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Excess Entry, Entry Regulation, and Entrant's Incentive

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Abstract

Excess entry theorem, which shows that the free market can generate too many firms, is a theoretic base for entry regulation. When the current market is a monopoly, entry is considered as excessive if the social welfare under the post-entry Cournot-Nash equilibrium, net of entry cost, is lower than that under monopoly. However, this paper argues that, even if this is true, limiting entry is not an optimal choice of the benevolent government. The entrant has an incentive to produce more than the Cournot-Nash equilibrium output level to get an entry permission as long as it is still profitable to enter. Therefore, an entry regulation which imposes entry condition, rather than just limiting entry, that the new entrant produces enough to make entry welfare increasing, will be an optimal regulation against excess entry problem. Limiting entry based on the excess entry theorem is a wrong policy, since it ignores the strategic reaction by the new entrant. Entry regulation can cure excess entry problem not by limiting entry but by imposing conditions on entry, since the latter is equivalent to a price regulation on the imperfect post-entry oligopoly market.

1. Introduction.

Entry and price regulations might be the two most widely used types of government regulations. From the pure natural monopoly to the structurally competitive markets, entry is usually regulated with differing degrees of entry conditions.[1] It is also quite common that prices in these market are controlled in various forms by the regulator. However, in spite of the similar popularity of these two types of regulations, theories of government regulation show serious imbalance between entry and price regulations. It is not difficult to recognize that there have been just few studies on entry regulations, while most regulation studies are about the price regulation, simply assuming that entry is limited either by market-generated barriers or by entry regulation.[2]

Entry regulation needs more attention for at least two reasons. First, entry regulation is more fundamental and more influential than price regulation. This is in the sense that entry regulation directly affects the market structure, while price regulation affects the behavior of the firms within the given market structure. Second, in many cases, entry regulation is the precondition of the price regulation. This means that price regulation is needed mainly because entry is regulated by the government. This is surely true for the natural monopoly.[3] If the market is not a natural monopoly, which is true for most of the markets under price regulations, without entry regulation, price regulation is more difficult to be justified.

All theoretic bases for the entry regulation, if any, can be summarized as the so-called excess entry theorem. It is a well-known fact that free entry can generate too many firms within the market. This is clear for the natural monopoly, and excess entry can also occur in a non-natural monopoly market under some conditions.[4]

However, it should be emphasized that excess entry theorem cannot be a justification for limiting entry into the market. In other words, limiting entry based on the excess entry result in a free market is a wrong policy.

[1] Entry regulation includes not only disallowance, but also conditions or requirements for entry permission.

[2] See as surveys Braeutigam(1989) for the optimal price regulation under complete information, and Baron(1989) for the case of incomplete information.

[3] If the natural monopoly market is sustainable and so entry regulation is not necessary, price regulation is also unnecessary.

[4] See Mankiw and Whinston(1986), Perry(1984), and Suzumura and Kiyono(1987) for the excess entry theorem.

The point is that the excess entry theorem is based on a model without government, therefore cannot be an appropriate prediction about the market with government intervention. Once government actively plays the role, the behavior of the firms, both incumbents and new entrants, and so the market equilibrium, will not be the same as before any more. It is obvious that if there were government within the model from the beginning, the behavior of the firms would have been totally different from that which generated the excess entry result.

This paper will particularly highlight the incentive change of a new entrant due to the entry regulation.[5] More specifically, consider a situation such that entry is profitable to the new entrant, but excessive to the whole society based on the standard post-entry Cournot-Nash equilibrium. The government will then disallow further entry following the policy recommendation of the excess entry theorem. However, if this is the case, the new entrant will surely have an incentive to produce more than the Cournot-Nash equilibrium level to make entry socially desirable, and so obtain entry permission from the regulator, as long as entry is still profitable. Then, taking entrant's incentive into considerations, the optimal policy of the benevolent government should be allowing entry under the condition that a new entrant produces enough to make entry welfare increasing, not just rejecting entry expecting the Cournot-Nash equilibrium after entry.

Even though entry is socially excessive without government regulation, it can be changed to welfare-increasing under an appropriate entry regulation. Nonetheless, if the government just disallows entry based on the passive prediction about the post-entry market equilibrium, the whole society will lose potential welfare gains from competition. This is the case in which we are interested in this paper.

In this paper, the strategic reaction by the new entrant to the entry regulation will be examined. Specifically, a new post-entry market equilibrium under the constraint of entry regulation, which is therefore different from the unconstrained Cournot-Nash equilibrium, will be derived. In such an equilibrium, entry will be allowed by the benevolent government, which would not have been allowed at the standard Cournot-Nash equilibrium. Entry regulation, which appropriately takes potential entrant's reaction into con-

[5] See Kim(1997, 2000a) for the incumbent's incentive change under entry regulation, and the resulting inefficiency of the entry regulation which aims to prevent excess entry in a free market.

siderations can cure excess entry problem not by preventing entry but by inducing a larger production in the post-entry market from the new entrant.

The structure of the paper is as follows. In section 2, a simple model of entry regulation will be introduced. Section 3 will derive an equilibrium of the entry regulation game where the new entrant's strategic behavior under entry regulation is incorporated. Some interpretations and policy issues will be discussed in Section 4, and Section 5 concludes the paper with suggestions of further research on entry regulation.

2. Model.

Consider a monopoly market with a potential entrant, where firm 1, the incumbent monopolist, is assumed to be maximizing monopoly profit without implementing any entry-deterring strategy.[6] Entry regulation game in such a monopoly market is a three-person two-stage game as in <Figure 1>. In the first period t_1, firm 2 makes a decision on entry. The entry decision is represented by the entry plan K, which includes the capacity investment as well as the production plan in the post-entry period. Firm 2 submits $K > 0$ to the benevolent government when it wants to enter, and $K = 0$ implies staying out.[7]

<Figure 1>

When firm 2 reports a positive capacity/production plan, the government decides whether to allow (Y) or reject (N) firm 2's entry. The entry regulation is such that entry is allowed if duopoly welfare net of entry cost is expected to be higher than the monopoly welfare, and it is rejected otherwise. We assume no behavioral regulation on the monopoly so that the monopoly welfare is evaluated by the unregulated monopoly price.[8] On the

[6] It may be the case that the monopolist has been free of entry threat for a long period of time. When entry is not expected with high probability, implementing an entry-deterring strategy may not be optimal. However, the real reason for such an assumption is to focus on the impact of an entry regulation on entrant's incentive.

[7] To minimize notations, entry plan will be represnted by the capacity investment plan K. Actually, our anlaysis doesn't require capacity investment, however, it is assumed just for the generality of the model.

[8] No regulation of the monopoly might seem unrealistic. However, if we assume some

other hand, the welfare in case of entry is to be based on the duopoly market equilibrium given the production plan of the new entrant, not on the usual Cournot-Nash equilibrium.

If either firm 2 chooses not to enter, or the government rejects firm 2's entry, firm 1 preserves its monopoly position. If firm 2's entry is allowed by the government, firm 2 should pay fixed entry cost $F > 0$, and firms play a Cournot competition game producing x_1 and x_2 respectively. It is assumed that, for the consistency of the government regulation, firm 2's capacity investment and production plan is a commitment which cannot be reversible after entry is permitted.[9]

The market demand is $p = 1 - X$, where p is the market price and X is the total production. The marginal cost of production is normalized to zero so that firm 2's production cost is simply the capacity investment cost rK for $x_2 \leq K$, where $r > 0$ is the unit capital cost, while firm 1 has no production cost. The monopoly market outcome can be easily characterized by $x^M = p^M = \frac{1}{2}$, $\pi^M = \frac{1}{4}$, $W^M = \frac{3}{8}$, where W^M is the social welfare, as the sum of the profit and consumer surplus, under monopoly.

On the other hand, the post-entry market is not characterized by the standard Cournot-Nash equilibrium. This is because firm 2 is allowed to the market under the condition that the post-entry market should be more efficient than the monopoly market (otherwise, entry permission is canceled). Since holding an idle capacity in the post-entry period is not optimal, firm 2 will choose the same capacity level as the equilibrium production level in the post-entry period, that is, $K = x_2$.[10] Then firm 2's capacity decision and the subsequent production decision can be combined into one action without loss of any generality, and firms' behavior in the post-entry duopoly market under entry regulation will be as follows.

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optimal monopoly regulation, and furthermore, if there is no regulation on the post-entry oligopoly market, at least in theory, the regulated monopoly would be easily more efficient than the unregulated oligopoly. Then, competition, unless it is perfect, will be hard to be justified. Our assumption is to avoid such a theoretic inconsistency between monopoly regulation and entry regulation, and also to follow the tradition of the excess entry literature which assume structural policy only.

[9] Since entry regulation is a binding contract, if firm 2 breaches the entry plan, there will be a severe penalty such as negating entry permission, etc.

[10] If entry is permitted only based on the capacity plan, then it can be optimal to the new entrant to install a large capacity to get entry permission, and produce less than the capacity level after entry. For the credibility of a large production after entry, entry regulation needs to require a post-entry production plan from the new entrant.

$$Max\ \pi_1(x_1, x_2) = (1 - x_1 - x_2)x_1$$

$$Max\ \pi_2(x_1, x_2) = (1 - r - x_1 - x_2)x_2$$
$$\text{subject to } W^D - W^M \geq F$$

To distinguish such a constrained Cournot competition in the post-entry stage from the standard unconstrained case, denote the former as game D (duopoly under the entry regulation constraint) and the latter as game C (unconstrained Cournot competition). Furthermore, let D^* and C^* be the equilibria of game D and game C respectively.

The standard Cournot-Nash duopoly equilibrium without entry constraint C^* can also be easily derived as follows: $x_1^C = \frac{1+r}{3}$, $x_2^C = \frac{1-2r}{3}$, $p^C = \frac{1+r}{3}$, $\pi_1^C = (\frac{1+r}{3})^2$, $\pi_2^C = (\frac{1-2r}{3})^2$, and $W^C = (\frac{1+r}{3})^2 + (\frac{1-2r}{3})^2 + \frac{1}{2}(\frac{2-r}{3})^2$. Finally, firm 2 will enter the market if and only if π_2^D covers F, where π_2^D is the equilibrium profit of firm 2 in game D.

3. Duopoly Equilibrium under Entry Regulation.

Let $G(x_1, x_2) = \pi_2^D - F$ and $H(x_1, x_2) = W^D - W^M - F$. $G(x_1, x_2) = \bar{G}$ is an iso-profit curve for firm 2, and firm 2 will enter if and only if $G(x_1, x_2) \geq 0$. $H(x_1, x_2) = 0$ is the government's indifference curve between allowing and rejecting entry, and entry will be allowed if and only if $H(x_1, x_2) \geq 0$. Since we already know what the iso-profit curve looks like, let us find out the property of the government's indifference curve $H = 0$.

Rewriting $H(x_1, x_2) = 0$, and totally differentiating, we can obtain the slope and the curvature of the government's entry-indifference curve as follows.

$$H(x_1, x_2) = (1-x_1-x_2)x_1 + (1-r-x_1-x_2)x_2 + (x_1+x_2)^2/2 - \tfrac{3}{8} - F = 0$$

$$dH(x_1, x_2) = (1 - x_1 - x_2)dx_1 + (1 - r - x_1 - x_2)dx_2 = 0$$

$$dx_2/dx_1 = -(1 - x_1 - x_2)/(1 - r - x_1 - x_2) < -1$$

$$d^2x_2/dx_1^2 = r^2/(1 - r - x_1 - x_2)^3 > 0$$

<Figure 2>

<Figure 2> describes the two curves that play the key roles in finding out an equilibrium in our entry regulation game. If the intersection of $G(x_1, x_2) \geq 0$ and $H(x_1, x_2) \geq 0$ is empty, there will be no entry. On the other hand, if it is non-empty, there will be an entry if the post-entry duopoly equilibrium D^* exists in this joint set.

Let $R_1^C(x_2)$ and $R_2^C(x_1)$ be the reaction functions in game C, and $R_1^D(x_2)$ and $R_2^D(x_1)$ be those in game D, of firm 1 and firm 2 respectively. It is obvious that $R_1^D(x_2) = R_1^C(x_2)$, however, $R_2^D(x_1)$ can be different from $R_2^C(x_1)$ as follows.

Lemma 1. $R_2^D(x_1)$ is equal to $R_2^C(x_1)$ if $(x_1, R_2^C(x_1))$ satisfies $H(x_1, x_2) \geq 0$, and is equal to $H(x_1, x_2) = 0$ otherwise.

<Proof> Refer to <Figure 3>. If $(x_1, R_2^C(x_1))$ satisfies $H(x_1, x_2) \geq 0$, the constraint to firm 2 is non-binding, and so $R_2^D(x_1)$ becomes the same as $R_2^C(x_1)$. If $H(x_1, R_2^C(x_1)) < 0$, then firm 2's best response to x_1 becomes the minimum x_2 that satisfies entry requirement $H(x_1, x_2) \geq 0$, which is x_2 that satisfies $H(x_1, x_2) = 0$. *Q.E.D.*

<Figure 3>

The duopoly equilibrium D^* then will be obtained at the intersection of $R_1^C(x_2)$ and $R_2^D(x_1)$. First consider the case that the entry regulation is non-binding. This is the case that $D^* = C^*$, that is, entry, if it is planned by firm 2, is allowed at C^*.

Lemma 2. $H(x_1^C, x_2^C) \geq G(x_1^C, x_2^C)$ if and only if $r \geq \frac{1}{2}$.

<Proof> Omitted.

Assume $r \geq \frac{1}{2}$. If $H(x_1^C, x_2^C) \geq G(x_1^C, x_2^C) \geq 0$, firm 2 will enter the market at C^*, and entry will be allowed by the government. This is the case that entry regulation is non-binding and so D^* is identical to C^*. Since there is no impact of the entry regulation on the entrant's strategic behavior, this

is not the case of our interests.

If $H(x_1^C, x_2^C) \geq 0 > G(x_1^C, x_2^C)$, firm 2 doesn't want to enter the market at C^*. However, since C^* satisfies the entry regulation constraint $H(x_1^C, x_2^C) \geq 0$, C^* and D^* will be the same. Since firm 2 willingly stays out regardless of entry regulation, this is also not the case of interests.

Finally, if $0 > H(x_1^C, x_2^C) \geq G(x_1^C, x_2^C)$, we can guess that there might exist an equilibrium D^*, which is different from C^*, such that entry is profitable to the entrant and it is also allowed by the government. However, such a conjecture is not true, since for such a large entry cost, as proved in Proposition 1 below, there will be no equilibrium D^* which gives positive profit to the new entrant while satisfying entry constraint.[11] Therefore, firm 2 will stay out of the market in game D as in game C. This is also not an interesting case since there is no strategic behavior of the potential entrant under entry regulation.

Since our interest is on the incentive change of the new entrant under entry regulation, we can restrict our attention on $r < \frac{1}{2}$ without loss of any relevance in our analysis. When $r < \frac{1}{2}$, $H(x_1^C, x_2^C) < G(x_1^C, x_2^C)$. Then there exists F such that $H(x_1^C, x_2^C) < 0 \leq G(x_1^C, x_2^C)$, which means that firm 2 wants to enter at C^*, however, it is socially excessive. This is the case of the business-stealing effect, which causes entry more attractive to the new entrant than to the whole society.[12] However, since entry, if allowed, is profitable to the entrant, firm 2 will have an incentive to sacrifice some profit and make its entry attractive to the whole society, and so get the entry permission from the government. This is the case of our interests. Let us assume that $r < \frac{1}{2}$ and $H(x_1^C, x_2^C) < 0 \leq G(x_1^C, x_2^C)$, or equivalently, $W^C - W^M < F \leq \pi_2^C$.

Assumption 1. $r < \frac{1}{2}$ and $W^C - W^M < F \leq \pi_2^C$.

Under Assumption 1, now we can find conditions for the existence of D^*, where firm 2 produces more than under C^* so that entry is not excessive any more.

Proposition 1. Assume $r < \frac{1}{2}$ and $W^C - W^M < F \leq Min\{\pi_2^C, \frac{2}{25} - \frac{r}{10}\}$. Then, entry is profitable to the entrant but socially excessive at the un-

[11] More specifically, the intersection of $F \leq \frac{2}{25} - \frac{r}{10}$ and $F > H(x_1^C, x_2^C)$ is empty.

[12] See Mankiw and Whinston(1986) for the business-stealing effect, and its implication on excess entry.

constrained Cournot-Nash equilibrium C^*. However, there exists a duopoly equilibrium under entry regulation D^* such that entry is not only profitable to the entrant but also socially desirable.

<Proof> Refer to <Figure 4> for the proof. First note that entry is excessive at C^* if F is in the range defined in Proposition 1. Let us show that there exists a unique (x_1, x_2) which satisfies both $x_1 = R_1^C(x_2)$ and $x_2 = R_2^D(x_1)$. From <Figure 3> in Lemma 1, the intersection of the two reaction curves, if exists, must be on the $H(x_1, x_2) = 0$ part of $R_2^D(x_1)$. Replacing x_1 by $R_1^C(x_2)$, $H(x_2) = x_2^2/8 + rx_2/2 - (r/2 + F) = 0$. Since $H(x_2)$ is monotonically increasing in x_2 with $H(0) < 0$ and $H(1) > 0$, there must be a unique x_2 which satisfies $H(x_2) = 0$ in the relevant range. Let this unique solution be $D^* = (x_1^*, x_2^*) = (R_1(x_2^*), x_2^*)$. Now, let us confirm that entry is profitable at D^*, that is, $G(x_1^*, x_2^*) \geq 0$. Replacing again x_1 by $R_1^C(x_2)$, $G(x_1, x_2) = -x_2^2/2 + (1 + r)x_2/2 - (r/2 + F)$. Since $(r/2 + F) = x_2^2/8 + rx_2/2$ at D^*, $G(x_1^*, x_2^*) = -\frac{5}{8}x_2^*(x_2^* - \frac{4}{5})$, which is nonnegative for $0 < x_2^* \leq \frac{4}{5}$. Finally, from $H(x_2) = x_2^2/8 + rx_2/2 - (r/2 + F) = 0$, $x_2^* \leq \frac{4}{5}$ is satisfied if and only if $H(\frac{4}{5}) = \frac{2}{25} - \frac{r}{10} - F \geq 0$, that is, $F \leq \frac{2}{25} - \frac{r}{10}$. Therefore, if F is in the intersect of this range and the range defined in Assumption 1, while entry is excessive at C^*, there exists unique D^* which satisfies $x_1 = R_1^C(x_2)$ and $H(x_1, x_2) = 0$ such that entry is profitable to the entrant and also desirable to the whole society. *Q.E.D.*

<Figure 4>

If F is large enough, then firm 2 doesn't want to enter the market not only under game C but also under game D. On the other hand, if F is small enough, firm 2 wants to enter the market, and it will be allowed by the government both in game C and in game D. These are the cases of non-binding entry regulation.

Proposition 1 implies that for some intermediate values of F, even though entry would be socially excessive and so rejected at the unconstrained Cournot-Nash equilibrium C^*, we can find a duopoly equilibrium under entry regulation D^* such that entry is not only profitable to the entrant but also allowed by the benevolent government. Entry is allowed at D^* since the new entrant produces more than the unconstrained Cournot-Nash equilibrium level. The incumbent firm 1 produces less at D^* than at C^*, however, since firm 2's production increase is more than offsetting firm 1's output reduction, welfare

is higher at D^* than at C^*.

4. Discussions.

The standard entry model accepts an unconstrained duopoly equilibrium, for example, the Cournot-Nash equilibrium, for the post-entry market characteristic. Particularly, the excess entry theorem compares pre-entry monopoly equilibrium with a post-entry Cournot-Nash duopoly equilibrium.[13] Assume that social welfare net of entry cost is lower under the standard Cournot-Nash equilibrium than under monopoly. Then should the government limit further entry into the monopoly market? Our analysis shows that the answer is negative. If we correctly find out a new duopoly equilibrium where entrant's strategic behavior is incorporated into the entry contract, then entry will not be socially excessive any more under the same demand and cost conditions. In spite of this fact, if the government disallows entry based on the unconstrained post-entry market equilibrium, the result will be a welfare loss for the incumbent's sake.[14]

The point is that the post-entry equilibrium which generates excess entry without government intervention cannot be an appropriate market characteristic any more once government intervention is incorporated into the model. This is because the government intervention will change the incentives and so the behaviors of the firms, including both the incumbent and the new entrant in general. It is needless to say that any government policy which ignores strategic reactions by the market is empty and results in inefficiency.

Entry regulation, if it is correctly designed, can cure the excess entry problem as is proved in our analysis. In our analysis, entry regulation cures excess entry problem not through limiting entry as is suggested by the excess entry literature, but by allowing entry under the condition that the entrant is to produce much enough to make entry socially desirable. Entry regulation changes entrant's behavior to welfare-increasing by threatening entry rejection in case that entry turns out to be excessive.

[13]Excess entry theorem holds under general conditions for the post-entry oligopoly market including Cournot competition. However, all such model specifications are the same in ignoring the strategic behavior of the firms against government intervention.

[14]In our model, since D^* is on the government's entry-indifference curve $H = 0$, there is no welfare gain with entry. However, we can assume that the entrant is required to produce $x_2^* + \varepsilon$ so that entry is strictly welfare-increasing without loss of generality.

How can the new entrant make it credible that it will produce more than the unconstrained Cournot-Nash equilibrium level so that entry won't be excessive? Entry regulation itself is the answer. Entry regulation is a contract between the regulator and the new entrant about the production plan in case that entry is allowed. Making a binding contract in the form of regulation is a way to make its production plan credible not only to the incumbent firm but also to the whole society.

Note that depending of F and r, π_2^D can be even greater than π_2^C, that is, the new entrant can make even higher profit under entry regulation than at the standard Cournot-Nash equilibrium. This implies that the new entrant doesn't actually sacrifice any profit to obtain entry permission. Rather, by pre-committing a higher production level through regulation, the new entrant can enjoy the first-mover advantage as in Stackelberg model. Contrarily, the incumbent clearly makes a smaller profit than under Cournot-Nash equilibrium since it now has to react passively to the more aggressive strategy by the new entrant.

One last, but not the least, observation from our analysis is that entry and price regulations can be equivalent to each other. More specifically, entry regulation has the same effect as the price regulation on the post-entry market, and price regulation on the pre-entry market can be equivalent to the entry regulation. This observation may be a good news to the regulator since now it has more alternatives to choose from. However, it can also be a warning since government regulation can create some unintended negative effects.

First, imposing conditions on entry is equivalent to regulating post-entry market price. Excess entry problem occurs because post-entry oligopoly market is still imperfect. However, regulating oligopoly market may not be easy to be justified, contrary to the monopoly case. In such a case, the government can achieve the same result through entry regulation as the price regulation on the post-entry oligopoly market. A binding contract with a new entrant such that entry is allowed under the condition that the post-entry market produces more than some level is identical to imposing a price ceiling on the post-entry oligopoly market. Therefore, if entry is permitted with some conditions, even without additional price regulation, post-entry oligopoly market will be implicitly subject to price control. Entry regulation as in our model is pro-competitive in the sense that first, it allows entry instead of limiting, contrary to the policy recommendation of the excess entry literature, and second, it induces a low price in the post-entry oligopoly market.

Second, the incumbent might also want to make a binding contract with the government to prevent entry. Like the new entrant, the incumbent monopolist is also willing to sacrifice some monopoly profit if it can deter entry, and such a goal can be achieved through a price regulation. If monopoly price is regulated by the government, entry can be socially excessive again because the welfare increment due to entry will not be big enough. If the monopoly regulation is not perfect, the regulated monopoly profit can be still higher than that under unregulated oligopoly. In such a case, which seems plausible in reality, the incumbent will prefer a price regulation on the pre-entry market as an effective entry regulation. Therefore, price regulation on the monopoly market may not be necessarily pro-competitive. We need to compare welfare gain from a low price today with the inefficiency due to limited entry in the future. The analogy between price regulation and entry regulation can be one answer to why firms sometimes prefer price regulation to deregulation.

5. Further Research Agenda on Entry Regulation.

One of the answers to why less attention is paid on entry regulation than on price regulation is that entry regulation is rapidly disappearing in reality. Theoretically, it is true that entry regulation becomes more difficult to find its own justifications. However, this cannot be the answer to the imbalance in regulation studies between entry and price regulations at least for two reasons.

First, if such an argument is true, price regulation is also an irrelevant issue, because without entry regulation, markets won't need price regulations, at least in theory. The trend of market liberalization can explain why traditional natural monopoly type regulation theory becomes less important, but it cannot explain why entry regulation deserves comparatively less attention than price regulation, which is still receiving extensive attention in regulation theory.

Second, entry regulation is still a very general phenomenon in many countries, and in many industries. An extreme type of entry regulation, like yes or no to entry, will be more difficult to be justified with some exceptions. Rather, imposing some conditions for a new entry becomes a standard type of entry regulation. Djankov, La Porta, Lopez-de-Silanes and Shleifer(2000) provide an excellent data on actual entry regulations in 75 countries. They

confirm that the nature of entry regulations is not a simple binary one, but a condition-assigning to new firms that eventually enter the market. If this is the truth of the actual entry regulations, the impact of entry conditions on the strategic behavior of the entrants as well as of the incumbents will be the key to evaluate the performance of the government regulatory policy.

As concluding remarks, I'd like to suggest several further research agenda regarding entry regulation. First, entry regulation will change incumbent's incentive against the potential entrant. Kim(1997, 2000a) shows that entry regulation can change incumbent's incentive such that it strategically expands either capacity or output in the pre-entry period to generate an excess entry situation with further entry, and so to induce entry regulation. In these cases, the entry regulation, which aims to prevent socially excessive entry, may actually be exploited by the incumbent as a way to protect incumbent's monopoly position at the cost of social welfare. We need to understand more about the incumbent's incentive under entry regulation, and about the optimal entry regulation that takes incumbent's reaction into considerations.

Second, we need to derive an optimal entry regulation under asymmetric information. When the government has incomplete information, the same informational problem as in price regulation will occur in entry regulation. If excess entry depends on the production costs of the firms, then the incumbent monopolist might well distort entry regulation by misreporting true costs. Even though we have the same informational problem under entry regulation as under price regulation, there is no study on the incentive entry regulation under asymmetric information.[15]

Third, when price regulation is based on entry regulation, the non-dichotomy between these two regulations needs special attention. If some optimal form of price regulation is implemented on the monopoly market, and if post-entry oligopoly market is not regulated even though competition is still imperfect, then entry regulation is hard to be justified. It is because, in theory, the monopoly market under some optimal price regulation can easily be more efficient than the unregulated imperfect market with entry. Should we regulate entry because we can make the monopoly market more efficient through price regulation than the oligopoly market? It is clear that the answer can hardly be affirmative. Then the question is what should be the standard for an

[15] Kim(2000b) proposes that signaling is a more appropriate mechanism for the entry regulation, while incentive mechanism is more relevant for the price regulation, and shows furthermore that entry regulation is more efficient under incomplete information, through signaling by the incumbent firm, than under full information.

entry regulation which takes optimal price regulation for the entry-regulated market into considerations.

Finally, another issue regarding non-dichotomy between entry and price regulations is whether a standard incentive price regulation is still incentive compatible if entry regulation is considered together. It is not difficult to expect that the traditional incentive price regulation, which is derived without referring to entry regulation, will not be incentive compatible any more if the incumbent takes both price and entry regulations into considerations simultaneously.. Then deriving a new incentive monopoly regulation under incomplete information which includes both price and entry regulations should be an important task.[16]

[16] Kim(2000c) proposes an integrated incentive monopoly regulation, which includes both price and entry regulations, and is incentive compatible against both regulatory measures under asymmetric information.

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