SUNK PRICES AND SALESFORCE COMPETITION*

Alejandro Corvalán and Pablo Serra**

Abstract

This work analyses those industries in which the role of salespersons is to poach clients from rival firms. This is done with a three-stage model where firms decide successively if they enter the market or not, what price to set, and how many salespersons they hire. It is assumed that each consumer is obliged to contract a service unit, but can do so with any firm. The firms can freely choose the price, but must charge same rates to all clients. Under these assumptions it is shown that the possibility of poaching rivals' clients reduces the intensity of price competition.

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** Banco Central de Chile and Universidad de Chile, respectively.

I. Introduction

The presence of salespeople that poach "attractive" clients from rival firms is a common practice in those service industries in which companies establish long-term relationships with their clients. Such activities include pension fund administration (PFA), banking and health insurance. The objective of this paper is to analyze the effect that the presence of this type of sales force has upon the intensity of competition. In particular, we focus on the case where prices are more rigid than the number of salespersons hired by the firms.

Empirically, our work is based on: (i) robust evidence that prices remain fixed for long periods of time, (ii) the greater price rigidity found in long-term service industries, and (iii) the existence of markets in which the number of salespeople fluctuates more than the price of services. Regarding the first point, Blinder [1991] interviewed executives from a representative sampling of US firms and found that 75% of prices remained unchanged for at least 6 months, while the median time lapse between successive price changes was one year. Subsequent econometric studies have coincided in placing this median within a range between six months and one year.[1]

There is also evidence that price rigidities are greater in service markets where there is a long term relationship between supplier and client. Aucremanne and Dhyne [2004] find that in Belgium the average time for prices being unchanged in the service sector was 20.3 months,

[1] The average time for prices to go unchanged was 4.3 months between 1995 and 1997 in the United States, (Bils *et al*, 2004); 6.2 for France between 1994 and 2003; 8.5 months, Portugal, 1997 to 2001; 13.2 months Belgium, 1989-2001 (Aucremanne *et al* 2004). Even during periods of high inflation price remain unchanged for a length of time. Lach and Tsiddon (1992) show the average time between successive price changes fluctuates between 2 and 3 months when the annual average rate of inflation is greater than 60 per cent.

greater that the 13.3 months average for all sectors studied. Between 1997 and 2003, Finland's education sector showed prices unchanged for up to 30 months compared to the average of all other sectors which hardly reached 10 months [Vilmunen and Laakkonen, 2004]. Bils and Klenow [2002] showed that medical services tend to have the lowest frequencies of price variations among US's services.

Blinder [1991] provides some reasons for greater price rigidity within long-term service markets. The first is the presence of implicit contracts that force companies to maintain a price for a prudent time to build client trust. Second, price changes in these markets have costs above and beyond the usual ones, including: (i) the need for companies to inform all of their clients of the change in prices through publication or direct notification, ii) the delegation costs incurred by modifying prices in industries with many clients spread over different geographic zones, in which companies usually operate through centrally administered branch offices, and iii) the possibility of competing through other variables, making frequent price changes less crucial.

The main body of evidence for markets in which prices are more rigid than the size of the sales force comes from PFA markets in Latin America. Argentina, Chile, El Salvador, Mexico and Uruguay registered an average annual variation in prices of 5.9% between 2000 and 2003, while annual variation in expenditures for sales force remuneration was 30.2% over the same period. In Chile, the monthly variation coefficient for the number of salespeople was 10 times higher than for prices between 1990 and 2001.[2] Another feature of FPA industries across countries is the engagement of a large number of salespeople specifically to capture their

[2] This result holds even when focusing in those periods where the number of salespeople fluctuated less. Between 1995 and 1997 using monthly data the variation coefficient for the number of salespeople was 4.54%, while for the average price was 0.5%. The figures are 8.14% and 1.6%, respectively, between 1999 and 2001.

competitors' clients. In the Chilean FPA business, sales salaries accounted for one-third of all costs in 1997.[3] This situation is robust in all Latin American pension systems. In 2000, sales commissions amounted to more than a quarter of total operational costs in Argentina, Chile, El Salvador, Mexico, and Uruguay.[4]

According to some experts, over-sizing of the sales force arises from firms' need to maintain the same fee structure for clients with highly different costs, as they hire sales persons to poach attractive clients from their competitors. For instance, affiliates in Chile pay their FPA a commission equal to a percentage of their income, although the cost of providing the service is not income-proportional. The Chilean FPA Superintendency (SAF, 2004) found that young people with high incomes change FPAs most frequently, which is consistent with the idea that companies focus on capturing their rivals' attractive clients. In this case a legal provision obligates FPAs to charge all clients the same fee. Other industries may find it profitable not to differentiate clients.

This paper presents a model that reflects the principal stylized facts for these industries. We assume the each consumer must contract one unit of a homogenous service, but is free to choose the provider. Further it assumed there are two types of clients, attractive and unattractive. The cost of servicing the latter is greater than for the former. Firms can set prices as they wish but must charge the same rate to all clients. Finally, it is assumed that price is a more rigid variable than the number of salespeople. Put another way, in the short term it is assumed that prices are "sunk" [Sutton, 1991].

[3] In 2000 this proportion had declined to 15 per cent as a result of different measures adopted by the pension authorities to reduce transfers.
[4] AIOS Bulletin, 2000.

Market equilibrium is modeled as a three-stage game where the firms decide first if they will enter the market or not; then set a price, which determines how the market is shared; and last choose how many salespersons to hire. In this framework we show that the possibility of poaching clients from rival firms reduces the intensity of price competition. The intuition is as follows: if the price falls too low firms may find attractive not to match the other firms' price and in so doing avoid recruiting unattractive clients, and then poach attractive clients from rival firms in the subsequent stage. Within this context, it is found that firms by shifting competition from prices to sales efforts raise their profits.

Also it is shown that an increase in salespersons' wage reduces the number of salespersons while at the same time it increases price competition. Finally it is shown that when the cost differences for serving both types of clients grow, salesperson competition becomes more attractive. This in turn reduces the intensity of price competition. Thus client heterogeneity tends to reduce price competition and increase the number of salespersons when firms are obliged to charge the same fee to all. This result is consistent with empirical evidence: firms hire a large number of salespersons in those industries where direct discrimination is unfeasible.

Salespersons in this model play the same role as advertising in other models. Traditionally views about advertising have been two, the informative and the persuasive [Bagwell, 2003]. Many studies in this area focus, for simplicity, only in one of these effects. For instance, Dixit and Norman [1978] target advertising's persuasive character while Grossman and Shapiro [1984] assumes that advertising supplies useful information but leaves consumers' preferences unaltered. In this paper the salesforce is restricted to persuading attractive clients from rival firms, a role which appears satisfactory in several real markets.[5] Although IO modeling usually assumes that price is the decision variable that firms can most easily reverse, some authors consider that publicity expenditures are at least as reversible as prices.[6] However, this paper goes further by assuming that prices are more rigid than the number of salespersons.

The article contains a description of the model (section II), the resolution of short-term equilibrium (section III), the effects of changes in the parameters on the intensity of competition (section IV), a description of long-term equilibrium (section V) and final conclusions.

II. The Model

The model assumes an industry that provides a homogeneous service and where each consumer is obliged to contract a unit with any one of the firms.[7] The number of clients is large and is normalized to 1. A fraction $(1-\mu)$ of clients is attractive to firms and the remainder is not. The assumption of economies of scale is quite natural in this context. Hence the cost structure consists of a fixed sunk entry cost and a unitary cost that defers to the type of client. Providing the service to an attractive consumer has no cost (this without the loss of generality), while servicing an unattractive client has a cost of $c>0$. Clients have perfect information about prices.

[5] In the case of APFs in Chile, transfers between firms are not correlated with price changes or improvements in profitability.

[6] For instance, see Dorfman (1954) and Grossman and Shapiro (1984), and for the pension fund industry see Bernstein and Micco (2002).

[7] This assumption is reasonable for markets such as those analyzed and is introduced for simplicity.

Firms have price freedom, but they must charge the same rate to all users. The firms then hire salespersons to poach attractive clients from competitors and pay them a fixed wage *w*.[8] The model assumes that clients contacted by salespersons change providers without bargaining on condition that they do not pay a higher price.[9] This assumption simplifies the solution of the model but is not crucial to the results. Indeed, the decreasing productivity of the salesforce, together with the assumption that will be made that each firm takes the number of salespersons hired by rival firms as given, would avoid attractive clients demanding all the benefits that they report to the firm that poaches them. It is also assumed that the price is not sufficiently high to justify poaching unattractive clients, a condition that will be verified at equilibrium.

The marginal productivity of the salespeople is assumed to decrease with their number, as they saturate the market. By analogy, an increase in the number of attractive clients has a contrary effect. Using Tirole's [1989] specification where salespersons are sent at random to visit the attractive clients of rival firms, the probability that a salesperson visits a previously contacted client increases by their number. Then the number of transfers is equal to the probability that an attractive client is contacted multiplied by the number of attractive clients. Thus if ν denotes the number of salespersons and σ the number of attractive clients that can be poached, the total number of transfers is given by,

(1) $$T(\sigma, v) = \sigma(1 - \exp(-v/\sigma))$$

[8] It is assumed that the salespersons have no incentive problems and that their effort is given.
[9] A gift could compensate any price difference

Industry behavior is represented by a three-stage game where decisions about entry, price and salesforce are taken sequentially. In the next section the symmetric non-cooperative Nash equilibria are derived.

III. Model Solution

We solve the model by reverse induction. Then the first step regards the firms' decision on the number of salespersons they hire given the equilibrium price set in the previous stage. Each firm chooses the number of salespersons in order to optimize the net income generated by poaching attractive clients from rivals, that is,

$$\underset{v}{Max}\left\{p^{+}T(\sigma, v+v^{+})-vw\right\}$$

where v^{+} denotes the number of salespersons contracted by the other firms and p^{+} is the equilibrium price set in the previous stage. Notice that p^{+} is the lowest price offered in the previous stage by any firm. Then if the firm asked a price $p > p^{+}$ in the previous stage, it will have to give a compensation $\Delta p = p - p^{+}$ to clients of rival firms in order to poach them. Hence the firm gains p^{+} per each client it captures, and the first order condition is

(2) $$w = p^{+}T'(\sigma, v+v^{+}).$$

Thus the firm contracts salespersons up to the point where the marginal income of poaching attractive clients from rival firms equals wages. Using the definition (1) for *T(σ,v)* the number of salespersons hired by the firm is

$$(3) \qquad v(\sigma, p^{+}, v^{+}) = \sigma \ln(p^{+} / w) - v^{+} .$$

The number of transfers made by the firm is obtained by substituting (3) in (1)

$$(4) \qquad T(\sigma, p^{+}, v^{+}) = \sigma(1 - (w / p^{+})) \frac{v(\sigma, p^{+}, v^{+})}{v(\sigma, p^{+}, v^{+}) + v^{+}} .$$

Thus, the number of number of salespersons hired and the number of transfers made by the firm depend both on the price and the number of salespersons of the other firms, as well as on the number of attractive clients. From (3) it can be deduced that this sub-game has infinite Nash equilibria. In what follows we focus merely in the symmetric one.

The second step is to analyze the price decision, i.e., the price p set by a firm in response to the price p^{+} set by rival firms. Given that the equilibrium is symmetrical it can be assumed that there is a common price for all other firms. Clients have perfect information about prices, so they choose the firm with the lowest price. When firms set the same price, clients distribute proportionally between them. To determine the optimum strategy, a firm should compare its profits in the following three cases.

***p=p*⁺.** Firms share the market in equal proportions, each one with $1/n$ clients. At the following stage all compete through salespersons and given the symmetry all capture the same number of clients, so the final proportion of each firm's clients continuing to be *1/n*.

To determine the number of salespersons employed by each firm, the market is divided into *n* segments, each one corresponding to the *1/n* clients attracted by each firm in the previous stage. In each segment there are *(1-μ)/n* attractive clients and *n-1* rival firms with the intention of poaching. Then the number of salespersons what each firm hires to compete in this specific segment is given by

$$v\left(\frac{1-\mu}{n}, p^+, v^+\right) = \frac{1-\mu}{n}\ln(p^+/w) - v^+ .$$

And given that solution is symmetric; to compete in each segment each firm hires the number of salespersons equal to

$$\frac{1-\mu}{(n-1)n}\ln(p^+/w) .$$

Finally each firm participates in *n-1* segments and so employs $(1-\mu)\ln(p^+/w)/n$ salespersons. Their profit is given by

(5) $$U(p^+, p^+) = \frac{1}{n}[\mu(p^+ - c) + (1-\mu)p^+ - (1-\mu)\ln(p^+/w)w].$$

***$p>p^+$*.** The firm initially charges a price greater than the others and does not grab clients in this stage, so that all its income comes from transfers in the final stage. To poach clients from rival firms, it will have to offer a compensation equal to p-p^+, thus the net price it charges is p^+.[10]

Now the market is divided into *n-1* segments, each one of which is made up of the *1/(n-1)* clients captured by the rival firms in the previous stage. In each segment there are *(1-μ)/(n-1)* attractive clients and *n-1* firms with the intention of poaching them. Then the number of sales persons that each firm hires to compete in this segment is given by,

$$v\left(\frac{1-\mu}{n-1}, p^+, v^+\right) = \frac{1-\mu}{n-1}\ln(p^+/w) - v^+,$$

and given that the symmetry of the solution, each firm hires $(1-\mu)\ln(p^+/w)/(1-n)^2$ salespersons to compete in each segment. Finally the firm participates in *n-1* segments (the others only participate in *n-2* segments) with the total number of salespersons hired given by $(1-\mu)\ln(p^+/w)/(n-1)$. The number of attractive clients poached by this sale force is:

$$\frac{1-\mu}{n-1}\frac{p^{+}-w}{p^+}$$

Then the profit of a firm that initially sets a price $p>p^+$ is given by:

[10] Equivalently it could be assumed that the firm maintains the price *p+* but offers a compensation *p+-p* to consumers.

$$U(p,p^+) = p^+T(\sigma,p^+,\nu^+) - \nu(\sigma,p^+,\nu^+)w\,.$$

And by rearranging terms,

(6) $$U(p,p^+) = \frac{1-\mu}{(n-1)}\left[(p^+ - w) - \ln(p^+/w)w\right]$$

p<p⁺. In this case, the firm charges a lower price than the rest, capturing the whole market. Then there is only one segment with *1-μ* attractive clients that the *n-1* rival firms attempt to poach. Then each one of them hires the number of sales persons equal to:

$$\nu\left(1-\mu,p,\nu^+\right) = (1-\mu)\ln(p/w) - \nu^+$$

If $p>w$, given the symmetry of the solution, the number of sales persons hired by each of the *(n-1)* rival firms is $(1-\mu)\ln(p/w)/(n-1)$. Therefore the number of salespersons contracted by the industry is $(1-\mu)\ln(p/w)$, and these poach $(1-\mu)(p-w)/p$ attractive clients from the firm. Then the profits for this firm are given by,

$$U(p,p^+) = \mu(p-c) + (1-\mu)p - (1-\mu)(p-w) \qquad\qquad p>w.$$

Now if $p<w$, the firm retains all clients and so its profit are

$$U(p,p^+) = \mu(p-c) + (1-\mu)p \qquad\qquad p<w.$$

$U_0(p^+)$, $U_1(p^+)$ and $U_2(p^+)$ are defined as the firm's profits which corresponds to the best response given the price p^+ set by competitors for $p=p^+$, $p>p^+$ and $p<p^+$, respectively. In the

first two cases, profits do not depend on the price p chosen by the firm and are given by equations (5) and (6) respectively. For $p<p^+$ the profits increase with p; then the best response is to choose the minimum price under p^+, which leads to

(7) $$U_2(p^+) = \mu(p^+ - c) + (1-\mu)w\,.$$

These values verify the following condition:

(8) $$U_0(p) = \frac{(n-1)U_1(p) + U_2(p)}{n}, \qquad \forall p > w\cdot$$

The term p^e is defined as that price p where

(9) $$U_0(p) = U_1(p) = U_2(p)$$

In what follows it is shown that if p^e exists then it is Nash equilibrium. The equation (8) shows that U_0 is the weighted average of U1 and $U_{2.}$ If we further assume that

(10) $$\left.\frac{\partial U_1(p)}{\partial p}\right|_{p^e} < \left.\frac{\partial U_2(p)}{\partial p}\right|_{p^e},$$

the function $U(p, p^+)$ for values of p^+ in the vicinity of p^e can be represented by Figure I.

If $p^+ > p^e$ as in Figure1a, then one of the firms can marginally lower its price and grab the whole market and so obtain profits $U_2(p^+) > U_0(p^+)$. If, on the contrary, $p^+ > p^e$ as in Figure1c, one of the firms will marginally lower its price, poach the whole market and gain a profit of $U_1(p^+) > U_0(p^+)$. Last, if $p^+ = p^e$, as in Figure1b, no firm will increase their profits if it deviates unilaterally. Hence p^e is a non-strict Nash equilibrium.

The equilibrium is stable in the sense it can be achieved through a learning process. In fact, given condition (10), $U_1(p) > U_2(p)$ if $p < p^e$ and $U_1(p) < U_2(p)$ if $p > p^e$. Then when $p^+ > p^e$ the best response is to reduce the price and when $p^+ < p^e$ is to increase the price (as shown in Figure I). Thus (10) is a local stability condition.

Next we derive the existence conditions. Defining $\delta = \mu/(1-\mu)$ as the ratio between the number of attractive and unattractive clients, and using (7), (8) and (9), then the equation that determines the equilibrium price is:

(11) $$w\ln(p/w) = (1-\delta(n-1))p + (\delta c(n-1) - nw)$$

We write (11) as *lhs(p)=rhs(p), and* first consider the case when *rhs(p)* has positive slope, i.e., $(1-\delta(n-1)) > 0$. Then the existence condition is that *rhs(p)* > *lhs(p)* at the point *p* where *rhs(p)* and *lhs(p)* have the same slope. Formally this last condition is

(12) $$(1-\delta(n-1)) < \exp((1-\delta(c/w))(n-1)).$$

In this case there are two equilibria. In the first, the slope of *rhs(p)* is less than the slope of *lhs(p)*, i.e.,

(13) $$\frac{w}{p} - (1 - \delta(n-1)) > 0 .$$

It is to be noted that condition (13) is exactly the stability condition (10). So this solution is a locally stable Nash equilibrium. The second solution does not meet condition (13), and can be shown to be unstable, and being of little interest in the remainder of this paper it is not considered.

Next we consider the case when *rhs(p)* has a negative slope, i.e., $(1 - \delta(n-1)) < 0$. In this case the functions *lhs(p)* and *rhs(p)* obey $lhs(p \to 0) \to -\infty$, $lhs(p \to \infty) \to +\infty$, $rhs(p \to 0) = (\delta c(n-1) - n)w$ and $rhs(p \to \infty) = -\infty$, ensuring the existence of an equilibrium. Moreover the monotonicity of both functions guarantees uniqueness. Furthermore condition $(1 - \delta(n-1)) < 0$ implies that (10) holds for any *p*, so the equilibrium is globally stable.

If the existence condition (12) is not satisfied, the equilibrium cannot be sustained as for each price the best response for a firm is to increase prices and compete through salespersons, (that is, for each price p^+, the situation set out in Fig 1c applies). In fact, (12) is more difficult to achieve for high values of *c/w*, i.e. when differences between attractive and unattractive clients are substantially higher than salespersons' wages. So, firms in each situation would prefer to increase prices, which would bring a limitless bang. It is plausible to suppose that in such circumstances, being an obligatory service, the regulatory authority would set a maximum price or the firms themselves would agree on one.

Next we derive conditions for the solution to have salespeople that poach clients from rival firms, but only those that are attractive. Given that the transfer technology T shows decreasing returns, and as $T'(v=0)=1$, the value of the productivity of the first sales person hired is p. Therefore in equilibrium sales persons are hired if and only if $p \geq w$. On the other hand, the necessary and sufficient condition for the existence of an equilibrium satisfying $p>w$ *is* $rhs(p=w) > lhs(p=w) = 0$. Besides $rhs(p=w)=(n-1)(\delta c-(1+\delta)w)> 0$ if and only if $w>\mu c$.

Thus if the condition $w>\mu c$ is met, $p>\mu c$ in equilibrium. Otherwise the equilibrium is Bertrand without salespersons and with a price $p=\mu c$. Hence the equilibrium price is influenced by the possibility that firms have to poach attractive clients from other firms and thereby reduce price competition intensity. The intuition is as follows: if the price falls too low firms may find attractive not to match the other firms' price and in so doing avoid recruiting unattractive clients, and then poach attractive clients from rival firms.

The derivation of the condition that sales persons do not poach unattractive clients is analogous. A sufficient condition is that in equilibrium $p-c \leq w$. Since our focus is in stable equilibria, function $lhs(p)$ cuts function $rhs(p)$ from above. Hence the condition is $rhs(w+c)<lhs(w+c)$, *i.e.*, $ln(c/w+1)>c/w-(n-1)(1+\delta)$. In turn a sufficient condition for the last inequality to hold is $c/w<(n-1)/(1-\mu)$.

Finally it is to be verified if firms have positive profits in equilibrium (excluding entrance costs). Using equation (7) the condition for positive profits can be written as,

(14) $$p > c - w/\delta$$

Condition (14) holds if and only if *rhs(p=c-w/δ) > lhs(c-w/δ),* which in turn is true if and only if

$$\ln\left(\frac{c}{w} - \frac{1}{\delta}\right) < \frac{c}{w} - \frac{1}{\delta} - 1.$$

As this last condition is always satisfied, firms always have positive profits.

IV. Intensity of Competition

This section examines how changes in the parameters affect the intensity of competition, under the assumption that *c/w<Min{(n-1)/(1-μ),1/μ}*. In order to analyze the effect the number of firms has on the equilibrium, equation (11) is implicitly differentiated with respect to this variable, obtaining

(15) $$\frac{\partial p}{\partial n} = \frac{-\delta(p - c + w/\delta)}{(w/p - (1 - \delta(n-1))} < 0.$$

Inequality is deduced from equations (13) and (14). Therefore, an increase in the number of firms diminishes the price. This in turn causes a fall in the total number of salespersons hired by firms, which is given by *v=(1-μ)ln(p/w)*, and consequently in the number of transfers. Each firm's profits diminish with *n,* as deduced from equation (7). Also, the industry's total profits fall with an increase in the number of firms. In effect,

$$\frac{\partial(nU(p))}{\partial n}\frac{1}{\mu} = (p - c + \delta^{-1}w)\left(1 - \frac{\delta n}{(w/p - (1-\delta(n-1))}\right) < 0 .$$

The intuition of these results is the following. When the number of firms in the industry increases, poaching reports fewer benefits as attractive clients are split among more firms, thus shifting competition to prices. In consequence the equilibrium price is lower. Finally each firm's profits fall due to greater price competition.

From equation (11) it can be deduced that an increase in sales persons' wages effects equilibrium. In fact,

(16) $$\frac{\partial p}{\partial w} = \frac{(1-n) - \ln(p/w)}{(w/p - (1-\delta(n-1))} = -\delta^{-1}\frac{\delta(1-n) - \delta\ln(p/w)}{\delta(1-n) - (w/p - 1)} < -\delta^{-1}$$

An increase in sales persons' wages implies that competition between them is more costly, which causes the firms to compete more strongly by price in the previous stage. As a result, prices fall, which in turn reduces the number of salespersons and transfers. Firm profits fall, which follows from differentiating (7).

Now the cost increase of serving unattractive clients has an effect on the equilibrium price, given by,

(17) $$\frac{\partial p}{\partial c} = \frac{\delta(n-1)}{(w/p-(1-\delta(n-1))} > 1$$

Then price grows more than cost, although this only affects a proportion of clients. The cost increase has a direct effect on the price and an indirect effect through shifting competition from prices to sales efforts. When the cost difference between serving both types of client increases, competition by sales persons becomes more attractive, reducing the intensity of price competition. As a consequence of the increase in prices, the number of sales persons and transferred clients increases, as do firm profits.

Table I shows the equilibrium values for a group of parameters that meet the conditions (12) and $c/w<Min\{(n-1)/(1-\mu),1/\mu\}$.

V. The market entrance decision

The decision by firms to enter the market, determines the number that operate in long run equilibrium.[11] Firms make the decision to enter the market in anticipation of the equilibrium at later stages described by equation (11). The model has no entry barriers, thus profits are zero in the long term.

[11] It is assumed that equilibrium exists for any number of firms. For this to obtain it is sufficient to require the equilibrium conditions of (11) are obeyed with two firms in the market, that is $(1-\delta) < \exp(1-\delta(c/w))$.

Equilibrium with unrestricted market entrance is determined by the short-run equation (11) together with the zero-profit condition. Given the equality of (8) any of the equations, (5)-(7), could be chosen to represent zero profits. Equation (7) is used here because it is simpler to work with. If K denotes entrance costs, the zero-profit condition can be written as,

$$K = \mu(p - c) + (1 - \mu)w \tag{18}$$

In long run equilibrium both the short-term equilibrium condition (11) and the zero-profit condition (18) must hold. Figure II shows both relations where SR corresponds to the first condition and ZP to the second. The short-term equilibrium p is decreasing on the number of firms (equation 15), while the zero-profit equilibrium price does not depend on it. The long run equilibrium price and the number of firms are determined by the intersection of both curves.

The effect that changes on parameter have on the long run equilibrium can be examined by looking at Figure II and the results found in the previous section. An increase in entrance cost, K, moves the curve ZP upward but does not affect the SR curve, in that way increasing the price and reducing the number of firms. An increase in salespersons' wages displaces both curves downward (equations 16 and 18). The price fall is greater in the short term, because firms leave the market to reestablish equilibrium. Consequently an increase in the cost of poaching clients increases price competition, so that the price falls, but the welfare effect is ambiguous because the costs of poaching increase.

Finally the cost increase of serving unattractive clients moves both curves upward, causing an increase both in price and in the salesforce. The increase in c causes an increase of similar magnitude to the zero-profit equilibrium price (equation 18), but an increase that is greater in the short run price (equation 17). Then new firms must enter to reestablish long-term equilibrium.

VI. Conclusions

This article has discussed the economics of the hiring of salespeople to poach attractive clients from rival firms. This paper assumed two types of clients – attractive and unattractive to firms – but that the service fee is similar for both. It is argued that in this type of industry, firms compete in the short term through the sales force, and in the medium term through prices. To model this behavior, hiring salespersons was introduced at a subsequent stage to price competition. Under these assumptions it was shown that the possibility of contracting salespersons to poach rivals' clients reduces the intensity of price competition.

A second result shows that an increase in the cost difference between both types of clients diminishes price competition. When the cost difference increases the hiring of salespeople becomes more attractive. While this increases competition based on salespeople, price competition is weakened so the equilibrium price increases. In consequence of this, an increase in differential costs between both types of clients increases the number of salespersons as well as firms' profits. So this result of the model is consistent with the observation that when there are different costs for firms but they are obliged to charge the same fee to clients, there is a large number of salespeople.

Results also show that both the number of salespeople and the price fall with an increase in salespeople' wages as well as with the entrance of new firms. Since salespeople do not provide information and that each client always demands one unit, the social welfare (omitting distribution issues) moves, in principle, with the number of salespeople. So raising the cost of poaching clients from rival firms and promoting the entrance of new firms appear to be adequate policies. Nevertheless since the fall in the number of salespeople is accompanied by cost increases, it is not possible to draw definitive conclusions with respect to how the said policies impact on social welfare.

This paper assumes that clients do not bargain the terms of transfer. This assumption simplifies the solution of the model, but it not crucial for the results. Indeed, the decreasing productivity of the sales force, combined with the fact that in the model each firm takes as given the number of salespeople of rival firms, does not allow sales force competition to completely dissipate firms' rents. Notwithstanding the previous point, the logical extension is to incorporate the negotiation process between salespersons and clients. For future work, the model could be also extended to consider a more general transfer function that also depends on the number of firms.

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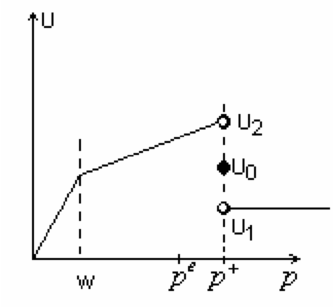
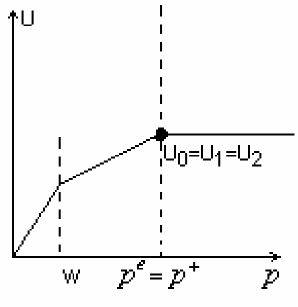
Table 1

Equilibrium Prices for Distinct Parameter Values

(wages normalized to 1)

Parameters			**Equilibrium**	
Number of firms	Attractive fraction	Cost c	Price p	Utilities U
3	25%	3	2.85	0.08
		5	5.05	0.24
	50%	3	2.21	0.11
		5	5.32	0.66
10	25%	3	2.77	0.02
		5	4.81	0.05
	50%	3	2.03	0.01
		5	4.20	0.10





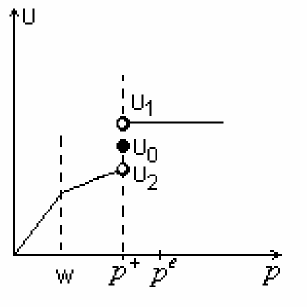


Fig. I a.: $p^+ > p^e$

Fig.I b: $p^+ = p^e$

Fig.I c: $p^+ < p$

Figure I: *U(p)* for distinct values of p^+

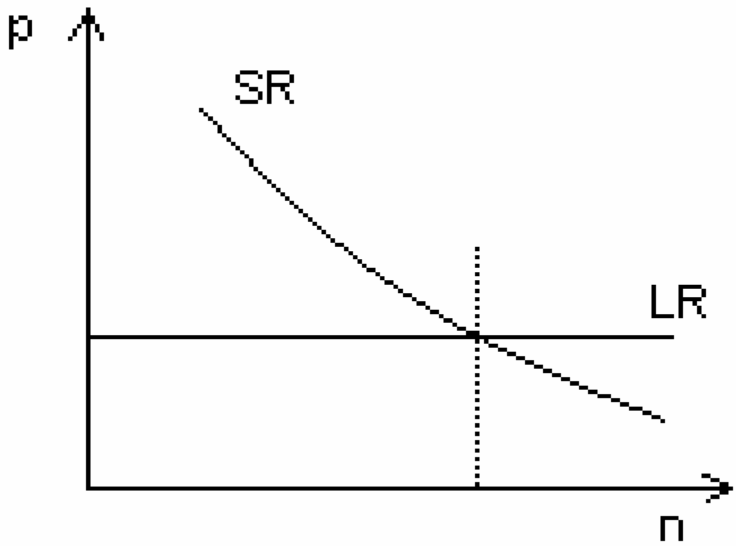


Figure II: Short and long term equilibrium curves