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A Note on the Relationship between Entry and Social Welfare in the Japanese Insurance Market

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Abstract: The purpose of this paper is to consider the relationship between entry and social welfare in the Japanese insurance market. This paper has explained the entry problem using the Salop model and provided some meaningful results. The important results in this paper are as follows:

(1) The number of insurance firms with no regulations is more than the number of insurance firms which achieve the socially desirable outcome (already described in Salop (1979)).

(2) The upper price regulation can achieve the socially desirable outcome.

(3) It may be difficult and ineffective for the regulator to institute the upper price regulation in the Japanese insurance market because the fixed entry cost is relatively large.

Keywords: product differentiation, the Salop model, upper price regulation

JEL Classification: G22, L11, L51

Ⅰ. Introduction

Since 1996, a lot of insurance firms are entering into the Japanese insurance market. The reason they enter into in recent years is to relax the entry barriers. It is most well-known example that the life insurance firms could enter into the non-life insurance market and the non-life insurance firms could enter into the life insurance market. Thus, although there were 31 life insurance firms and 27 non-life insurance firms as of April 1, 1995[1], there are 42 life insurance firms and 57 non-life insurance firms as of June 30, 2003[2].

According to the perfect competition model, an increase in the number of insurance firms also increases social welfare. But there are many reasons why the Japanese insurance market should not be referred as perfect. For example, there are still some regulations such as capital and price regulations in order to limit the cutthroat competition. Even if there were tremendous numbers of insurance firms, each insurance firm may sell the differentiated insurance product in order to avoid

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[1] See "Life Insurance in Japan (Fact Book), 1995" and "Non-Life Insurance in Japan (Fact Book), 1995". We do not count in Axa Life Insurance Company because it begun to operate in Japan at April 1, 1995.

[2] See http://www.fsa.go.jp/news/newsj/15/sonota/f-20030918-1b/118-123.pdf

the fierce competition[3]. Thus, it is not clear whether an increase in the number of insurance firms is socially desirable in the insurance market. Furthermore, if an increase in the number of insurance firms may decrease social welfare, we have one question: what should the regulator do in order to realize socially desirable outcome?

The purpose of this paper is to consider the above question. To do so, we would briefly sketch Salop (1979) as follows. According to Salop's results, if the regulator does not institute regulations at all, then there are too many insurance firms in view of social welfare. Thus, the regulator has to institute some regulations in order to achieve the socially desirable outcome. The conclusion of this paper is that maintaining the price level not to be excessive is an effective way to achieve the socially desirable outcome.

Ⅱ. Excess entry theorem: the Salop model[4]

Let assume that there are a lot of consumers in the insurance market. All consumers have any ideal point which is indicated by most desirable insurance product. Each ideal point may refer as his or her subjective product measurement. Thus, the consumers have different ideal point. For simplicity, these ideal points are assumed to be uniformly distributed on a circular market depicted by Figure 1. The circumference of this market is equal to unity.

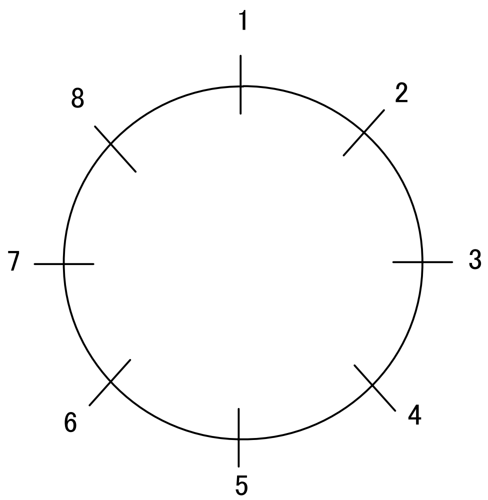


Figure 1: The curcular market

[3] Schlesinger-Schulenburg (1991), Gravell (1994) and Tsutsui et al. (2000) have analyzed a horizontal differentiated insurance market which is associated with variety (product characteristics). Okura (2003a) has analyzed a vertical differentiated insurance market which is associated with quality (after care level).

[4] Schlesinger-Schulenburg (1991) has already used the Salop model in order to analyze the entry problem in the insurance market. But, they have not considered the case where the regulator may institute some regulations.

The consumer whose ideal insurance product is denoted by x has the following utility function:

$$u = \overline{p} - p_i - |x - x_i| \qquad \text{---(1)}$$

where $\overline{p}$ represents the reservation price for insurance product and is assumed to be sufficient high. Thus, all consumers always purchase one unit of insurance product. For simplicity, we eliminate the possibility where some consumers purchase more than one unit of insurance product. p_i and x_i are the price and variety of the insurance product sold by insurance firm i, respectively. It is assumed that all insurance firms sell only one insurance product and they cannot charge different prices to consumers with different varieties. So the insurance firm i submits only one insurance contract denoted by $\delta_i \equiv \{x_i, p_i\}$.

Each insurance firm has the following profit function:

$$\pi_i = p_i D_i - F \qquad \text{---(2)}$$

where D_i is the demand for insurance firm i and F denotes the fixed entry cost. The all insurance firms have an identical fixed entry cost. In contrast, the variable cost of the insurance product is negligible.

Salop (1979) set out a two stage game as follows: In the first stage, potential insurance firms decide whether he enters into the insurance market or not. In the second stage, they choose their prices simultaneously in order to compete with rival insurance firms which entered into the previous stage. Let n be the number of insurance firms which exist at the beginning of the second stage.

Assume also that the insurance firms are located symmetrically and so the distance from the insurance firm to the neighborhood insurance firm is equal to $1/n$. Thus, in fact, the insurance firm i can only consider his two (left and right side of) neighborhood insurance firms despite he competes with all rival insurance firms. Let denote $\tilde{x}$ be the marginal consumer who feels indifferent between purchasing from insurance firm i and from his neighborhood insurance firm. Then, formally the marginal consumer $\tilde{x}$ is given by

$$p_i + \tilde{x} = \hat{p} + \left(\frac{1}{n} - \tilde{x}\right) \qquad \text{---(3)}$$

where $\hat{p}$ represents the price of neighborhood insurance firm. Thus,

$$\tilde{x} = \frac{\hat{p} + (1/n) - p_i}{2}. \qquad \text{---(4)}$$

The insurance firm i is able to have his demand $\tilde{x}$ from both sides. The demand for insurance firm i can be written as

$$D_i = 2\tilde{x} = \hat{p} + \frac{1}{n} - p_i. \qquad \text{---(5)}$$

Therefore, the profit function of the insurance firm i can be expressed as

$$\pi_i = p_i\left(\hat{p} + \frac{1}{n} - p_i\right) - F. \qquad \text{---(6)}$$

The insurance firm i chooses his price p_i to maximize his profit given the prices of other insurance firms.

Next, we seek a subgame perfect Nash equilibrium. This equilibrium can be derived by backward induction (see Selten (1975)). At the second stage, it shows that given the number of insurance firms, all insurance firms set the price simultaneously.

Using the equation (6), the first-order optimality condition would be

$$\frac{\partial \pi_i}{\partial p_i} = \hat{p} + \frac{1}{n} - 2p_i = 0. \qquad \text{---(7)}$$

Since all insurance firms have identical cost structure, we are sufficient to search for a symmetric equilibrium which can be denoted by $p_1 = p_2 = \Lambda = p_n \equiv p$. Hence, the equilibrium price is given by

$$p^* = \frac{1}{n}. \qquad \text{---(8)}$$

Thus, when the number of insurance firms is close to infinite, that is, $n \to \infty$, then the equilibrium price is close to zero. In other words, the perfect competitive equilibrium realizes because the equilibrium price is equal to marginal cost. However, by the equation (8), this equilibrium never realizes unless the fixed entry cost is zero (or negligible). If the fixed entry cost is strictly positive, finite number of insurance firms only enters into the market and the equilibrium price is always above marginal cost.

Let consider the first stage. Suppose that the number of insurance firms is determined from zero profit condition. Substituting the equation (8) in (6), the zero profit condition can be expressed as

$$\pi_i = \frac{1}{n^2} - F = 0\,. \qquad \text{---(9)}$$

Equation (9) yields

$$n^* = \frac{1}{\sqrt{F}}\,. \qquad \text{---(10)}$$

However, we do not know whether the number of insurance firms indicated by the equation (10) is socially desirable or not. The more the number of insurance firms, the more the number of varieties. Thus, an increase in the number of insurance firms increases the consumer welfare. But at the same time, an increase in the number of insurance firms also increase the total fixed entry cost. Thus, an increase in the number of insurance firms reduces the producer welfare. So in order to check whether the number of insurance firms indicated by the equation (10) is socially desirable or not, we need to calculate the number of insurance firms which minimize the sum of the fixed entry cost and consumer disutility which is occurred by the discrepancy between ideal product and purchased product.

Let n^S be the number of insurance firms which achieve the socially desirable outcome. Then, this is determined by

$$n^S = \arg\min_n \left[nF + 2n\left(\int_0^{1/2n} x\,dx \right) \right] = \arg\min_n \left[nF + \frac{1}{4n} \right]. \qquad \text{---(11)}$$

Hence,

$$n^S = \frac{1}{\sqrt{4F}}\,. \qquad \text{---(12)}$$

Thus, in comparison with the equation (10) and the equation (12), we conclude that the number of insurance firms with no regulations is more than the number of insurance firms which achieve the socially desirable outcome.

Ⅲ. The upper price regulation

In the previous section, if the regulator does not institute regulations at all and the fixed entry cost is not negligible, socially desirable outcome never realizes. In order to achieve the socially desirable outcome, the regulator has to institute some regulations.

One very simple way to achieve the socially desirable outcome is to institute the entry regulation which sets the maximum number of the insurance firms in the insurance market. It is easy to verify that the regulator can realize the socially desirable outcome, that is, the regulator sets the maximum number of the insurance firms is equal to the number of them in the socially desirable outcome. But actually the regulator may not institute this sort of entry regulation because the Japanese insurance law basically permits new entry unless there are some critical problems such as capital shortage and so on. Thus, the regulator may consider other way to realize the socially desirable outcome.

Let us demonstrate the relationship between the number of insurance firms and the price regulation. Suppose that the regulator institutes the price regulation which specifies the feasible price p^U. The regulator chooses this price both which is satisfied with zero profit condition and which becomes the number of insurance firms n^S. Using the equation (6), this price is given by

$$\pi_i = \frac{p^U}{n^S} - F = 0. \qquad \text{---(13)}$$

Substituting the equation (12) in the equation (13), it can be seen that

$$p^U = \frac{\sqrt{F}}{2}. \qquad \text{---(14)}$$

Thus, if the regulator introduces the price regulation in accordance with the equation (14), the socially desirable outcome achieves.

The above argument may lead us to feel doubt. The regulator cannot decide only one price and prohibit choosing other prices nowadays. Instead, the regulator may be able to maintain the price level not to be excessive. In other words, the regulator may be able to introduce p^U as “upper” regulated price. When the regulator introduces not the one price regulation, that is, $p^* = p^U$ but the upper price regulation, that is, $p^* \le p^U$, can the regulator achieve socially desirable outcome? In order to check above description, we have to prove that no insurance firm has any incentive to cut his price from p^U

Suppose that one representative insurance firm j lowers his price from p^U to $p_j \in [0, p^U)$.

Then, his profit function can be written as

$$\pi_j = p_j\left(p^U + \frac{1}{n^S} - p_j\right). \qquad \text{---(15)}$$

Therefore, the insurance firm j 's profit maximization problem yields the first order condition given by

$$\frac{\partial \pi_j}{\partial p_j} = p^U + \frac{1}{n^S} - 2p_j. \qquad \text{---(16)}$$

To investigate whether the insurance firm j has incentive to cut price or not, it needs to confirm whether the equation (16) at $p_j = p^U$ is positive or not. In this case,

$$\left.\frac{\partial \pi_j}{\partial p_j}\right|_{p_j=p^U} = \frac{1}{n^S} - p^U = \frac{3\sqrt{F}}{2} > 0. \qquad \text{---(17)}$$

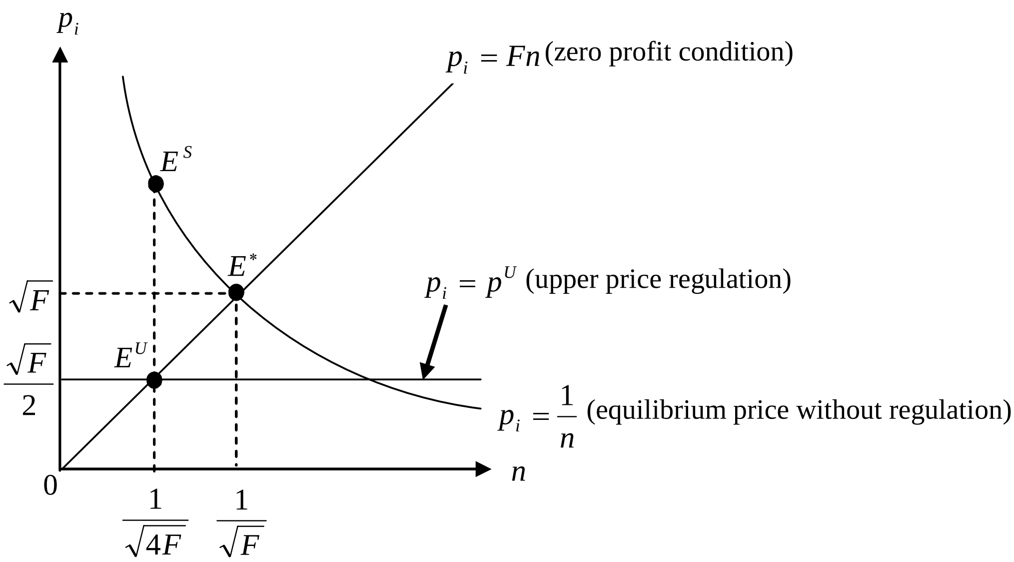
Because the equation (17) becomes positive, the insurance firm j always lower his profit if he lowers his price from p^U. Therefore, no insurance firm has incentive to cut his price. Figure 2 summarizes the above discussion.

Finally, we can analyze effects of changes in fixed entry cost (exogenous variable) in order to check the relationship between the price regulation and the fixed entry cost. The following properties are readily verified:

$$\frac{\partial\left(p^* - p^U\right)}{\partial F} = \frac{1}{4\sqrt{F}} > 0, \qquad \text{---(18)}$$

$$\frac{\partial\left(n^* - n^S\right)}{\partial F} = -\frac{1}{4\sqrt{F^3}} < 0. \qquad \text{---(19)}$$

According to the equations (18) and (19), when the fixed entry cost is relatively high, the difference between p^* and p^U becomes large and difference between n^* and n^S becomes small. In this case, to institute the upper price regulation is not only difficult but also ineffective. In reality, to enter into the insurance market, new entrants incur large fixed costs of investment. For example, potential entrants must prepare their distribution systems and/or educate their employees before they can sell their insurance products in the Japanese insurance market. Hence, we conclude that it may be difficult and ineffective for the regulator to institute the upper price regulation in the Japanese insurance market[5].



notes:

E^* : The equlibrium point without regulation

E^S : The socially desirable point without regulation
(This point is not the equlibrium point)

E^U : The socially desirable point with regulation

Figure 2: The results

Ⅳ. Conclusion

This paper has explained the entry problem using the Salop model and provided some meaningful results. The important results in this paper are as follows:

(1) The number of insurance firms with no regulations is more than the number of insurance firms which achieve the socially desirable outcome (already described in Salop (1979)).

(2) The upper price regulation can achieve the socially desirable outcome.

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[5] Okura (2003b) has analyzed the relationship between the entry and fixed entry cost when the incumbent insurance firm can choose the entry deterrence strategy.

(3) It may be difficult and ineffective for the regulator to institute the upper price regulation in the Japanese insurance market because the fixed entry cost is relatively large.

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