{p_{2i}, p_{2j} + B_i\}$.

The expectation is difficult to compute in many cases, due to the difficult structure of the mixed strategies played in the last stage.
Firms, anticipating the decision of consumers, choose prices $p_{1i}, p_{1j}$. We look for equilibria where firms share the market so,

$$p_{1i} - p_{1j} = B_i - B_j - (E \min\{p_{2i}, p_{2j} + B_i\} - E \min\{p_{2j}, p_{2i} + B_i\})$$

For strategies to be an equilibrium, firms must have no incentives to deviate. That is firms must prefer sharing the market than having the whole market.
\[ \pi_{1i}(\text{entire market}) = (p_{1i} - B_i) + B_i = p_{1i} \]
\[ \pi_{1i}(\text{half the market}) = \frac{1}{2}(p_{1i} - B_i) + V_i, \text{ where } V_i \text{ is the continuation payoff after splitting the market.} \]

Therefore it must be true that \( p_{1i} \leq 2V_i - B_i : = c_i \)

The above equations are satisfied if we choose prices

\[
\begin{align*}
p_{1i}^* &= \min\{c_i, c_j + d\} \\
p_{1j}^* &= \min\{c_j, c_i - d\}
\end{align*}
\]
We conjecture these prices and then verify that they give positive profits to firms.

It is possible to have these eq. prices since firms **do not want** to have the whole market. A firm that owns half the market is less aggressive in trying to poach the rival’s customers.
Bonus Decision in Stage 1

- Firms choose Bonuses simultaneously
- They anticipate profits $\frac{1}{2}(p^*_{1i} - B_i) + V_i(B_i, B_j)$
Results
No Bertrand Trap

There is no equilibrium where competition leads zero profits.

**Theorem 1**

*There is no equilibrium with \((B_i, B_j) = (0, 0)\).*

Moreover

**Proposition 1**

*There is no equilibrium with \((B_i, B_j) = (B, B)\) and \(B < \frac{1}{4}\) (double sided poaching)*
Introduction

The Model

Solution

Results

Conclusions

No Bertrand Trap

Equilibrium

Other Equilibria

Price Discrimination

Subset of Switching Cost Space for Double Sided Poaching Equilibria

Case I

Case II

Case III

Nicolás Figueroa, Ronald Fischer and Sebastián Infante

Loyalty Inducing Programs and Competition with Homogeneous Goods
No Bertrand Trap
Equilibrium
Other Equilibria
Price Discrimination
There exists an equilibrium where firms make positive profits. All of them are obtained in the second stage.

**Theorem 2**

The following constitute an equilibrium path of the game:

\[ B_i, B_j = \frac{1}{2}, \ p_{1i}^* = p_{1j}^* = \frac{1}{2}, \ p_{1i}^* = p_{1j}^* = 1 \]

**Remark 1**

There is a continuum of equilibria, all of them analogous to the previous one but with \( p_{1i}^* = p_{1j}^* = p < \frac{1}{2} \). They all involve lower profits for both firms.
Theorem 3

There exists other (asymmetric, one-sided poaching) equilibria where both firms play $B_i = B_j = B \in (\frac{1}{4}, \frac{1}{2})$. All of these yield lower profits than the previous one.
Suppose that firms are allowed to discriminate in the second period, choosing prices $p_2^I_i$, $p_2^O_i$. Then firms obtain zero-profits.

**Theorem 4**

_The following expressions describe the equilibrium paths when firms can price discriminate in the second period,_

\[
B_i, B_j \in [0, 1], p_{1i} = p_{1j} = 0
\]

\[
p_{2i}^I = B_i, \quad p_{2j}^I = B_j, \quad p_{2i}^O = p_{2j}^O = 0
\]

Price discrimination helps consumers in this case.
Conclusions
Conclusions

- Even with homogeneous goods and forward-looking consumers, bonuses allow firms to exercise market power, through endogenously selected switching costs.
- There is no equilibria with zero bonuses.
- Equilibria with zero-profits are dominated by equilibria with identical continuations and bigger profits.
- If bonuses are allowed, price discrimination should also be allowed.