

Marketing as an entrance barrier into the fashion market

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Abstract: In this paper I intend to model a firm decision of entrance into a profitable fashion market where fashion results from the existence of positive interdependence between buyers utility functions. I conclude theoretically that i) when incumbent firm has an aggressive strategy it sets a marketing limit strategy that do not permit the other firm to enter the fashion market and that ii) when incumbent firm accommodates the other firm *a la Cournot* there is no pure strategy *Nash* equilibrium. The properties of the model seem to be in accordance with the persistence in time of fashion brands.

Keywords: Fashion, Marketing, Utility interdependence, Entrance barrier

JEL codes: L13, M31

1. Introduction

One well-known empirical fact is that in developed societies there is fashion. Being that goods have several colors and designs (varieties), consumers assign a higher value to the variety in fashion. This difference in value is independent of the functionality or quality of the

item. Other well-known empirical fact is that it is difficult to a new firm to enter into the fashion market. That is, fashion leader position remains in time.

Although consumers in their acquisition of fashion goods pursue two opposite goals, either, consumers intend to be unique (e.g., Simmel, 1904), or they intend to be like the others (the Veblen effect, e.g. Leibenstein, 1950), this convey a social phenomenon that results exclusively from the existence of interdependency in individual consumers' utility function (Granovetter and Soong, 1986).

In my theory I intend to model the entrance decision of a new firm in a profitable fashion market, being fashion a mass phenomenon, where there is an incumbent fashion leader.

Even though the utility function of buyers is simple (buyers prefer fashion good at price P than non-fashion good at price zero), the used random advertising technology turns the model algebraically intractable. Being so, I manipulate the model partially using simulation/computational techniques.

In the theory there are, in a first stage, two firms in the market being one monopolist in the profitable fashion market. In a second stage, the other firm menaces to enter the fashion market.

2. Assumption of the theory

Assumptions concerning sellers

A1. There is in the market two goods, a fashion good and a non-fashion good.

A2. Both goods' marginal cost is constant and equals to zero and there is no fixed-costs.

A3. Fashion and non-fashion goods' market price are 1 and 0, respectively.

A4. Fashion good is vertically differentiated. I.e., each firm that is in the fashion market manufactures a different design type (it is impossible to imitate the design);

A5. The strategy of sellers is nested: first each seller decides if enter the fashion market and, second, decides the level G of advertising of its design type;

A6. Sellers maximize the expected profit.

Assumptions concerning buyers

Although the variety in fashion is the one that the largest part of buyers acquires, that is *a priori* unobservable. Being so, I assume that buyers use as proxy the perceived advertising intensity, the brand awareness (see, Macdonald and Sharp, 2003).

A5. A buyer acquires one unity of the fashion good if he/she receives at least one ad advertising it. Otherwise the buyer acquires one unity of the non-fashion good.

A6. The buyer acquires the fashion good from the seller that sends him/her more ads;

A7. When the buyer receives the same number of ads from several sellers he/she will acquire the fashion good to one of them randomly selected (with identical probability).

A8. There are N buyers in the market, $N \geq 100$.

Assumptions concerning advertising technology

The adopted advertising technology is the same used in Butters (1977).

A9. When a seller advertising intensity is G that means the seller distribute G ads to the buyers.

A10 Ads are distributed in a random way (with identical probability);

A11. Each ad cost is B (as price is assumed 1, this is a relative measure).

3. Main properties of the theory

When a firm sends G ads to a total of N buyers, the number of ads x that a particular buyer receives has binomial distribution with “ p ” = $1 / N$ and “ n ” = G (in the expression Pr means probability):

$$Pr(x | G) = \begin{cases} \frac{G!}{x!(G-x)!} \left(\frac{1}{N}\right)^x \left(1 - \frac{1}{N}\right)^{G-x} & \text{if } x \leq G \\ 0 & \text{if } x > G \end{cases} \quad (1)$$

3.1. Strategy of the monopolistic firm in the fashion market

The monopoly firms will set a level of advertising that maximizes its expected profit. Being so, it results the strategy of the monopolistic firm:

Property 1. *When $B > P$, the firm do not advertise. When $B = P$, the firm is indifferent between not advertising and send just one ad. When $B < P$ there is at least one positive solution for the seller's strategy. At most it exists two consecutive solutions between which the firm is indifferent (to which it corresponds the same expected profit).*

Proof. When a buyer sends one new ad, it only results in one new sell if it is received by a buyer that did not previously received any ad. Being that the firm send G ads and there are N buyers, on average the percentage of buyers that did not received any ad is $(1 - 1/N)^G$. The expected marginal profit of the $(G + 1)^{\text{th}}$ ad will be $(1 - 1/N)^G \cdot P - B$, that is a decreasing function on G (so the profit function is quasi concave on G).

When $P < B$ the margin for all $G > 0$ is negative, so the optimum is to set $G = 0$;

When $P = B$ the margin for $G = 0$ is zero and negative for all G positive, so the firm is indifferent between $G = 0$ and $G = 1$ (profit is zero).

When $P > B$, at least the margin for $G = 0$ is positive so, at least, it is optimum to send on ad.

In quantitative terms, the firm will increase the number ads until the expected marginal cost becomes negative or zero:

$$\{G^* : (1 - 1/N)^G \cdot P - B > 0 \text{ and } (1 - 1/N)^{G+1} \cdot P - B \leq 0\} \quad (2)$$

Simplifying this expression, the solution G' of the continuous counterpart of this discrete optimization problem is in the interval $\{G^* < G' \leq G^* + 1\}$:

$$\left(1 - \frac{1}{N}\right)^{G'} P - B = 0 \Leftrightarrow G' = \frac{\text{Ln}(B/P)}{\text{Ln}(1 - 1/N)} \approx -N \cdot \text{Ln}(B/P) \quad (3)$$

Although less important, being G a discrete variable and the profit function quasi concave on G , for some particular value of B the maximum expected profit occurs for two consecutive values of G . QED

Property 2. $G(i)$ is not increasing with B (it remains constant or decreases)

Proof. The solution of the continuous counterpart optimization problem is strictly decreasing in B :

$$G = \frac{\text{Ln}(B/P)}{\text{Ln}(1-1/N)} \Leftrightarrow \frac{dG}{dB} = \frac{1}{\text{Ln}(1-1/N)B} \approx -\frac{N}{B} < 0 \quad (4)$$

Being so, when occurs an increases in B the value G^* that makes G' to be in the interval $\{G^* < G' \leq G^* + 1\}$ decreases or remains constant. QED

3.2. The second firm decision about entrance

When there are two firms in the fashion market, one sending G_1 ads and the other G_2 ads to a total of N buyers, firm 1 sells to a certain buyer if he receives more ads from this firm than from the other. That occurs with the probability:

$$q_1(G_1 | G_2) = \sum_{x=1}^{G_1} [P(x | G_1)P(x_2 < x | G_2)] \quad (5)$$

Sums up to that probability half the probability that the buyers receives the same number of ads from both firms:

$$q_1(G_1 | G_2) = \sum_{x=1}^{G_1} [P(x | G_1)P(x_2 < x | G_2) + 0.5P(x | G_1)P(x | G_2)] \quad (6)$$

This probability is algebraically intractable.

Multiplying this probability by the total number of buyers in the market it results the firm's expected demand $E[Q(G_1) | G_2] = q_1(G_1 | G_2) \cdot N$. Firm's expected profit quantifies by:

$$E[\mathbf{p}(G_1) | G_2] = E[Q(G_1) | G_2] \cdot P - G_1 \cdot B \quad (7)$$

3.3. Incumbent firm is *Stakelberg* leader and the other firm is follower

Being incumbent firm a *Stakelberg* leader, it signifies that this firm reacts aggressively when the second firm menaces to entry the profitable fashion market. The leader reaction is performed by the inclusion in his/her optimization problem of the Best Reply Function of the entrant firm (see, e.g., Pepall *et all*, 2002).

Claim 1. *There exists a limit strategy G^* that when the Stakelberg leader sets a strategy $G(i) < G^*$ the follower sets the strategy $G(j) > 0$ and when $G(i) \geq G^*$, the follower firm sets the strategy $G(j) = 0$.*

Proof. Caused by the algebraic intractability of the model, I am unable to present an algebraic proof for this claim. Nonetheless, using simulation techniques, for $N = 100$ it results that the Best Reply Function of the follower after the leader sets its strategy verify Claim 1 (see Fig.1).

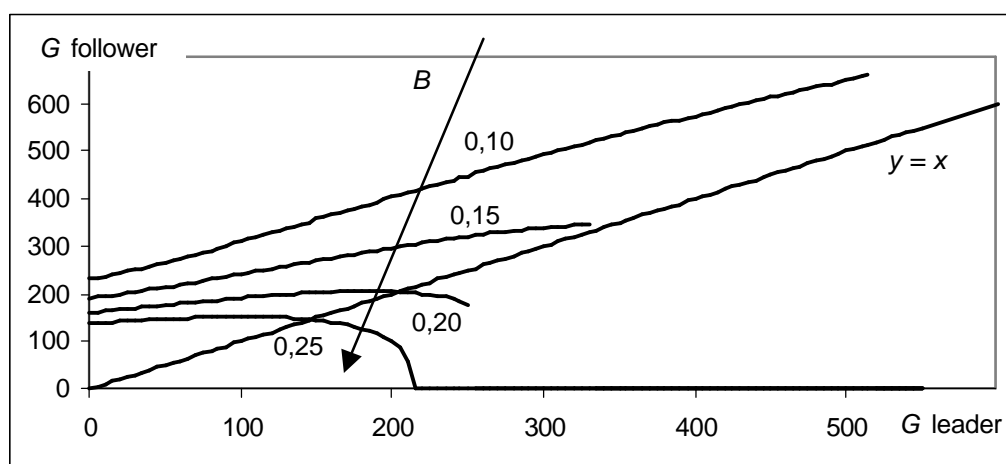


Fig. 1 – Best reply function of the *stakelberg* follower

Claim 2. *The limit strategy G^* maximizes the Stakelberg leader expected profit.*

Proof. I was unable too to present an algebraic proof for this claim. Nonetheless, using identical simulation of the one used in fig. 1, it results that the expected profit function of the *Stakelberg* leader has an absolute maximum at G^* (see Fig. 2).

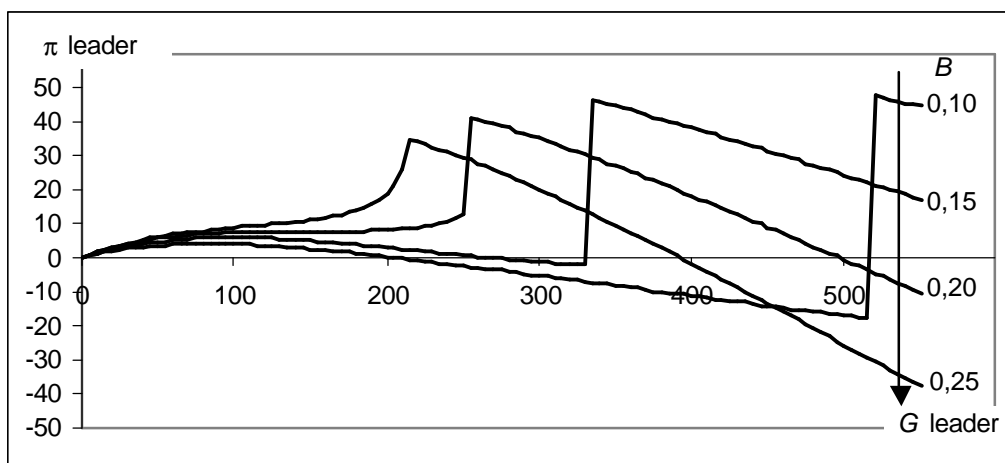


Fig. 2 – *Stakelberg* leader expected profit function

Property 3. The *Stakelberg* leader adopts the limit strategy G^* , sending the exact quantity of ads that turns unprofitable for the follower firm to enter the fashion market.

Proof. This property results straightforward from Claim 1 and Claim 2. QED

3.4. Incumbent firm accommodates *a la Cournot* the entrant firm

Now the incumbent firm accommodates the entrant firm by assuming that the entrant strategy will not be revised.

Property 4. When firms compete *a la Cournot* and the advertising marginal cost is smaller than B^* there is no pure strategy *Nash* equilibrium, $B^* \gg 0.15 P$.

Proof. When firms compete *a la Cournot*, there is only a pure *Nash* equilibrium when the firms Best Reply Function intersect each other. Being firms identical, that means that the Best Reply Function cuts the 45° axes. Although I was unable to present an algebraic proof for this, from simulation it is seen that for small values of B , being the limit value approximately 0.15, this is not observed in my theory (Fig. 1). QED

The limit value $B^* \gg 0.15 P$ for the marginal cost of advertising seems, in economic terms, very high (15% of price). Being so, it must be empirically more relevant the mixed strategy *Nash* equilibrium than the pure strategy *Nash* equilibrium. This means that the entrance of a new firm in the fashion market is a risky decision.

4. Conclusion

Assuming that there is positive interdependence between buyers' utility functions that justify the existence of a profitable fashion market, I build a theory that models the entrance decision of a firm in that market where there is an incumbent monopolist.

Although the model starts with a simple utility function, it is algebraically intractable. Being so, I manipulate the model using simulation/computational techniques for a duopoly market structure.

I conclude from the model that i) when incumbent firm has an aggressive strategy (firm is a *Stakelberg* leader) he/she sets a limit strategy that does not permit the other firm to enter the profitable fashion market and that ii) when incumbent firm accommodates the other firm *a la Cournot* there is no pure strategy *Nash* equilibrium.

Being so, the entrance in the fashion market or is "impossible" or is risky (entrant firm's pay-offs tend to be negative).

The properties we derive seem to be in accordance with empirical fashion stylized facts, namely the persistence in time of fashion brands.

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