Economics Letters 72 (2001) 47–52

economics letters

www.elsevier.com/locate/econbase

Why firms should care for customers

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Received 16 June 2000; accepted 21 December 2000

Abstract

Adopting the indirect evolutionary approach, we show that it might be beneficial for firms on a heterogeneous market not only to care for their profits but also for their respective customers' welfare.

Keywords: Customer orientation; Heterogenous market; Duopoly; Evolutionary stability

JEL classification: D43

1. Introduction

''Customer orientation'' is a keyword in modern business. The basic idea behind it is that firms should focus on the needs and wishes of past, current and future buyers. It can mean e.g. offering friendly and immediate service, devoting attention to complaints and making information about products easily accessible. Homburg and Rudolph (in press) show that such activities are important for customer satisfaction. They argue that ''highly satisfied customers can lead to a stronger competitive position'' and list a number of empirical studies on the subject.

But how can customer orientation be represented in a formal economic model? Is it simply a label for an additional variable in the firm's action space which is chosen in order to maximize short-run profit? Or should one rather think of it as a corporate goal that enters the firm's objective function in addition to profit? In the latter case customer orientation may be viewed as part of a corporate philosophy or corporate culture which diffuses through all layers of the firm's hierarchy. It influences employees' choices and thus determines behavior of the firm as a whole. This is related to Kreps (1990) who views corporate culture as a basic principle that underlies the decisions of authorities within a corporation in case of unforeseen contingencies.[1]

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[1] See pp. 93–94.

0165-1765/01/$ – see front matter
PII: S0165-1765(01)00400-1

We take the latter perspective and present a formal model in which customer orientation is modelled explicitly within a firm's objective function. Specifically, we assume that a firm may care for consumer surplus in addition to its own profit. In this case customer orientation does not necessarily induce short-run profit maximizing behavior. We view this an advantage rather than a disadvantage of the model. To us it has some intuitive appeal that customer oriented behavior does not always account for the short-run returns and cost it generates. However this raises the question of long-run survival of the firm. Namely, if firm A exhibits a customer orientation policy and has to compete with firm B, which just cares for profit, one might wonder whether firm A looses competitiveness and will ultimately be driven out of the market.

We investigate this question within an evolutionary framework adopting the indirect evolutionary approach as initiated by Güth and Yaari (1992).[2] We model an indirect evolutionary game where each period two firms interact in a heterogeneous duopoly market. Both firms choose output quantities in order to maximize the firm's objective function (preference function), which may depend solely on profit alone or on profit as well as customer surplus. In the latter case the chosen quantity reflects customer orientation. Thus the firm is modelled as a single actor rather than an organization with multiple decision units. Furthermore, customer orientation is not modelled as a separate choice, but as a modifier of the quantity choice. Both specifications are chosen for simplicity.

We introduce a preference parameter t_i which is the weight that duopolist $i = 1,2$ attaches to (own) firm profit. The residual weight $(1 - t_i)$ represents how strongly firm i cares for customer surplus. The parameter t_i will be referred to as i's type. We study the evolution of t_i assuming that evolutionary success depends only on profit. It turns out that in general only types $t_i < 1$ are evolutionarily stable; firm's who only care for profit and exhibit no customer orientation at all get driven out of the market by evolution.

2. The model

We consider two firms $i = 1, 2$ on a heterogeneous market. The strategy sets are $S_i = \{q_i \mid q_i \geq 0\}$, $i = 1,2$, and the inverse demand functions[3] are given by

$$p_i(q_i,q_j) = \max\{1 - q_i - \gamma q_j,0\},\ i \neq j \tag{1}$$

where the parameter γ is assumed to satisfy the restriction $0 \leq \gamma \leq 1$. So, the goods are substitutes. For simplicity we assume that cost is zero, so that firm i's profit π_i is given by

$$\pi_i(q_i,q_j) = p_i(q_i,q_j) \cdot q_i \tag{2}$$

for $i,j \in \{1,2\}$, $i \neq j$. While π_i describes monetary earnings, firm i's preferences (goals) are given by the following utility function:

[2] The indirect evolutionary approach was applied to investigate e.g. the evolution of monopolistic competition (Güth and Huck, 1997), the evolution of altruism within a duopoly framework (Bester and Güth, 1998) and within ultimatum games (Huck and Oechssler, 1999; and Königstein, 2000).

[3] For this specification see Martin (1993).

$$u_i(q_i,q_j,t_i) = t_i \pi_i(q_i,q_j) + (1-t_i)C_i(q_i,q_j) \tag{3}$$

where

$$C_i(q_i,q_j) = \int_0^{q_i} p_i(y,q_j)\,\mathrm{d}y - p_i(q_i,q_j)q_i$$

is net consumer surplus on firm i's market and with $t_i \in [1/2,1]$. We refer to C_i as 'customer surplus' to stress that in our model firms exhibit customer orientation rather than a more general welfare orientation (e.g. a care for $C \equiv C_i + C_j$).

Thus, firm i's utility is a weighted average of both goals. The weight t_i is a preference parameter (i's type). For $t_i = 1$ firm i cares only about its own profit. So, as a boundary case the model allows for preferences that are usually assumed in economics. The type t_i is assumed to be observable. It is the object of evolution; i.e., type t_i is assumed to be transmitted in the evolutionary process. Moreover its evolutionary success is determined by $\pi_i(.)$. This is, in our view, a natural assumption in economics and management science. It says that the long-run survival of a firm type t_i does not depend on the degree of happiness (utility) it generates, but on monetary success (profit). Despite this specification of the model we will show below that customer orientation may (and, in fact, does) lead to superior economic performance than simply maximizing profit.

3. Analysis

By specifying the choice sets S_i of both players, the utility functions $u_i(.)$, the space of possible preference types $T_i = [1/2,1]$ and the evolutionary success function $\pi_i(.)$ we have defined an indirect evolutionary game (see Güth and Yaari, 1992 as well as Königstein and Müller, 2000). Solving this game proceeds in two steps. First, we derive the solution of the duopoly market for all possible combinations of preference types for the two firms. Thus, taking the preference types as given we solve for Nash equilibrium strategies $q_i^*(t_i,t_j)$. Second, we determine the evolutionary success of preference type t_i given that players choose equilibrium strategies, and we derive an evolutionarily stable type t^* according to the notion of an evolutionarily stable strategy (ESS).

To derive the Nash equilibrium we maximize u_i with respect to q_i leading to the following system of first order conditions

$$\frac{\partial}{\partial q_i} u_i(q_i,q_j,t_i) = -3t_i q_i + t_i - t_i q_j \gamma + q_i = 0 \text{ for } i = 1,2.$$

It can be solved for equilibrium strategies $q_i^*(t_i,t_j)$:[4]

$$q_i^*(t_i,t_j) = \frac{t_i(1 + t_j(\gamma - 3))}{3(t_i + t_j - 3t_it_j) - 1 + \gamma^2 t_i t_j} \text{ for } i,j = 1,2. \tag{4}$$

[4]Since $(\partial^2/\partial q_i^2)\, u_i(q_i,q_j,t_i) = 1 - 3t_i$, the second order condition for a maximum is satisfied if $t_i > 1/3$ which holds by definition of T_i.

Note that $q_i^*(t_i,t_j) \geq 0$ for $t_i,t_j \in [1/2,1]$ and $\gamma \in [0,1]$.

While these strategies maximize utility, they determine at the same time the evolutionary success of each type. Specifically, substituting $q_i^*(t_i,t_j)$ and $q_j^*(t_j,t_i)$ into $\pi_i(.)$ yields the evolutionary success $\pi_i^*(t_i,t_j)$ of type t_i given that the opponent exhibits type t_j:

$$\pi_i^*(t_i,t_j) = \pi_i(q_i^*(t_i,t_j),q_j^*(t_j,t_i)) = \frac{t_i(2t_i - 1)(1 - 3t_j + t_j\gamma)^2}{\left(3t_i - 9t_it_j + 3t_j - 1 + \gamma^2 t_it_j\right)^2}. \tag{5}$$

Note that the game is symmetric (in the sense of $\pi_1^*(t_1,t_2) = \pi_2^*(t_2,t_1)$) and that the function $\pi_i^*(t_i,t_j)$ determines evolutionary success for all combinations of preference types. Furthermore, the type spaces are equal $T_1 = T_2$. So we simplify the notation referring to T as the type space and to $\pi^*(t,l)$ as type t's evolutionary success when paired with type l. A preference type t^* is an ESS if and only if (see e.g. Maynard Smith (1982)):

$$\pi^*(t^*,t^*) \geq \pi^*(t,t^*) \text{ for all } t \in T \tag{6}$$

and

$$\pi^*(t^*,t) > \pi^*(t,t) \text{ for all } t \in T \text{ with } \pi^*(t^*,t^*) = \pi^*(t,t^*). \tag{7}$$

Thus, an evolutionarily stable preference type t^* is a best reply against itself (6), and if t is a best reply against t^* as well, then a t^*-mutant invading a society of t-players is more successful than t (7).

In order to satisfy stability requirement (6), we have to find a t^* that is a best reply against itself. Due to the differentiability of π^*, best replies against t^* either solve $\partial\pi^*(t,t^*)/\partial t = 0$ or are boundary solutions, i.e. $t \in \{1/2,1\}$. The first order condition

$$\frac{\partial}{\partial t}\pi^*(t,l) = 0$$

can be solved for $t = 3l - 1/\gamma^2 l + 3l - 1$. Setting $t = l = t^*$ and solving the resulting quadratic equation with respect to t^* results in two candidates for an ESS: $t^* = \left(2 + \sqrt{(1-\gamma^2)}\right)/(\gamma^2 + 3)$ and $t^{**} = \left(2 - \sqrt{(1-\gamma^2)}\right)/(\gamma^2 + 3)$. Since $t^{**} < 1/2$ for all $\gamma \in [0,1)$ it is not feasible.[5] So, only the first candidate t^* remains. Note that the only solution of the equation $\partial\pi^*(t,t^*)/\partial t = 0$ is $t = t^*$. Furthermore it holds that $\pi^*(t^*,t^*) > \pi^*(1/2,t^*)$ except for $\gamma = 1$ and that $\pi^*(t^*,t^*) > \pi^*(1,t^*)$ except for $\gamma = 0$. But in case of $\gamma = 1$ we have $t^* = 1/2$ and in case of $\gamma = 0$ we have $t^* = 1$. Hence t^* is the unique best reply against itself which implies that stability requirement (7) is also fulfilled. Thus, we have the following result.

Proposition 1. In the indirect evolutionary market game as defined above $t^* = \left(2 + \sqrt{(1-\gamma^2)}\right)/(\gamma^2 + 3)$ is the unique evolutionarily stable strategy.

[5] Note that for varying values of γ the preference parameter t^{**} induces either negative quantities or negative prices.

4. Discussion

Proposition 1 implies that for all $\gamma \in (0,1]$ only those types of firm's survive evolution which care for customer welfare. Pure profit maximization, as it is assumed throughout most of economic theorizing, will die out in such markets. Only for the boundary case $\gamma = 0$ the ESS is $t^* = 1$. The survival of pure profit maximization in this case is not surprising, since here firms operate on two completely independent markets and can, therefore, exercise monopoly power in their respective markets. Furthermore, note that $t^* = 1/2$ for $\gamma = 1$, i.e., firms care most for their costumers when their goods are perfect substitutes.

To see why $t = 1$ (i.e. no customer orientation) can not be an ESS for $\gamma > 0$, consider a fraction of firms being of type $t = 1 - \varepsilon$ (ε positive but sufficiently small) invading a population of firms of type $t = 1$. According to (5) it holds that

$$\pi^*(1-\varepsilon,1) - \pi^*(1,1) = \frac{\varepsilon(4\gamma^2 - \gamma^4 - \varepsilon(4 + 4\gamma^2 - \gamma^4))}{(\gamma+2)^2(4 - 6\varepsilon - \gamma^2 + \gamma^2\varepsilon)^2} > 0 \text{ for } \varepsilon \in \left(0, \frac{\gamma^2(4-\gamma^2)}{4 + 4\gamma^2 - \gamma^4}\right).$$[6]

Hence, a firm of type $t = 1 - \varepsilon$ earns higher profit and is, therefore, evolutionarily more successful than a firm of type $t = 1$.

According to Eq. (4) it holds that $q_i^*(t^*,t^*) > q_i^*(1,1)$ for $\gamma \in (0,1]$, i.e., in a market in which firms care for customer welfare, individual quantities are higher than in a market in which firms act egoistically. Fig. 1 illustrates the impact of evolution on customer surplus C_i in market i. Depending on the market parameter γ it shows the difference in customer surplus in case firms exhibit the ESS-type t^* (upper curve) rather than if firms simply maximize short-run profits ($t = 1$, lower curve). For instance, for $\gamma \approx 0.88$ customer surplus is 50% higher on the former market. Thus, there are substantial gains in customer welfare due to the ESS compared to $t = 1$.

These gains in customer surplus come at no loss in total welfare (sum of customer surplus and

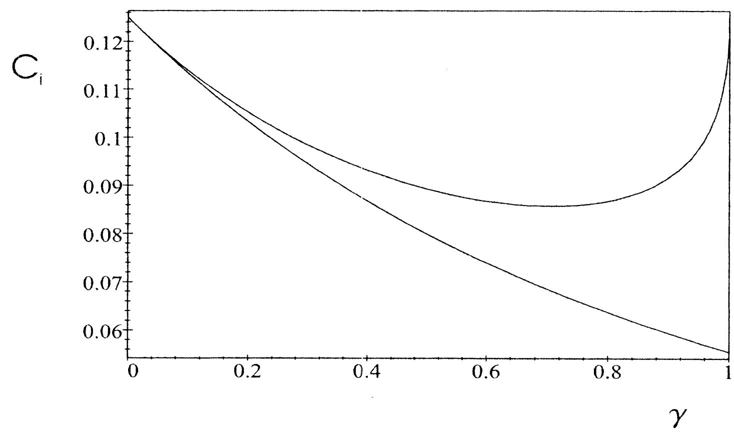

Fig. 1. Costumer surplus in market i.

[6] Note that $\gamma^2(4-\gamma^2)/4 + 4\gamma^2 - \gamma^4 < 1/2$ for $\gamma \in [0,1]$.

profits on both markets) as long as $\gamma \in (0, 0.791]$. Namely, in this case one can easily check that total welfare in a market with type t^*–firms is higher than in a market with firms of type $t = 1$. Only for $\gamma > 0.791$ total welfare in the former market is lower than total welfare in the latter market.

The results above were derived for a duopoly model, and one might investigate the influence of customer orientation in a more general setup. However, for the duopoly case they show that if one of the firm's strategic policy includes customer orientation the other firm is forced to do the same in order to stay competitive in the long run.

Acknowledgements

We thank Dirk Engelmann and Lea Michaelis for helpful comments.

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