Globalization and the Effect of Interest Group Pressure on Firm Entry

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This paper challenges a substantial body of literature suggesting that regulators are often captured by the industries they control and therefore end up ignoring the interests of consumers. We present an analytical model examining the effect of international rivalry between regulators on firm-entry and consequent industry/market profits and product-pricing. Our analysis overturns previous findings and provides significant insight into whether strategic competition constrains regulators to pursue the public interest more effectively.

1. Introduction

A number of policy studies have dealt with the regulation of firm entry on the workings of asymmetric economic and political markets. In his (1971) path-breaking article on the 'Theory of Economic Regulation', George Stigler recognized this asymmetry while focusing on an oligopoly industry which employs 'effective' party politics. The industry uses (*captures*) state coercive powers in controlling licensure. Driven by their self-interest, politicians and organized producer or occupational constituents exchange objects of utility. In return for an entry restriction or a regulated price, the latter provides votes, money, campaign contributions, and must know enough to vote 'right' on election day. Thereafter, Richard Posner, (1971, 1974), Sam Peltzman (1974), Barry Weingast (1981), and Gary Becker (1983) have made substantive contributions to our understanding of asymmetric economic and political markets.

Posner (1971) considers that an entry restriction is similar to a price-discrimination designed to favor industry allies (customers, e.g. small firms or individuals). He notes that, 'taxation by regulation' or discriminatory pricing provided to the allies is employed as an indirect, internal or cross-subsidy – cause they are less visible to direct taxation, noting that information is not a free good – in exchange for 'votes.' In such a case, subsidies create false price signals (below market price) and are covered by averaging its costs on a broader consumer base. The status-quo is protected by the regulators' incentive to maintain cartel profits of public service industries and thus limit firm entry. Posner's theoretical framework emphasized the

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distributional effects of regulation as a taxation or public finance instrument disregarding the winners' selection criteria and size constraints relative to other groups. He attempted to overcome this deficiency in his 1974 article by asserting that cus tomers should be concentrated in order to limit cartel industry policing or free-riding (Posner, 1974, p. 344–346). Posner and Stigler do not really develop a fully-rounded theory of regulation; what they do, rather, is to introduce a promising approach that suggests what some of the key variables are to predict regulation. Although he makes a case for the economic theory as the best available approach, Posner recognizes this: 'The economic theory is still so spongy that virtually any observations can be reconciled with it... At best it is a list of criteria relevant to predicting whether an industry will obtain favorable legislation. It is not a coherent theory yielding unambiguous and therefore testable hypotheses' (Posner, 1974, p. 348–349).

Peltzman (1976) formalizes Stigler's and Posner's theoretical models. 'Politicians' – as the supply side of regulation – play a central role in Peltzman's model when compared to Stigler's concern with a 'single' successful interest (regulation demanders). In their capacity as suppliers, politicians decide on the size of the beneficiaries who provide electoral support by votes and dollars (same as Stigler), and losers (consumers) who pay the dues. Peltzman offers the politician the discretion to draw the dividing-line between broad-based, low-cost consumers who cross-subsidize high-cost consumers for the reward of electoral support. Therefore, the politician's objective function maximizes the probability of receiving support as a function of the average net gain of the supporter i.e. dollar gain (transferred to the beneficiary) minus the 'dollars spent by the beneficiaries in campaign funds, lobbying, and so on, to mitigate opposition' minus the 'costs of organizing both direct support of beneficiaries and efforts to mitigate opposition,' all divided by the number of potential voters in the beneficiary group (Peltzman, 1976, p. 214–215). Despite his argument that regulation has a tendency to the averaging of costs among dissimilar customer groups, Peltzman views the politician, generally, as more inclined to limit entry in industries with high demand elasticity to the adverse of the consumer majority.

Weingast (1981) criticizes the economic explanations of regulation, particularly Peltzman's and, originally, Stigler's 'single-politician' model. He introduces a conceptual model in which the legislator is an important actor. In the context of the agency-clientele and self-interest paradigm, the legislator-politician serves interest groups (generally firms) on the understanding that group desires will indirectly be met through the vehicle of the regulatory agency. An agency is seen to fall within the jurisdictional domain of a congressional subcommittee. This forms the tripartite actors of the model whereby both the legislators and regulatory agencies are subservient to the needs of the clientele (pressure groups). Election or re-election by district constituents is the reward sought after by politicians. This institutes what is labeled as 'sub-government,' 'cozy triangles' or 'iron triangles' (p. 153). Weingast's model suggests that a political equilibrium might not be reached at the committee level if majority-rule is not secured. This is attributed to the potential opposition from other committees. However, structure-induced policy equilibrium can possibly be achieved at the agency level due to jurisdictional allocation. Accordingly, capture cannot be ruled out at the politician's level. In Weingast's words (p. 159): '...once clientele relationships have been established, committee members will attempt to protect them.' Unlike Stigler, Peltzman and Posner, Weingast argues that votes *sine qua non*, not wealth used in a way tantamount to bribery, is the prominent factor.

His model centers on the institutional rules governing the committee system; i.e., legislation must come from the proper committee; legislation is subject to majority-rule; oversight is delegated to the appropriate committee; and representatives are assigned, if possible, to the committee they desire. Denzau and Munger's (1986) model features some similarities to Weingast's especially on issues relating to the legislators' pursuit of vote maximization. Conversely, Denzau and Munger emphasize the role played by 'unorganized' voters in shaping the supply of government policy. 'Organized' interests are represented in the legislative arena through expenditures on campaign contributions (advertising, money, in-kind services, volunteer labor, etc.) for casting 'unorganized' votes to a 'single' policy. These resources are used to shape the public opinion of policy, 'indifferent' or 'rationally-ignorant' geographical constituencies. 'Biased information' used to elicit favorable votes is a political tool employed by legislators to further the wealth of interest groups, but departures from the electorate's interests are constrained by the public's preferences, and by the threat of informing and mobilizing collective action through the media or other political entrepreneurs (p. 103). On the other hand, unorganized 'fully-informed civic classes' represent a cheaper alternative to interest groups should they autonomously support the policy in question. A surprising feature of the model accounts for the inability of interest groups to exercise their voting rights directly and thus participate in the process of policy selection. Moreover, the model is void of a presentation of equilibrium properties for maximizing players' preferences. It is, also, worthwhile noting that both Weingast's and Denzau and Munger's political discourse give little concern to the implications of policy selection on firm entry or industrial policy in explaining the behavioral aspects of legislators.

In contrast to the previous models, Becker (1983) introduces a theory of wealth distribution that builds on competition among pressure groups who are defined by occupation, industry, income, geography, age, and other characteristics. These groups are assumed to use political influence to enhance the well-being of their members. Rather than taking the all-or-nothing outcomes implied by formal models of political behavior (to which Weingast, and Denzau and Munger belong) where the 'majority' clearly wins and the 'minority' loses, he asserts that winners' success or losers' failure is attributed to the 'relative' efficiency of each group in gaining subsidies or paying taxes. Becker's only statement on firm entry was upon his initial introduction of the distributional aspects of subsidies in which an entry limitation is regarded as a policy alternative, *per se*. The political equilibrium thus comprises a balancing of marginal pressure exerted by winners (tax-payees) and losers (tax-payers), with some dead-weight loss. These gains and losses are what motivate the competing pressures in the political process. So rising marginal dead-weight loss must progressively enfeeble the winners relative to losers. The pressure the winners can exert for each extra dollar's gain must overcome steadily rising pressure from the losers to escape escalating losses. In such a case, the optimum size of the winner group should be smaller than the loser group because free-riding can be easily policed and economies of scale enhanced. This is what Becker terms as the 'tyranny of the status-quo' (p. 382). Accordingly, the status-quo is reinforced by competing groups' ability to purchase 'votes' through expenditures of time, money and campaign contributions to guarantee a 'majority-vote,' a concept refuted earlier. Also, despite his allegations (p. 392) that '...I too claim to have presented a theory of rational political behavior...,' there was no justification as to the reason behind a rational voter's willingness to sell his/her vote for a sub-optimal (undesirable, if not harmful) regulation! This seems to be in sharp contrast with rational self-interested behavior. Moreover, it is advocated that governments have a tendency to correct market failure (a public-interest view) to the best interest of 'all' pressure groups. This argument cannot be held as valid if the model of distributional effects is to hold, since costs will be borne by the whole population rather than on a discriminatory basis as advocated by Becker, particularly in policy areas relating to national defense, welfare-nets, etc. Finally, Becker's handling of group coalition captured a passing comment in which interest group co-operation was regarded as necessary to prevent wasteful expenditure, yet difficult because each group possesses an 'intrinsic advantage' to reduce the pressure wielded by other groups. Becker's work stumbled into some idiosyncratic errors by generalizing results on public-interest grounds, and handled coalition dynamics and firm entry insufficiently. However, we believe that his work should still be given credit as the first model studying the distributional dimensions of competing pressure group politics.

From our point of view, the traditional theories summarized above suffer from a number of deficiencies. First, they imply that there is a single political arena in which bargains are struck. Therefore, players' mobility to an alternative jurisdiction is totally ignored. Second, a heavy emphasis is placed on electoral voting in general. Again, this ascertains the implicit assumption that the jurisdictions under study comprised closed economies and focuses entirely on national constituents. Or, to use Hirschman's typology, 'exit' is not an option, or at any rate a very costly one, so 'voice' becomes correspondingly important (Hirschman, 1971). Third, the above models give considerable importance to the construction of legislators' and politicians' objective functions while neglecting the factors that shape the behavior of the regulator and constitutes his/her utility maxima. Fourth, modeling firm entry receives limited attention whereas capture to producers' interests is highlighted compared to consumers' ability to wield pressure on the policy-maker. Finally, net welfare was considered in the context of subsidy vs. tax distributional models (Posner, 1971, 1974; Peltzman, 1974; Becker, 1983), assuming a concentrated number of winners who represent the industry and, perhaps, some voting allies. Accordingly, we can argue that the critique of the above mentioned theories demonstrates a gap in the literature of regulation that was incapable of answering the following questions: Who are the set of market players and what are their motives? How can the regulator's objective function be constructed in an open economy? What type of variables comprises this function? How can market openness affect firm entry in contrast to a case of regulatory collusion? And finally, are there any constraints on firm licensure?

This paper develops a model attempting to find answers to the above questions. We argue that the efficacy of regulatory policy in this paper arises from the fact that regulators can credibly decide on a political outcome based on competing domestic and international influences rather than factors singularly restricted to 'voting.' We would like to emphasize that this is an example of a more general principle understanding of regulatory policy choice: the regulator becomes one of the key players in a strategic game and can influence its equilibrium outcome through the interplay of private agents and by altering the set of credible actions open to them in what we dub 'neo-capture paradigm' (see figure 1).

The model is based on the principle of regulatory capture so that the interest of the regulator becomes partially aligned with that of the industry. In the simple set up considered, the regulators' only policy instrument is the number of domestic firms licensed within the home jurisdiction. The original purpose of licensure may have been to exclude renegades or correct some of the externalities but self-interest soon takes over. To boost industry profits, the regulator restricts the number of firms licensed. However, consumers are able to exert power over the system and restrain the regulator to some extent, so there is an incentive to keep prices low. Given market openness, both producers and consumers are characterized by 'mobility.' Hence, the 'exit' option opened to them represents a credible bargaining-strategy.

This system is based on two internationally competing regulators who have an incentive to attract firms/regulatees to their jurisdiction (see figure 2).

2. Overview

A three-stage model is developed. The first-stage concerns two rival regulators, which we imagine to be located in different countries. They each simultaneously decide how many firms have located in their own country to license. Regulators maximize their own interests rather than seek national welfare goals. Once licenses are issued the firms engage in Cournot-Nash competition.

To begin with, the regulatory equilibrium outcome is examined when firms have no fixed costs. Then, the analysis is extended to test the impact of fixed cost on the equilibrium number of firms in the market. After looking at the equilibrium number of firms, and assuming the independent regulator's behavior, it is examined how results change when one country is regulated and when regulators collude.

The analysis and its results are strengthened by introducing a special case (inverse linear demand) which reinforces the results of the general case.

The principal results are as follows. With two independent rival regulators and no fixed costs, we get a strategic equilibrium outcome equivalent to perfect competition firm entry. With fixed costs, an intermediate outcome is obtained. The same results hold when one-country is regulated irrespective of the presence of fixed costs or lack thereof. However, regulatory collusion results in the monopoly outcome. Therefore, competition between regulators, even when there are only two of them, has dramatic effects on firms entry, industry profits and prices.

3. Basic Model Structure

3.1. Players and Their Incentives

The economic actors of the present model are restricted to regulators, producers and consumers. Producers and consumers, whose payoffs enter the regulator's objective function, are distinct in their motivations. While producers are driven by a rent-seeking behavior, consumers are concerned with a larger output supplied for consumption and thus want lower prices. When self-interest rules, the regulator's welfare objectives are realized according to the weight attached to satisfying the interests of both players.

3.2. The Regulator

There are two countries N and M with one regulator in each country. Each regulator is at least in part captured by the industry, and so places a significant weight on industry profits. In addition, consumers are able to exert pressure both on regulators and producers, so that the regulator attaches some importance to keeping output price at a lower level.

We mentioned earlier that regulators, in the same way as other players, are self-interested maximizers. The previous discussion shows the utility function of the regulator in country N is:

$$U_R = \alpha \Pi^N - \beta P^N$$

where, U_R – the utility function of country N regulator;

Π^N – aggregate profit in country N;

P^N – aggregate price of output in country N;

and α and β are the weights placed on profits and prices, respectively.

A similar expression applies to country M's regulator.

Note that the second term of the regulator's objective function is negative ($-\beta P^N < 0$) as a high price harms consumers who are able to make their influence felt. The magnitude of β represents consumers' pressure on regulators to admit an additional number of firms to the market or cause a regulatory change that might partially or entirely erode industry profits. On the other hand, the coefficient α represents producers' pressure on the regulator to limit licensure and thus boost industry profits. In our set-up, both α and β are exogenous (given), though we later consider parametric variations in their values.

3.3. The Behavior of Firms

According to our analysis, producers sell identical (homogeneous) goods, seek to maximize profit and are engaged in Cournot-Nash competition. Moreover, in each country entry to the industry is controlled by a regulator.

Imagine that there are two groups of oligopolistic firms, one domestic and one foreign, serving an aggregate world market. We assume the inverse-demand function for this world market is:

$$P = P\left(\sum_{i=1}^{n} q_i + \sum_{j=1}^{m} q_j\right)$$

where, P – price of output;

q_i – output of firm i in country N;

q_j – output of firms j in country M;

n and m – total number of firms in countries N and M, respectively.

This gives a profit function for firm i

$$\pi^i = q_i P\left(\sum_{i=1}^{n} q_i + \sum_{j=1}^{m} q_j\right) - cq_i$$

where, π^i – profit for firm i in country N;
c – marginal cost of output.

And the marginal cost is constant and identical for firms in countries N and M. For the present, we assume that there are no fixed costs. It is also assumed that there are no transport costs or other barriers to trade in goods and/or services.

Accordingly, under Cournot-Nash assumptions, the first-order condition for a maximum for each firm in country N is:

$$\frac{d\pi^i}{dq_i} = P + q_i P' - c = 0$$

An identical expression holds for each firm, j, located in country M.

3.4. The Results for Competing Regulators

Before proceeding, we will assume that a position has been reached in which the country N regulator licenses a number of firms, n, and country M regulator regulates m firms. In order to look at the effect of licensing further firms, we will observe the effect of increasing n on the domestic market (N) and the world (N+M). The following quest will be to test the consequences of extra licensure on regulator(s)' welfare.

In the symmetric equilibrium for firms' outputs, we get

$$P([n+m]q) + qP'([n+m]q) - c = 0.$$

Hence, the effect of country N's regulator's licensure of one more firm on the output of each firm is:

$$\frac{dq}{dn}(\equiv q') = -\frac{[P'q + P''q^2]}{(n+m+1)P' + (n+m)qP''}.$$

It should be noted here that the denominator is negative according to standard stability conditions of Seade (1980).

Next, the level of profit of each firm is:

$$\pi^i = q(n+m)P([n+m]q(n+m)) - cq(n+m),$$

so, the effect of changing n is:

$$\frac{d\pi^i}{dn} = q^2 P' + qq'P'(n+m-1).$$

Now, aggregate profit in country N is:

$$\Pi^N = n\pi^i,$$

where n is the total number of firms. Then,

$$\frac{d\Pi^N}{dn} = \pi^i + n\frac{d\pi^i}{dn} = \frac{(n-m-1)P'P'q^2 - q^3P'P''(m)}{(n+m+1)P' + (n+m)qP''}. \tag{1}$$

Given that the denominator of (1) is negative because of Seade's stability condition, we have

Proposition I. $p'' \geq 0$ is a sufficient condition for $d\Pi^N/dn > 0$ to hold.

Therefore, we can state that if $p''=0$ (linear demand), or $p''>0$, then if country N licenses another firm, its aggregate profits will rise.

Employing Seade's E, the elasticity of the slope of the inverse demand curve, this result can be strengthened as follows. Assume that the initial position has $n = m$. Then $n - m - 1 < 0$ and $\frac{d\Pi^N}{dn} > 0$ if $-P'P'q^2 - q^3P'P''m < 0$.

Proposition II. Starting from a position with n = m, it is necessary and sufficient that E<1/m for Π^N to increase as country N licenses additional firms.

Proof. We mentioned that:

$$-P'P'q^2 - q^3P'P''m < 0$$

is the necessary and sufficient condition. Rearranging this gives:

$$-\frac{qP''}{P'} < \frac{1}{m}$$

and, according to Seade, p. 483 ($E = -qp''/p'$), then:

$$E < \frac{1}{m}$$

where, E – the elasticity of the slope of the inverse demand curve.

The implication of this result is that if the regulator is only concerned with profits, $\alpha>0$ and $\beta=0$, then issuing an additional license will add to aggregate profit. Both regulators are faced with the same incentives. Hence from any position with an equal number of licenses issued by each country, both have an incentive to issue more. These observations lead to Theorem 1.

Theorem 1. If the regulator is only concerned with aggregate profit and $E<1/m$, regulation will lead to the competitive outcome (where P=MC=MR).

Proof. We have shown that if we start from a position when $n = m$, an increase in n raises aggregate profit in country N, so the regulator will admit more firms. The same argument applies to country M. Hence the aggregate number of firms in both countries N and M increases. This process has no limit and thus converges to the competitive equilibrium.

Now, we introduce the effect of firm entry on price when all firms produce output q.

Since $P{=}P\big((n+m)q\big)$ then, $\dfrac{dp}{dn}{=}P'q{+}P'(n+m)q'{=}\dfrac{P'P'q}{(n+m+1)P'{+}(n+m)qP''}{<}0.$

The above equation demonstrates that the increase in the number of firms will reduce price (since the denominator is negative by the stability condition). This can now be combined with the profit effect to determine the change in the regulators' payoff.

Theorem 2. If the regulator is concerned about profit and price ($\alpha{>}0$, $\beta{>}0$), regulation will lead to the competitive equilibrium if $E{<}(1/m)((\alpha{+}\beta)/\alpha))$.

Proof. In this case

$$\frac{dU_R}{dn}{=}\alpha\left[\frac{((n-m-1)P'P'q^2{-}q^3P'P''(m))}{(n+m+1)P'{+}(n+m)qP''}\right]{-}\beta\left[\frac{P'P'q}{(n+m+1)P'{+}(n+m)qP''}\right]=$$

$$=\frac{\alpha\big[(n-m-1)P'P'q^2{-}q^3P'P''m\big]{-}\beta\big[P'P'q\big]}{(n+m+1)P'{+}(n+m)qP''}$$

then, since the denominator is negative because of the stability condition,

$$\frac{dU_R}{dn}{>}0 \ \text{ if } \ \alpha((n-m-1)P'P'q^2{-}q^3P'P''m){-}\beta P'P'q<0$$

now, set $n{=}m$

$$-(\alpha{+}\beta)P'P'q^2{-}\alpha q^3P'P''m{<}0$$

$$-\alpha q^3P'P''m{<}(\alpha{+}\beta)P'P'q^2$$

$$-\left(\frac{\alpha}{\alpha+\beta}\right)\frac{qP''m}{P'}{<}1$$

$$-\frac{qP''}{P'}{<}\frac{1}{m}\left(\frac{\alpha+\beta}{\alpha}\right)$$

$$E{<}\frac{1}{m}\left(\frac{\alpha+\beta}{\alpha}\right).$$

The response function is positive when $n = m$. In such a case the regulator has an incentive to increase the number of firms n.

Note here that since $(\alpha + \beta)/\alpha{>}1$, this is a weaker constraint than the earlier analysis (with $\beta{=}0$). We conclude from the present generalization that the regulators' capture to industry's profit expands licensure up to the competitive limit. What is more surprising is that while attaching some weight to product prices, regulators rivalry still leads to an increasing number of firms. Each country's regulator has an incentive to expand jurisdiction by capturing a larger share of the world market, though payoffs are constrained by the strategic moves of a competing regulator.

Fixed Costs

We developed our previous analysis on the assumption of zero fixed costs. By relaxing this assumption and introducing fixed costs, we can rewrite the firm's profit and first-order conditions as:

$$\pi^i = P\big((n+m)q\big)q - cq - F$$

where, F – fixed costs, and:

$$\frac{d\pi^i}{dq} = P'\big((n+m)q\big)q + P - c = 0.$$

The utility function of country N regulator is written as:

$$U^N = \alpha\Pi^N - \beta P^N = \alpha\big[n\Pi(n+m)\big] - \beta P(n+m).$$

The first-order condition for choice of n is:

$$\text{(2)} \qquad \frac{dU^N}{dn} = \alpha\pi(n+m) + \alpha n\frac{d\pi}{dn} - \beta\frac{dP}{dn} = 0$$

similarly, the first-order condition for the country M regulator is:

$$\text{(3)} \qquad \frac{dU^M}{dn} = \alpha\pi(n+m) + \alpha m\frac{d\pi}{dn} - \beta\frac{dP}{dn} = 0.$$

Note that equations (2) and (3) will determine the values of n, $m>0$. But the result will not be the same as the competitive outcome because fixed costs limit firm entry.

Consider the effect of changing F, α and β on the equilibrium determined by equations (2) and (3). It is clear that an increase in fixed costs limits firm licensure. Now, find the effect of an increase in the value of α relative to β which represents greater weight being placed on profits relative to price. We consider a symmetric equilibrium where $n = m = v$. The first-order condition for the utility function of the regulator in country N reads:

$$\alpha\pi(2v) + \alpha v\frac{d\pi}{dn} - \beta\frac{dP}{dn} = 0$$

and that in country M is identical. By substitution:

$$\alpha\big[P(2v)q(2v) - cq(2v) - F\big] + \alpha v\left[\frac{2P'P'q^2 + P'P''q^3}{(2v+1)P' + (2v)P''q}\right] - \beta\frac{P'P'q}{(2v+1)P' + (2v)P''q} = 0.$$

In order to calculate the effect of the change in the number of firms on the regulators' utility function while taking fixed costs into consideration, we will simplify by assuming $P''=0$ (linear), therefore, the objective function is now:

$$\alpha\left[P(2v)q(2v)-cq(2v)-F\right]+\alpha v\frac{2}{(2v+1)}P'q^2-\beta\frac{P'q}{(2v+1)}=0.$$

Now, let $\mu = \alpha/\beta$, which is the weight placed on profits relative to prices. Then:

$$\mu\left[P(2vq(2v))q(2v)-cq(2v)-F\right]+\mu\left(\frac{2v}{2v+1}\right)P'\big(2vq(2v)\big)q^2(2v)-\left(\frac{1}{2v+1}\right)P'\big(2vq(2v)\big)q(2v)=0.$$

By extending the previous analysis, we have:

$$\frac{dq}{dv}=-\frac{2qP'+2q^2P''}{(2v+1)P'+2vqP''}.$$

So, because $P'' = 0$ for the linear case, the above equation collapses to:

$$\frac{dq}{dv}(\equiv q')=-\frac{2q}{(2v+1)}$$

and (4):

$$\frac{dv}{d\mu}=\frac{\left[(Pq-cq-F)+\left(\frac{2v}{2v+1}\right)P'q^2\right]}{\left[2P'q^2+\mu\left[\frac{2}{(2v+1)^2}\right]P'q^2+\left[\frac{2}{(2v+1)^2}\right]P'q+(4v-2)P'qq'+\mu\left[\frac{2v}{2v+1}\right]4P'qq'-\left(\frac{1}{2v+1}\right)2P'q'\right]}.$$

In equation (4), the numerator is $Pq-cq-F+\left(\frac{2v}{2v+1}\right)P'q^2$.

But $P-c=-P'q$, so the numerator becomes

$$-P'q^2-F+\left(\frac{2v}{2v+1}\right)P'q^2=-F\left[1-\left(\frac{2v}{2v+1}\right)\right]P'q^2=-F\left(\frac{2v+1-2v}{2v+1}\right)P'q^2=-F\left(\frac{1}{2v+1}\right)P'q^2.$$

So, the numerator of equation (4) is negative if F and v (i.e. n or m) are large. Equation (4) denominator reduces to:

$$2P'q[4qmv^2+4qmv-4qm-3]$$

which is negative if v and m are large.

Therefore, we can infer that $dv/d\mu>0$ will hold if fixed costs (F) and the number of firms, $v = n+m$, are large.

Proposition III. With F>0, the more concerned is the regulator with profit, the greater the number of firms licensed.

The introduction of fixed costs to firm profits limits the size of output. This constraint results in limiting firms' market share. Thus economies of scale are not fully exploited, so the price rises. The regulator's capture with industry profits represents a sufficient drive for extra licensure. However, the existence of fixed costs prevents the attainment of the competitive outcome.

3.5. One Country Regulated

Proposition IV. With only one country regulated, the total number of firms is the same as when neither market is regulated. This is true whether or not there are fixed costs.

The demonstration of this result is straightforward. Since one country is unregulated, firms will enter the market in that country whenever profits are positive. If the regulator reduces the number of domestic firms, then to restore zero profit equilibrium, the number of firms in the unregulated country must increase by a matching amount so there is no impact on price, total output or profit. In other words, the regulator has no incentive to control the number of domestic firms. This illustrates in a powerful and simple fashion how international competition limits the opportunities for regulation. What is more surprising and will now be demonstrated, is that when both countries co-ordinate their policy decisions on the number of firms licensed, the outcome represents a great departure from the *laissez-faire* equilibrium.

3.6. Colluding Regulators

The colluding regulators' model represents a joint regulatory decision on the number of firms licensed curtailing the competitive forces witnessed under the competing and one country regulated models. This model assumes countries N and M face a single market and regulator. He or she attempts to maximize interest through maximizing accruing profits. The combined objective function is assumed to be the sum of the two country model:

$$U_R = 2\left(\alpha\pi^N - \beta P^N\right) = 2[\alpha\Pi^N(n+m) - \beta P(n+m)].$$

Set $n = m$, then:

$$U_R = 2\left[\alpha n\Pi(2n) - \beta P(2n)\right]$$

and the first-order condition under regulatory collusion is:

$$\frac{dU_R}{dn} = 2\left[\alpha\pi(2n) + \alpha n 2\frac{d\pi}{dn} - 2\beta\frac{dP}{dn}\right] = 0$$

or, in symmetric equilibrium we can write:

$$\alpha\pi(2n^J) + \alpha n^J 2\frac{d\pi}{dn^J} - 2\beta\frac{dP}{dn^J} = 0$$

where, n^J – the joint number of firms under a collusive regulatory decision.

For comparative purposes, the first-order condition for the competing regulators is:

$$\frac{dU_R}{dn}=\alpha\pi(n+m)+\alpha n\frac{d\pi}{dn}-\beta\frac{dP}{dn}=0$$

and in symmetric equilibrium

$$\alpha\pi(2n^C)+\alpha n^C\frac{d\pi}{dn^C}-\beta\frac{dP}{dn^C}=0$$

where, n^C – number of firms under competing regulators.

To simplify and with regulators' pecuniary interest in industry profits, assuming β=0, we rewrite the functions for colluding and competing regulators, respectively, as

(5) $$\alpha\pi(2n^J)+\alpha n^J 2\frac{d\pi}{dn^J}=0$$

and,

(6) $$\alpha\pi(2n^C)+\alpha n^C\frac{d\pi}{dn^C}=0.$$

Evaluating (5) at $n^J = n^C$ gives $\alpha n^C\frac{d\pi}{dn^C}\leq 0\cdot$ Therefore, $n^J = n^C$ is false, and $n^J < n^C$.

Proposition V. For β = 0, colluding regulators tend to limit licensure than competing regulators (n^J<n^C).

The above proposition stresses the importance of industry profits. We can, also, infer from Proposition *V* that if the weight of β (i.e. consumer pressure) is equal under competing and collusive regulators, the former will naturally tend to license more firms than the latter ($n^J < n^C$). However, there could be a higher level of β under the collusive case which equates licensure ($n^J = n^C$) under both types of regulation. To proceed, if the weight of α is negligible compared to β under the collusive regulators' case and relative to the case of competing regulators, we expect more firm licensure under collusion ($n^J > n^C$).

Intuitively, the result drawn in Proposition *V* together with the following inferences hold whether fixed costs are added or not.

3.7. An Illustrative Example

Following the logic applied in our general case, we will use the inverse linear demand case to gain an intuition on firms' behavior. The inverse demand equation is now

$$P=a-bQ$$

where, $Q=\sum q_i+\sum q_j$

so, profit for firm i in country N is:

$$\pi^i = \left[a - b\left[\sum q_i + \sum q_j\right]\right]q_i - cq_i$$

where, Q – total output in the two markets;

$a,b > 0$ are market size and slope parameters of the inverse demand curve; also $a > c$.

The Cournot equilibrium quantity for each firm is:

$$q = \frac{a-c}{b(n+m+1)}.$$

Thus, the firm's profit function is:

$$\pi^i = \frac{[a-c]^2}{b(n+m+1)^2}$$

and, aggregate profit for country n firms is:

$$\Pi^N = n\pi^i = \frac{n[a-c]^2}{b[n+m+1]^2}$$

which gives:

$$\frac{d\Pi^N}{dn} = \frac{[a-c]^2}{b[n+m+1]^2} - 2\frac{n[a-c]^2}{b[n+m+1]^3}$$

at the symmetric equilibrium, $n = m$, so

$$\frac{d\Pi^N}{dn} = \frac{(a-c)^2}{b(2n+1)^3} > 0.$$

This shows, again, that regulators have an incentive to license more firms as entry is incremental to aggregate industry profit.

The Cournot equilibrium price is:

$$P = \frac{a+(n+m)c}{n+m+1}$$

and, the effect of increasing n is given by:

$$\frac{dP}{dn} = \frac{c}{n+m+1} - \frac{a+(n+m)c}{(n+m+1)^2} < 0$$

at the symmetric equilibrium with $n = m$

$$\frac{dP}{dn} = \frac{-(a-c)}{(2n+1)^2} < 0.$$

Now, putting profits and prices together to the competing regulators objective function, we have:

$$\frac{dU^N}{dn}=\frac{(a-c)}{(2n+1)^2}\left[\frac{\alpha(a-c)}{b(2n+1)}+\beta\right]>0.$$

This confirms the results of the competing regulators under the general case.

To observe this outcome differently, the reaction functions for countries N and M are derived and plotted using the first-order condition of the utility maxima for each of the countries' regulators. The assigned values to the parameters *a*, *b* and *c* in our present simulation are 100, 2 and 3, respectively.

By incorporating a fixed cost parameter, the first-order condition determining the regulator's reaction function is:

$$\frac{dU_R}{dn}=\alpha\left[\frac{(a-c)^2}{b(n+m+1)^2}-\frac{2(a-c)^2 n}{b(n+m+1)^3}-F\right]-\beta\left[\frac{c}{n+m+1}+\frac{a+(n+m)c}{(n+m+1)^2}\right]=0.$$

A similar expression applies to country M.

We will initially deal with the special case where F=0. For β<0 and α>0, it is readily seen that the reaction curves do not cross and conventional dynamics imply the number of firms explodes. That is, competition between two regulators results in the competitive solution (see figure 3). The pressure on each regulator to match licensures to capture a greater share of global profit is intense and in the end price is driven down to marginal cost. The same result holds when the only concern of each country's regulator is profit (see figure 4).

Using comparative statics for the parameters defined above, it is also noted that the increase in the weight of β expands licensure at an increasing rate. For α=1 and β=10, figure 5 demonstrates that the regulators continue to have a vested interest in maximizing their utilities (having extra profit share) and the impetus to license a further number of firms is reinforced by consumer pressure groups. This will, again, proceed and is interpreted as tending to the competitive outcome.

Proposition VI. In compliance with the general case and in the absence of fixed costs, the competitive outcome emerges where there are at least two competing regulators.

Proposition VI is a special case of no fixed costs. The presence of fixed costs limits the free entry number of firms and as each firm adds less to profit, the regulator will be inclined to admit extra firms to the industry.

By taking fixed costs into account (F>0), an equilibrium solution for the number of firms is realized. For F=1 and given the parameter values for the present analysis, the equilibrium number of firms as shown in figure 6 is 8. Intuitively, the previously mentioned Figure shows a declining number of firms licensed at increasing levels of costs. This result differs to a limited extent when an equivalent consumer pressure to producers is imposed (n = m = 9; see figure 7). Yet, as profit opportunities seem restricted for the regulator, compared to the case of F=0, consequently consumer pressure gets more aligned with that of the regulator so more firms are allowed to enter the market. Figure 8 demonstrates this result for α, F=1 and β=10. The equilibrium number of firms under the latter assumptions is 16.

The impact of the fixed cost constraint is further affirmed by scrutinizing figure 9. It can be derived from this that under free entry fixed costs are negatively related to firm licensure. The same holds in the case of the regulated outcome. However, the free entry outcome is more responsive to changes in firm licensures compared to its regulated similar due to economies of scale. For reasons of simplicity, we assumed in this instance that $c=0$, $b=1$, and $\beta=0$. Then,

$$\eta_0=0{,}5\left(\frac{a}{F^{1/2}}-1\right)$$

and:

$$\eta_2=0{,}5\left(\frac{a^{2/3}}{F^{1/3}}-1\right)$$

where η_0 – number of firms under free entry;

η_2 – number of firms under regulated entry by two competing regulators.

Proposition VII. With positive fixed costs and linear demand, the ratio of the number of firms under regulation to the free-entry number falls with the increase in fixed costs until the number of firms is equal.

Figures 9 and 10 show that by allowing them to vary, a lower value of fixed costs encourages a higher number of firms licensed. This tends to infinity and is asymptotic to the y-axis, as shown in the diagrams. However, the regulated number of firms tends to be less elastic to the change in fixed costs. This phenomenon is attributed to the ability of free entry markets to easily capture economies of scale and achieve higher levels of industry capacity utilization compared to its regulated counterpart. Based on our previous assumptions, it is interesting to note that there is a tendency for the regulated and laissez-faire outcomes to converge. This is perfectly achieved at a level of 10,000 fixed cost units when no firms are licensed.

Now consider regulators' collusion. Assuming $\alpha=\beta=1$, the first-order condition for a maximum is:

$$\frac{dU_N}{dn}=\alpha\left[\frac{2(a-c)^2}{b(2J+1)^2}-\frac{8(a-c)^2J/2}{b(2J+1)^3}-F\right]-\beta\left[4\frac{c}{2J+1}+4\frac{a+2Jc}{(2J+1)^2}\right]=0$$

where J – the total number of firms based on the regulators' colluded decision ($n=m$, $2n=J$).

Proposition VIII. With F=0 or F>0, the monopoly number of firms is the utility maximizing solution for colluding regulators

Figures 11 ($\alpha=1$, $\beta=0$ and $F=0$), 12 ($\alpha=1$, $\beta=0$ and $F=1$) and 13 ($\alpha=\beta=1$ and $F=1$) show the result of proposition VIII whereby the number of firms is rounded to a single firm serving the world market (countries N+M). Using comparative statics for fixed costs in relation to the number of firms, the result is still a monopoly (figure 14 shows n when $F>0$ and $\beta=0$, while figure 15 shows the effect of changing fixed costs on the number of firms when $\alpha=\beta=1$). Intuitively, this structure has an adverse effect on consumer welfare as P>AC, MR=MC represent the monopoly equilibrium. In this case, the firm and industry coincide, profit-maximized and output limited. The expected outcome is that the regulator's welfare is aligned with that of the industry.

Proposition IX. The monopoly outcome promises the least consumer welfare.

This is obvious when we attempt to simplify our analysis by manipulating the joint profit function:

$$\eta_1=\left[\frac{1}{4}\frac{a^2}{F}+\frac{1}{36}\frac{\sqrt{3}a^2\sqrt{\dfrac{2a^2+27F}{F}}}{F}\right]^{1/3}-\frac{1}{6}\frac{a^2}{F\left[\dfrac{1}{4}\dfrac{a^2}{F}+\dfrac{1}{36}\dfrac{\sqrt{3}a^2\sqrt{\dfrac{2a^2+27F}{F}}}{F}\right]^{1/3}}-\frac{1}{2}$$

where η_1 – number of firms under collusive entry.

Figure 16 demonstrates proposition IX. In the figure, the change in fixed costs has a considerable impact on the free entry number of firms, followed by both regulated outcomes (competing vs. colluding regulators). However, in the case of regulators' collusion, the effect is 'sticky' for a single firm. Therefore, if consumer pressure is not sufficient to encourage firm licensure, the monopoly outcome will still be the most appealing solution to the regulator.

4. Conclusion

Under the neo-capture paradigm introduced in this paper, competition between self-interested regulators is likely to result in a larger number of firms in the market bringing equilibrium closer to the social optimum. This is true even with fixed costs. Changing the nature of regulator competition alters the results. That is to say, in a closed economy or with regulators colluding there is more likely to be a bias in favor of the regulator and producer while consumer welfare is reduced. This will, of course, be accompanied with a lower quantity of output, higher price and lesser product diversification. In contrast to traditional capture theories, the surprising feature is how much competitive discipline is achieved by the presence of even a second competing regulator.

Finally, some limitations of the present paper have to be noted though it is unforeseen that they would alter model results or its contrived policy implications once expedited. It would be interesting to test the forwarded theory on real-life cases. For example, the effect of deregulation on firm entry in banking, securities and/insurance industries from a neo-capture perspective can be studied. Preliminary data inform that the transformation of interest group pressure to account for financial services consumer groups, in addition to traditional producer group counterparts, during periods of policy reversal (that is to say, deregulation) have culminated in increased firm entry, surmounting consumer pressure over product price, quantity and diversity. However, these latter extensions go beyond the scope of the present paper, and these, pencil areas for future research. We believe, still, that these propositions do not affect the robustness of the exposition and results of the theory in hand.

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Figures

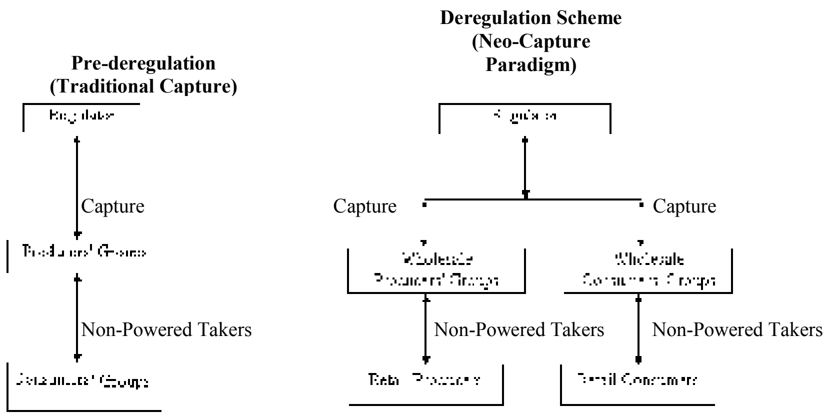

Fig. 1. A Comparative Relational Diagram of Traditional Capture and the Neo-Capture Paradigm

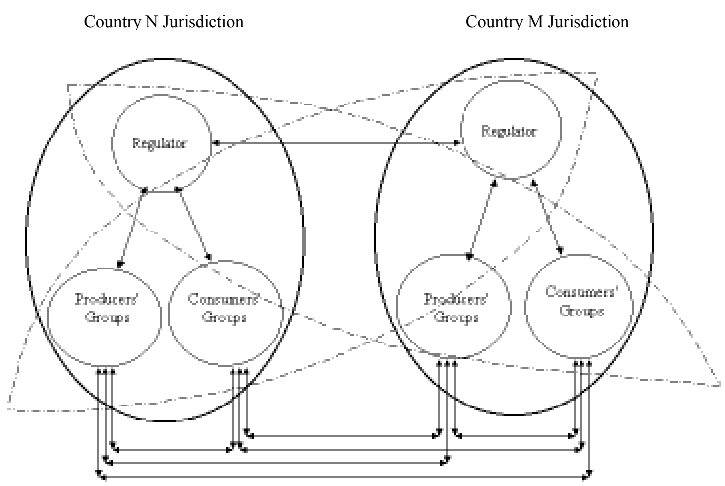

Fig. 2. A Schematic View On The Strategic Jurisdictional Inter-links Between Competing Regulators

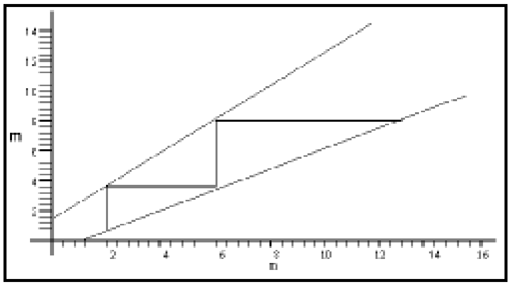

Fig. 3. Two Strategically Competing Regulators (α>0 and β<0)

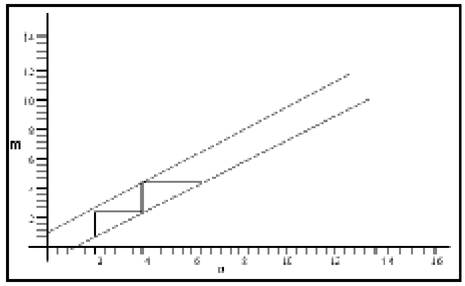

Fig. 4. Two Strategically Competing Regulators (α>0 and β=0)

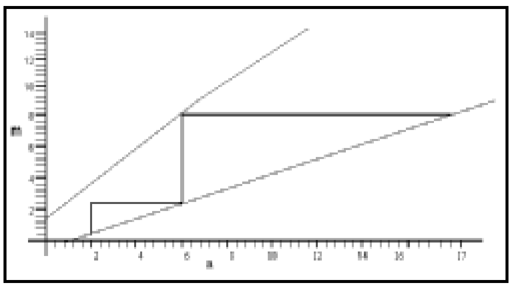

Fig. 5. Two Strategically Competing Regulators (α=1 and β=10)

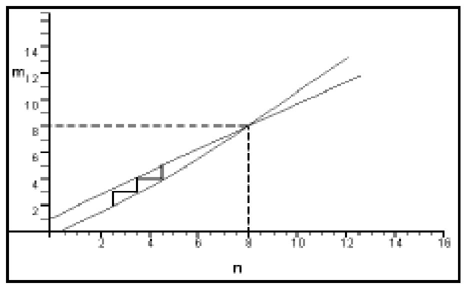

Fig. 6. Two Strategically Competing Regulators (α>0, β=0 and F=1)

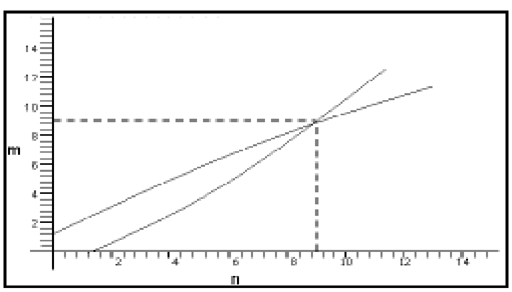

Fig. 7. Two Strategically Competing Regulators (α>0, β<0 and F=1)

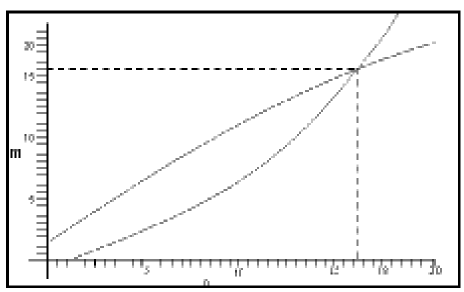

Fig. 8. Two Strategically Competing Regulators (α=1, β=10 and F=1)

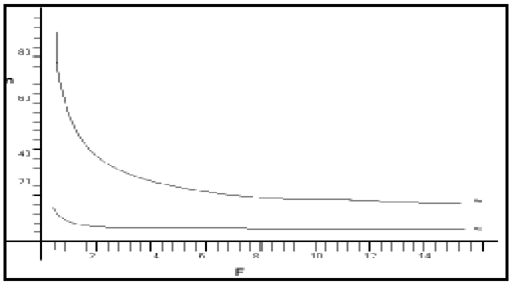

Fig. 9. Two Strategically Competing Regulators
(α>0, c=0, b=1, and β=0)

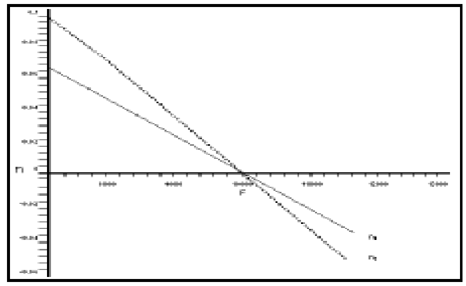

Fig. 10. Convergence of Laissez Faire and two Strategically Competing Regulators
(α>0, c=0, b=1, and β=0)

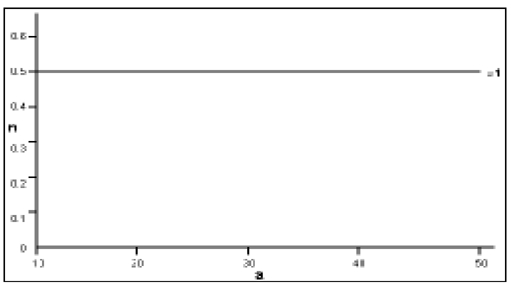

Fig. 11. Two Strategically Colluding Regulators
(α>0, β=0 and F=0)

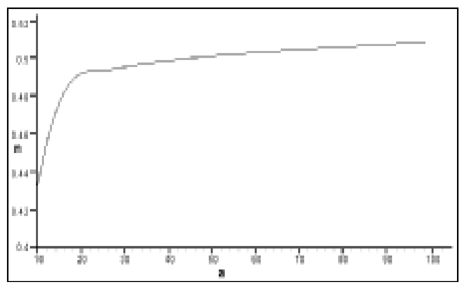

Fig. 12. Two Strategically Competing Regulators
(α=1, β=0 and F=1)

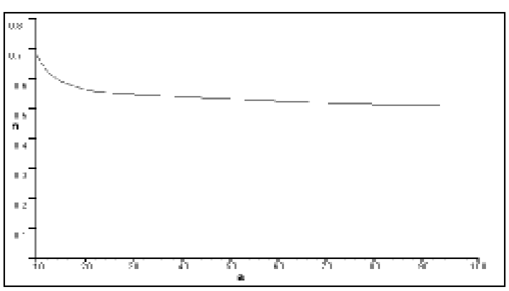

Fig. 13. Two Strategically Competing Regulators
(α=β=1 and F=1)

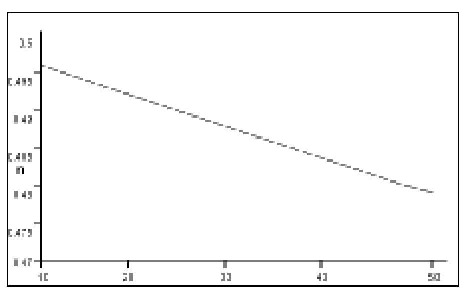

Fig. 14. Two Strategically Competing Regulators
(α>0, β=0 and F>0)

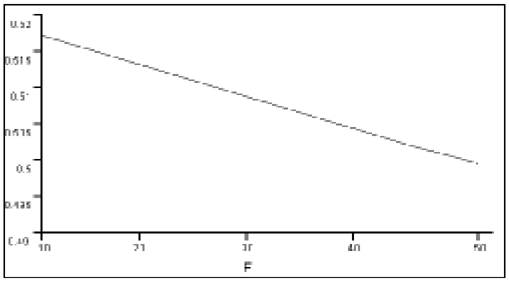

Fig. 15. Two Strategically Competing Regulators
(α=β=1)

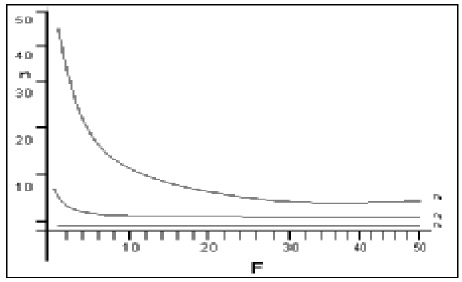

Fig. 16. Laissez-faire, Strategically Competing and Colluding Regulators
(α>0, c=0, b=1, and β=0)