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Private benefits and market competition

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Abstract

This paper deals with corporate governance and competition policy. The impact of private benefits extraction on the values of oligopolistic firms is analyzed. Private benefits are assumed to generate costs which create price distortion on the product market. For a wide range of industry concentrations, we prove that this may affect the profit (i.e. the value) of the firms in a positive sense since the intensity of rivalry is reduced by the price distortion. This reduces incentive to merge in the industry ; antitrust implications are therefore discussed.

In oligopoly, private benefits extraction may enhance the profits while still generating a welfare loss: this suggests that corporate governance cannot be divorced from competion policy in industries where managerial opportunism generates operating costs.

Keywords : Corporate governance, oligopoly, antitrust regulation
JEL classification : G3, L1, L4.

1 Introduction

Corporate governance deals with "the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment", (Shleifer and Vishny, 1997). In a market economy, competition is the most powerful mechanism contributing to global efficiency, which ensures by itself good governance. This point of view has been extensively discussed in the literature (for recent surveys see Allen and Gale, 2000, Buccirossi and

Spagnolo, 2007). Market forces eliminate the firms whose managers waste the resources and/or do not exert sufficient effort to increase productivity and promote new investments. Even if the shareholders and the managers interests are not perfectly aligned, the last word belongs to the market, including the market for corporate control which allocates at best the financial resources and the management skills.

Product market imperfections stimulate managerial opportunism (Hart, 1983) and then creates the need for good governance to restore shareholders gains, while when the market becomes more competitive, incentives to shirk are reduced. Then agency problems are inherent to distortions of competition in the product market.

According to Tirole (2006), four main sources of managerial opportunism may lead the management not to act in the shareholder's best interest (i) insufficient effort (ii) extravagant investment (iii) entrenchment strategies (iv) self-dealing. Private benefits or perks is the more usual form of self-dealing behavior in company; the responsiveness of the financial markets to them is high. Clearly private benefits generate costs which are not reported as themselves under the accounting procedures; in addition they do not exclusively accrue to the top managers. Then private benefits may hugely proliferate at any level of the hierarchy, through a system of mutual arrangements bringing small advantages or bribes. This kind of internal social system undoubtedly comforts the political power of the top managers over the organization; to some extent it contributes to the alignment of the individual interests but at a substantial cost : the private benefits may affect the whole cost structure of the firm and not only the dividends distributed, and then have some impact on the pricing decisions. This paper is aimed at exploring this issue in an oligopoly context.

We will consider n firms involved in oligopoly competition (quantity or price setting). The financial structure of each firm is close to the equity model of Jensen & Meckling (1976), which is the seminal contribution to managerial opportunism with private benefits : the manager holds a part α of the equity so that the perquisites he enjoys are partially financed by him. In addition, each firm is made of a two-tier organizational structure and the perquisites yield an additional unit cost which is fixed by the managers at the upstream level and then passed on the downstream unit. In the product market the n downstream units compete on the basis of these perquisites costs. This way we capture the idea that private benefits are diluted in the organization and disguised as operating costs. This is the best trick to escape from auditors'vigilance. As the unit costs are distorted, so are the prices/quantities prevailing on the oligopolistic market.

In a symmetric oligopoly, we will prove that the value of the firm - measured by the profits- is inversely related to the ownership concentration, except in the monopoly case. Contrary to the conventional beliefs, managerial opportunism does not undermine necessarily the profitability. It is not per se detrimental to the shareholder value as it contributes to restore a part of the rent through the cost distortions induced in the organization which dampen the intensity of product market rivalry.

The rest of the paper is organized as follows. Section 2 is devoted to the statement of the model in a quantity-setting context with a general inverse demand function. Equilibrium conditions are given and dominance relations are proved in the symmetric case, where the firms are identical, notably in terms of ownership structures. The beneficial impact of managerial opportunism on the value of the firms is established. Section 3 is devoted to horizontal merger incentives and implications in terms of anti-trust policy both in a quantity and price setting oligopoly. In section 4, we extend the model to duopoly situations where the ownership structures are endogenously designed in a preliminary competing phase. We show that competing on ownership structure leads to maintain indirectly some degree of managerial opportunism when the firms compete in prices. Concluding remarks are given in the last section.

2 Outside financing in a quantity-setting oligopoly

Let us consider n firms involved in a Cournot competition in a monoproduct industry. Let q_i the output of firm $i = 1, . ., n$. The market price of the homogenous good is determined by the total output quantity $q = \sum_{i=1}^{n} q_i$. The market demand is given by the inverse demand function $p(q)$, with $p' < 0$. For simplicity, we assume that the production costs are zero, so that $P_i(q) = p(q)q_i$ stands for the profit of firm i. Preliminary to competing on the product market, each firm goes through a financial phase similar to Jensen & Meckling equity model (1976), where the owner-manager of firm decides to sell a part of equity while still keeping the full control of the company. Let us formalize this as a three stage game

- *At stage 1*, the owner manager of firm i makes a contract with outside investors on selling $(1 - \alpha_i)$ of equity share for K_i The ownership structure (or concentration) of firm i , $\alpha_i \in [0, 1]$ is exogenously given.
- *At stage 2*, the manager i faces the managerial opportunism temptation. Private benefits extraction takes the form of an additional unit cost g_i which is fixed by the manager and passed on the organization, actually

borne on the shoulders of a downstream unit (for instance a marketing department) .

- *At stage 3*, The downstream units set simultaneously the output quantities q_i.

In this game, the manager i gets two types of returns: the reported income V_i and the private benefits $F_i = g_i q_i$. The reported income includes the sales of equity made at stage 1. It is then given by $V_i = \alpha_i(P_i - F_i) + K_i$, as $(P_i - F_i)$ stands for the dividend . As in Jensen-Meckling, the preferences of the manager encompass both types of incomes through an utility function, $U_i(V_i, F_i)$. For the sake of exposure, utility U_i is assumed to be additive i.e. it coincides with the full gain of the manager, $U_i = V_i + F_i$. so that $U_i = \alpha_i p q_i + (1 - \alpha_i) g_i q_i + K_i$. The downstream unit payoff is the operating profit $\Pi_i = (p - g_i)q_i$ which incorporates the perquisites cost. Finally, the outside investors gain $G_i = (1 - \alpha_i)(p - g_i)q_i - K_i$ is the difference between the dividends received and the amount paid to get the shares. As a result, the sum of the payoffs of the manager and the investor equals the profit :

$$U_i + G_i = P_i.$$

Consequently the contract of stage 1 amounts merely to share the profit among the parties.

2.1 Equilibrium analysis

For given values of the K_i, the subgame of stages 2 and 3 resorts to a two-tier organizational structure of the firms where, at the upstream level, the managers simultaneously choose the perquisites costs g_i,and, at the downstream level, the marketing departments fix the quantities q_i to be sold in an imperfectly competitive product market. When $\alpha_i = 1$, the perquisites cost g_i stands for a standard transfer price between the upstream and downstream units, since the upstream payoff equal to the total profit pq_i of the vertical structure (disregarding the constant K_i); for $\alpha_i = 0$, it stands for a pure wholesale price between them, with an upstream profit reduced to $g_i q_i$. *Accordingly managerial opportunism amounts to combine the transfer pricing and the double marginalization arrangements with the ownership concentration α_i as the weighted coefficient.*

Let us assume that the gross profit function of the industry $P(q) = p(q)q$ is concave, namely :

$$2p' + p''q \leq 0, \tag{1}$$

so that the monopoly quantity q^m, solution of $p + p'q = 0$, is unique. Let q^c be the global quantity of the symmetric Cournot equilibrium, solution of $p + p'q/n = 0$. Condition (1) implies the inequality $2p'(q) + p''(q)q_i \leq 0, \forall q_i \leq q$, which guarantees the concavity of the profit pq_i of firm i and then the existence and the unicity of the Cournot equilibrium.

Two information structures leading to two equilibrium concepts can be defined in this three-stage game (cf. Fudenberg & Tirole, 1991),

- *The open loop case* where, at the beginning of stage 2, the downstream unit of any firm i does not observe the decisions taken at stage 1 by his rivals.

- *The closed loop case* where, at the beginning of stage 2, the downstream unit of any firm i observes the decisions taken at stage 1 by his rivals and then capture competitive interactions stronger than in the open loop case

As we will see later, both cases yield close equilibrium conditions and similar interpretations. For simplicity of exposure, we will concentrate on the open loop case. Let us solve it by backward induction

At stage 3, the downstream unit i determines the quantity sold q_i for any values of the quantities sold by the rivals, $q_j, j \neq i$. and the perquisites cost g_i. Accordingly, the first order maximization of the downstream unit i yields the incentive constraint :

$$(p(q_{-i} + q_i) - g_i) + p'(q_{-i} + q_i)q_i = 0, \tag{2}$$

where $q_{-i} = \sum_{j \neq i} q_j$.

At stage 2, in the open loop case, the upstream unit i maximization program incorporates the incentive constraint only of the her downstream unit i, as follows:

$$\begin{cases} \max_{q_i, g_i} [\alpha_i p q_i + (1 - \alpha_i) g_i q_i] \\ (p - g_i) + p' q_i = 0, \end{cases} \tag{3}$$

the solution of which defines the reaction function $g_i(q_{-i}), q_i(q_{-i})$, respectively of the perquisites cost and output of firm i.

At stage 1, the parties agree on a contract fixing the amount K_i yielding a dividend $(1 - \alpha_i)(p - g_i)q_i$ to the investor. A contract is acceptable if the gain of the investor G_i is positive, namely :

$$K_i \leq (1 - \alpha_i)(p - g_i)q_i. \tag{4}$$

If, as postulated in Jensen-Meckling, the investors are operating in a competitive financial market, no arbitrage opportunity may arise so that the manager may just offer $K_i = (1-\alpha_i)(p-g_i)q_i$. Otherwise capital K_i depends on the bargaining power of the parties. This has no impact on the perquisites costs and the quantities determined in further stages of the game. Hence the equilibrium characterization:

Proposition 1 *The open loop equilibrium is determined by the n-uple* $\{q_i^*, g_i^*, K_i^*\}$, $i = 1, . ., n$, *solutions of:*

$$\begin{aligned} g_i - (p + p'q_i) &= 0, & (5) \\ p + (3 - 2\alpha_i)\, p'q_i + (1 - \alpha_i)p''q_i^2 &= 0, & (6) \end{aligned}$$

$$K_i^* \leq (1 - \alpha_i)(p(q^*) - g_i^*)q_i^*. \quad (7)$$

Proof. Let $L_i = [\alpha_i p(q_{-i} + q_i)q_i + (1 - \alpha_i)g_i q_i] + \lambda_i\,((p - g_i) + p'q_i)$ be the Lagrangian of the program (3). First order conditions are:

$$\begin{aligned} \alpha_i\,[p + p'q_i] + (1 - \alpha_i)g_i + \lambda_i\,((2p' + p''q_i) &= 0, \\ (1 - \alpha_i)q_i - \lambda_i &= 0, \end{aligned}$$

that lead to relation (6) after eliminating multiplier λ_i. ■

When $\alpha_i = 1$, the manager is the single owner and keeps the whole control of the firm, the solution is $q_i^* = q^c/n$, $g_i^* = 0$. The managerial opportunism does not operate and the g_i stands for a transfer price equal to zero; the first best solution is found. When $\alpha_i \to 0$, managerial opportunism fully works and the manager is only interested in the downstream profit. This yields the standard double marginalization outcomes.

Let $p^* = p(q^*)$ the market price and $P_i^* = p^*q_i^*$ the equilibrium profits. Since $G_i^* + U_i^* = P_i^*$, equilibrium *profit* P_i^* *represents the value of firm* i[1], resulting from the interactions of the private benefits extraction made by the competing companies, whatever are the sharing rules of the financial contract signed between the owner-managers and the investors.

2.1.1 Perfect monitoring and agency costs

When the manager is perfectly monitored (at no cost) by the outside equity provider, he cannot dissimulate his perquisites expenses; he is made accountable for them and the dividend is merely equal to profit P_i; the manager's

[1] Actually the market value of firm i, namely the price potential investors are willing to pay to get the control of the firm

reported income becomes $V_i = \alpha_i P_i - F_i + K_i$ and utility U_i reduces to $U_i = \alpha_i pq_i + K_i$ while the outside investor gains $G_i = (1 - \alpha_i)pq_i - K_i$.; this is equivalent to have the managers not extracting private benefits and the perquisites costs g_i set to zero; this yields the symmetric Cournot standard equilibrium with a value of the firm $P_i^c = p^c q^c/n$, which also prevails when $\alpha_i = 1$. The single-owned firm corresponds to the zero-agency cost base commonly used the empirical literature (e.g. Ang *et al.*, 2000). *The ownership concentration α_i can be considered as an inverse indicator of the managerial opportunism prevailing within firm i.*

Accordingly, the agency cost Δ_i of firm i is the loss of total value due to the managerial opportunism, namely the loss of profit with respect to the perfectly reported case equivalent to the single-owned case, so that $\Delta_i = P_i^c - P_i^*$. The agency cost of firm i depends on all the ownership structures α_k, $k = 1, . , n$, in the industry, but also on the distortions inflicted to the equilibrium quantities and market price. Let us examine this in the symmetric case when all the competing firms have identical ownership structures, i.e. $\alpha_i = \alpha$.

2.2 Comparative analysis in a symmetric oligopoly

The comparisons will be made in terms of industry profit $P(q) = p(q)q$, since the firms are identical. All produce the same output level q/n. Let us denote $P^m = P(q^m)$ the monopoly profit.

Lemma 2 *There exists $n^* > 1$, such that for $n = n^*$, the oligopoly with private benefits duplicates the monopoly; i.e. $q^* = q^m$ and $P^* = P^m$.*

Proof. see Appendix. ■

Theorem 3 .

- *For $n = 1$, the monopoly with private benefits is dominated by the zero-agency monopoly.*
- *There exists $n_1 > 1$ such that, for $n \geq n_1$, the oligopoly with private benefits dominates the zero-agency cost oligopoly, i.e. $P^* \geq P^c$.*

Proof. See Appendix . ■

In the monopoly case, $n = 1$, theorem (3) indicates that the agency cost is $\Delta = P^m - P^* > 0$. There is a loss of profit induced by the private benefits extraction of the manager. Since this extraction takes the form of an unit cost increase, this induces an increase of the monopoly price (as an application of the standard Lerner formula) and then a fall in demand, anyway a decrease of the dividend (ex post inefficiency). This is not fully compensated by the private benefit gq to the manager since the decrease of dividend makes the fee K received from outside investor lower (ex ante inefficiency) . All together the situation is detrimental to the manager. The deadweight loss is shared between the manager who incurs a positive agency cost, and the consumer, since the surplus decreases with the price[2].

In the oligopoly case, theorem (3) is in line with the literature on vertical integration in oligopoly (e.g. Greenhut and Ohta, 1979, Lin, 1988, Bonanno and Vickers, 1988, Abiru *et al.*, 1998, Cavero *et al.* 1998) : in a decentralized setting, when the firms are price makers, downstream competition holds on prices which are bounded from below by the wholesale prices decided at the upstream levels so that the price cutting opportunities of the downstream units are restrained, specially when the products are weakly differentiated. This induces a *lower intensity of rivalry* in the industry which boosts the equilibrium profits. This effect works similarly here with the perquisites costs in the role of the wholesale prices, so that, even in a quantity setting, the equilibrium profits are better off when the managers behave opportunistically for a sufficiently high industry size. Moreover there is an optimal size n^* for which the industry profit equates the monopoly. An adequate mix of managerial opportunism and competition makes the industry restoring a monopoly rent. To some extent, competition makes the agency cost negative.

Such a phenomenon also appears in various organizational contexts where the firms depart from the standard pure profit maximization, for instance in the oligopoly model of Fershtman & Judd (1987) where the firms maximize a weigthed sum of profit and sales, or in a quantity-setting oligopoly made of firms using a full cost pricing rule (cf. Thépot & Netzer, 2008).

This result implies that the firms of the industry have no incentives to promote good governance mechanisms. As discussed above in subsection (2.1.1), perfect reporting is equivalent to the single-owner case which is dominated in terms of created value. Incentives to implement good governance practice are not privately profitable; they may come from outside the industry.

2.2.1 The closed loop equilibrium

In the closed loop (and symmetric) case, only stage 2 of the game differs : the upstream unit i maximization program incorporates the incentive constraint

[2] The monopoly situation is close to Jensen-Merckling, except that, for these authors, ex post inefficiency comes from the trade-off made between reported and private income through a (strictly concave) utility function U, without impact on the profit while, in our case, it comes from the price distortion induced by the perquisites cost diluted within the organization and that deteriorates the profit

of all the downstream units $j = 1, . ., n, .$ as follows :

$$\left\{ \begin{array}{l} \max_{q_j, g_i} [\alpha p q_i + (1-\alpha) g_i q_i] \\ (p - g_j) + p' q_j = 0,\ j = 1, . ., n. \end{array} \right. \tag{8}$$

This way the interaction between the firms at the downstream level is stronger. Of course, stage 1 is unchanged. Let us formulate the equilibrium conditions in the symmetric case.

Proposition 4 *The symmetric closed loop equilibrium is determined by the 3-uple $\{q^{**}, g^{**}, K_i^{**}\}$ solution of :*

$$\left\{ \begin{array}{l} p - g + p'q/n = 0, \\ \left[p + (3-2\alpha)\, p'q/n + (1-\alpha) p''(q/n)\right] - \left[(q/n) \frac{(n-1)(p' + (1-\alpha) p" q/n)(p' + p" q/n)}{(n-1) p" q/n + np'}\right] = 0, \\ K_i^* \leq (1-\alpha)(p(q^*) - g^{**}) q^{**}/n. \end{array} \right. \tag{9}$$

Proof. see appendix . ■

When $\alpha = 1$, the manager, the second equation of (9) becomes $p + p'q/n - q/n \dfrac{(n-1)p' \, (p' + p" q/n)}{(n-1)p" q/n + np'} = 0$, so that the closed loop structure yields the standard transfer pricing outcomes; it differs from the open loop structure where Cournot outcomes were found. This is due to the fact that closed loop equilibrium fully captures the strategic complementarity involved in quantity competition holding at the downstream level. Let us formulate the dominance relations holding in the closed loop case.

Lemma 5 *There exists a real value n^{**}, such that for $n = n^{**}$, the closed loop oligopoly duplicates the monopoly; i.e. $q^{**} = q^m$ and $P^{**} = P^m$.*

Proof. see Appendix. ■

Theorem 6 *.There exists two real values $m_1 \leq n^{**} \leq m_2$ such that, for $n \in [m_1, m_2]$, the closed loop oligopoly dominates the zero-agency oligopoly , i.e. $P^{**} \geq P^c$.*

Proof. follows immediately lemma (5). ■

Proposition 7 *For $n \geq n^*$, the open loop equilibrium dominates the closed loop, i.e. $P^* \geq P^{**}$.*

	Cournot standard	open loop	closed loop
q	$\frac{n}{(n+1)}$	$\frac{n}{n+3-2\alpha}$	$\frac{n^2}{n^2+2n-2\alpha n+1}$
g	0	$\frac{2(1-\alpha)s}{n+3-2\alpha}$	$\frac{(n-2\alpha n+1)s}{n^2+2n-2\alpha n+1}$
p	$\frac{s}{(n+1)}$	$\frac{(3-2\alpha)s}{n+3-2\alpha}$	$\frac{(2n-2\alpha n+1)s}{n^2+2n-2\alpha n+1}$
P	$\frac{ns}{(n+1)^2}$	$\frac{n(3-2\alpha)s}{(n+3-2\alpha)^2}$	$\frac{n^2(2n-2\alpha n+1)s}{(n^2+2n-2\alpha n+1)^2}$
S	$\frac{n^2 s}{2(n+1)^2}$	$\frac{n^2 s}{2(n+3-2\alpha)^2}$	$\frac{n^4 s}{2(n^2+2n-2\alpha n+1)^2}$
W	$\frac{(n+2)ns}{2(n+1)^2}$	$\frac{n(6-4\alpha+n)s}{2(n+3-2\alpha)^2}$	$\frac{n^2\left(4n-4\alpha n+2+n^2\right)s}{2(n^2+2n-2\alpha n+1)^2}$

Table 1: The linear case

Proof. see Appendix . ■

The dominance relations are qualitatively similar to the open loop case. Both confirm that managerial opportunism may enhance the value of the firm when it is mixed with imperfect competition.

In the closed loop case this occurs only for a bounded interval of values of n. When the industry becomes highly competitive, managerial opportunism is again detrimental to the firm's value : closed loop effect strengthens the strategic complementarity on the product market and then stimulates the competitive forces at work in the industry, narrowing the gap with the single-owned situations when the number of competitors in the industry increases.

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2.2.2 The linear demand case

Let us consider linear case, where the inverse demand function is of the form $p = s(1-q)$. Parameter $s > 0$ stands for the highest willingness to pay of the underlying consumer population. Analytical results are found, as given in table (1), where S and W stand respectively for the consumer surplus and the social welfare.

,,

Profit and ownership concentration The expression of the profits in

the linear case illustrate how the value of the firms depends on α, namely on the property rights, contrary to what assert in different contexts the Modigliani-Miller theorem, the Fisher separation principle and the Coase theorem. Managerial opportunism makes the value of the firm dependent on the ownership structure. This is a classical result. What is less classical is the sense of this dependency. For $n = 1$, the (open loop and closed loop) equilibrium profits increases with α. But, when $n > 2$ (≥ 2, in open loop), this is the converse. Since managerial opportunism is inversely related to the ownership concentration, this means that managerial opportunism may be a windfall for oligopolistic companies.

Profit and welfare Let us illustrate how profits and welfare vary with the market concentration, n. Straightforward computations indicate that,

- In the open loop case, $n^* = 3 - 2\alpha \in \left]1, 3\right]$, so that the profit is maximum for $n = 2$ or 3. (ii) the private benefits equilibrium is dominant for $n \geq 2$.
- In the closed loop case, similar computations yield $n^{**} = 1 - \alpha + \sqrt{(2 - 2\alpha + \alpha^2)}$ and the private benefits equilibrium is dominant for $n \in \left[2, \frac{1}{2\alpha - 1}\right]$.

The industry profit varies with the number of firms, as depicted both in the closed loop and open loop cases on figure (1). The Cournot profit curve is below them for $n \geq 2$. The monopoly value is reached for some $n > 1$. Managerial opportunism may contribute to the value created with the help of outside financing if the competitive forces operate appropriately in the industry.

In terms of welfare, managerial opportunism is never socially desirable, since, welfare W is an increasing function of ownership concentration α. Then for any value of n and α we have the inequalities :

$$W_c \geq W^* \geq W^{**}.$$

Managerial opportunism systematically works at the expense of the consumer who pays the final bill, since the product price decreases with α. Even if managerial opportunism is not detrimental to the value of the firms according to the phenomenon we put here into evidence, managerial opportunism is is not socially desirable since $\partial W^*/\partial\alpha > 0$: it does not compensate for the loss of consumer surplus. In words, regulation authorities cannot delegate governance issues to financial regulators: managerial opportunism does not reduce to a private affair between managers and shareholders. As it extorts the consumer surplus, it has to be considered as a public policy issue, with specific implications in terms of merger regulation and antitrust policy that are discussed now.

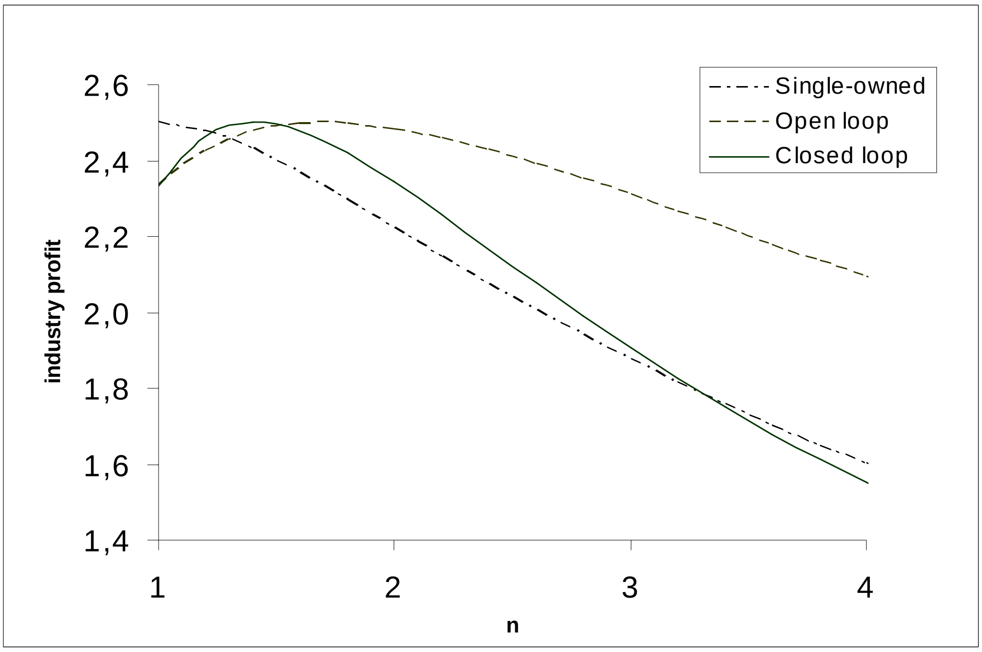

Figure 1: Industry profits for $\alpha = 0.65$ and $s = 10$.

3 Horizontal merger and managerial opportunism

Let us consider again the symmetric oligopoly situation where all the ownership structures of the firms are identical. and equal to α. Let us assume that firms $(1, ..m)$ intend to merge, with $m \leq n$. These firms are termed the insiders and firms $(m + 1, .., n)$, the outsiders. We assume that mergering m firms with identical ownership concentration α results in a firm with ownership α,as if $m - 1$ managers were eliminated.

We want to see whether the incentives to form coalitions depend on the ownership structure and are then related to the managerial opportunism. Incentives are made on the basis of the global values of the firms and not only on the gains of the managers (both coincide if the outside financing market is competitive, as indicated above). As discussed in Deneckere and Davidson (1985), this may depend on the type of competition (quantity vs price setting) prevailing in the final market. We continue to consider only the linear cases.

3.1 The quantity setting competition

Following Salant *et al.* (1983) approach, mergering firms $1, m$ amounts to have a $(n - m + 1)$-firm Cournot oligopoly with the insiders sharing the profit to a single firm. Incentives to form this coalition are effective if each insider gets a profit higher than the individual profit he would gain in a n-firm Cournot oligopoly, namely if $P^*(n - m + 1)/m \geq P^*(n)/n$, where $P^*(k)$ stands for the equilibrium industry profit in a $k-$firm private benefits oligopoly. In the linear symmetric case, the firms that merge are better off if (cf. table (1)):

$$\frac{(3-2\alpha)\,s}{m\,(n-m+4-2\alpha)^2} \geq \frac{(3-2\alpha)\,s}{(n+3-2\alpha)^2}, \tag{10}$$

namely when $m \geq m^* = n - 2\alpha + \frac{7}{2} - \frac{1}{2}\sqrt{(4n - 8\alpha + 13)}$, which defines the smallest number of firms for which a merger would be privately profitable. Clearly this number decreases with α. This means that managerial opportunism prevailing in the industry reduces the incentives to merge and then exerts a moderating effect on antitrust policy implementation.

3.2 The price-setting competition

The former result is still prevalent in the price-setting case. Let us examine this point in a differentiated price setting oligopoly where the demand system is symmetric is linear and given by the following standard specification (cf. Shubik, 1980, Denecker and Davidson, 1985):

$$q_i(p_i, p_j) = 1 - p_i - \gamma(p_i - \frac{\sum p_j}{n}); i, j = 1, .n, . \tag{11}$$

where $\gamma \geq 0$ is a substitutability parameter. When γ tends to zero, goods become independent, and when γ tends to infinity, goods become perfect substitutes. Transposing the computations made in the quantity setting case (cf. Appendix 5) yields the open loop equilibrium conditions :

$$\left(p_i \frac{\partial q_i}{\partial p_i} + q_i\right) + \frac{(1-\alpha_i) q_i}{\dfrac{\partial q_i}{\partial p_i}} \left(-\frac{q_i}{\dfrac{\partial q_i}{\partial p_i}} \frac{\partial^2 q_i}{\partial p_i^2} + 2\frac{\partial q_i}{\partial p_i} \right) = 0, i = 1, n. \tag{12}$$

When firms $1, . ., m$ merge, in the symmetric case, they fix the same price π_m, while the outsiders $j = m+1, . ., n$ fix their prices p_j independently. Then, the demand to insiders and outsiders given by (11) become respectively :

$$\begin{aligned} q_i &= 1 - \pi - \gamma(\pi - \frac{m\pi + \sum_{j \geq m+1} p_j}{n}), i = 1, ..m, \\ q_j &= 1 - p_j - \gamma(p_j - \frac{m\pi + p_j + \sum_{k \geq m+1, k \neq j} p_k}{n}), j = m+1, ..n. \end{aligned}$$

The coalition seeks to maximize the sum of insider profits $\sum_{i=1}^{m} \pi q_i$. Because of symmetry, Nash conditions derive from relations (12) which imply that the outsiders also charge the same equilibrium price $\bar{p}_m$. The following theorem establishes how the private profitability of merger is related to ownership concentration.

Theorem 8 *There exists a ownership concentration $\bar{\alpha}$ such that, in equilibrium :*

Proposition 9

- *for $\bar{\alpha} \leq \alpha \leq 1$, a merger of any size $2 \leq m \leq n$ is profitable to each of the merging parties*
- *for $0 \leq \alpha < \bar{\alpha}$, there exists $m^* < n$, such that mergers of size $m < m^*$ are not profitable to the each of the merging parties*

Proof. see Appendix ■

When $\alpha = 1$, in the absence of managerial opportunism, any merger is privately profitable, in accordance with Deneckere and Davidson's result (Theorem 1, p. 477). This result no longer holds when $\alpha < 1$. Some degree of managerial opportunism, encapsulated in an ownership structure lower than $\bar{\alpha}$, may make small coalitions not profitable, similarly to what happens in the quantity-setting framework although price competition resorts to strategic substitutability.

As illustrated on figure (1bis), threshold value

$$\bar{\alpha} = \left(\frac{\left(2\gamma^2(n-1)(n-2) - 4\gamma n + 14\gamma n^2 + 12n^2 - 2(n + \gamma n - \gamma)\sqrt{\left(\gamma^2(n-2)^2 + 4n^2(\gamma+1)\right)}\right)}{8n^2(\gamma+1)} \right)$$

becomes close to 1 when $n \to \infty$ and $\gamma \to \infty$:, when the market becomes perfectly competitive, coalition stability is altered by any slight occurrence of managerial opportunism triggered by dropping the value of α just below

1. Then the profitability of merger lacks of robustness with respect to the ownership structure.

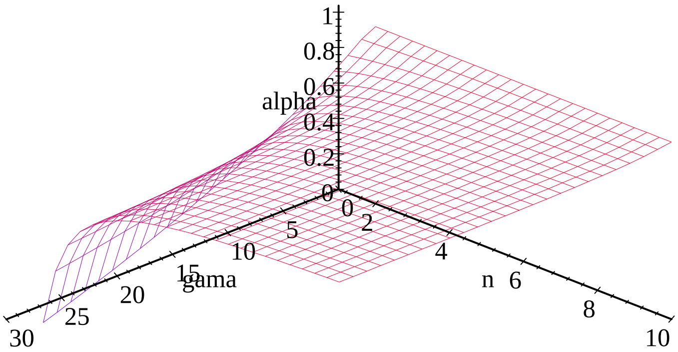

Figure 1bis : Privately profitable threshold $\bar{\alpha}$ in the (γ, n) space

3.3 Governance rules vs anti-trust policy

Antitrust policies are aimed at protecting the consumer against excessive concentrations and concerted practices. In turn, governance rules are meant to align the interests of the managers with those of the shareholders; in our context these rules are more meant to eliminate the private benefits through efficient reporting procedures than to design proper compensations schemes for the managers. Corporate governance and antitrust policy contribute to welfare improvement though they represent the objectives of different economic agents

Antitrust policies are costly : leniency programs for instance (Motta and Polo, 2003) are designed to allow individuals or firms freely to denounce collusive practices they are aware of, in exchange of some financial compensation or fines reduction; such a decentralized system reveals that improving the antitrust policy efficiency in terms of reducing investigation and instruction costs is a challenging public policy issue.

In our model, policy efficiency matters in a particular way : when ownership concentration is low, antitrust policies must only take care on large mergers opportunities, since for any type of market competition (quantity vs price-setting), small mergers are not beneficial to the merging parties. Of course this reduces the administrative costs incurred by the antitrust authority which can concentrate its investigations on potential large mergers. When ownership concentration is high, managerial opportunism is diluted and the small mergers become privately profitable; antitrust authority has to spend more resources to cope with all merger opportunities.

Clearly, small horizontal mergers are more frequent than large ones, as the former need only bilateral agreements while the latter take often the form of cartels based on multilateral negotiations, which are recognized as being less stable. Then when small mergers are not privately profitable, a significant number of arrangements to be considered by regulation authorities are irrelevant since they are never rationally implemented in the industry; this reduces substantially the administrative cost of the antitrust policy.

When governance rules work well in the industry, the expenses of the managers are perfectly reported and this yields to equilibrium conditions equivalent to $\alpha = 1$, as discussed in section 2.1.1. In this case, antitrust policy becomes more expensive and then less efficient. This suggests that antitrust policy and corporate governance may be complementary.

4 Ownership structure design

By now, the ownership concentrations α_i have been considered as exogenous. They reflect the capital structure namely a key component of organizational design of the firms actually revealing the degree of managerial opportunism at work within their organizations. In the line of *strategic incentives theory* (Fershtman & Judd, 1987, Vroom, 2006) we are going to examine how the ownership structure may be designed as a commitment device binding the firm to more or less welfare friendly behavior. This amounts to adding a preliminary stage (stage 0) where the firms simultaneously determine their α_i. As will are going to see, the results differ according to the type of market competition. Let us examine first the quantity-setting duopoly case.

4.1 The quantity-setting duopoly

For the sake of simplicity we restrict our analysis to the linear case with open loop interaction. At stage 0, the managers of the duopolistic firms choose different structures α_1 and α_2 leading in further stages to subgame equilibrium quantities $q_i^* = \frac{3-2\alpha_j}{4(2-\alpha_j)(2-\alpha_i)-1}$ and profits $P_i^* = s\frac{(3-2\alpha_j)(9-6\alpha_i-6\alpha_j+4\alpha_i\alpha_j)}{(15-8\alpha_i-8\alpha_j+4\alpha_i\alpha_j)^2}$.

In figure (2), area OAUB represents the pairs (α_1, α_2) where the open loop equilibrium dominates the Cournot equilibrium (corresponding to the point U) for both firms. Similarly, area OAVB deals with the closed loop case, that is smaller. When the firms have close financial structure, they are more likely to benefit from the competitive forces which make the managerial opportunism *in fine* favorable to the value created in the contract between the managers and the investors.

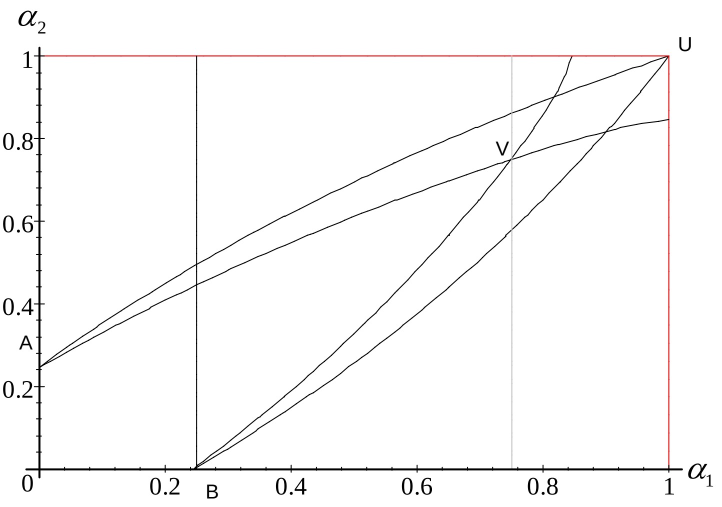

Figure 2: Quantity setting duopoly and ownership structure design

For $\alpha_1 = \alpha_2 = 1/2$, the duopolists get the optimum as they share the monopoly profit[3]. If both firms agree on fixing their ownership structures at this particular value, they can fully eliminate the competitive pressures on the product market. But this is a prisoner's dilemma situation since this optimum is not a Nash equilibrium arising from the stage 0 game: Straightforward computations show that $\partial P_i^* / \partial \alpha_i > 0$ and $\partial P_i^* / \partial \alpha_j < 0$, expressing that the equilibrium profits are strictly increasing with respect to the direct ownership structure and strictly decreasing with respect to the rival's. As a result, $\arg\max_{\alpha_i \in [0,1]} P_i = 1$. Then ownership competition yields Cournot outcomes with a 100% ownership and no managerial opportunism. Accordingly, when the firms are free to design the ownership structure, the incentives created in an imperfectly competitive market dissipate the managerial opportunism devils, so that ownership competition works as a self regulating device aimed at restoring the welfare at the expenses of the profits. As it is well known in strategic incentives theory (e.g. Vroom, 2006), this conclusion depends on the nature of competition: When firms compete in quantity, decisions are strategic substitutes; then the stage 0 choice is designed so as to motivate the manager to be more aggressive at stage 2 and to increase

[3]In the observable case this holds for $\alpha_1 = \alpha_2 = 1/4$

output in order to decrease the output of the rival. this is achieved by fixing the α_i at the highest possible value, namely $\alpha_i = 1, i = 1, 2$. Strategic substitutability in the product market leads to eliminate managerial opportunism. This is no longer true when the firms compete in price.

4.2 The differentiated price setting duopoly

Let us examine the ownership structure design problem in a differentiated price setting duopoly. Relations (12) determine the equilibrium prices and profits : In the linear case, we have:

$$
\begin{aligned}
p_i^* &= \frac{2\,(3-2\alpha_i)\,(4\alpha_j(1+\gamma)-7\gamma-8)}{\left[7\gamma^2+16(\gamma+1)(\alpha_1\alpha_2+6)-2\,(\gamma^2+16\gamma+16)\,(\alpha_2+\alpha_1)\right]^2}, \\
P_i^* &= \frac{2\,(2+\gamma)\,(3-2\alpha_i)\,(4\alpha_j(\gamma+1)-7\gamma-8)^2}{\left[7\gamma^2+16(\gamma+1)(\alpha_1\alpha_2+6)-2\,(\gamma^2+16\gamma+16)\,(\alpha_2+\alpha_1)\right]^2}.
\end{aligned}
$$

The equilibrium of the ownership structure design game is given by $\partial P_i^*/\partial\alpha_i = 0, i = 1, 2$. which yield $\alpha_1^* = \alpha_2^* = 3/2 - \frac{(\gamma+2)}{4\sqrt{(1+\gamma)}} < 1$[4]. This results contrasts with the quantity-setting situation since competition on ownership structures maintains here some degree of managerial opportunism through ownership structures strictly lower than 1. The higher is the substitutability between the products, the stronger is the managerial opportunism prevailing at equilibrium. Of course this results from the strategic complementarity inherent to the price competition which attenuates aggressiveness.

5 Conclusion

This paper was aimed at bridging the gap between governance issues and competition policy. We have discussed the impact of private benefits extraction on the values of the firms of an oligopolistic industry. Private benefits generate costs which create in turn price distortions on the product market and this may affect the profits of the firms in a positive sense when the intensity of rivalry is reduced. In this context corporate governance rules are useless since the defense of shareholders interests is mechanically ensured by the increase of market power of the firms. Private benefits extraction leads actually to consumer surplus extraction and a loss of welfare. Accordingly

[4] It can be proved that q similar result still holds in the closed loop case, with equilibrium ownership structure $\alpha^{**} = \frac{\left(64(1+\gamma)\left(\gamma^2+6\gamma+6\right)-8\sqrt{(1+\gamma)(2+\gamma)^2(8+\gamma^2+8\gamma)^2}\right)}{2(16+16\gamma)(8+\gamma^2+8\gamma)} \geq \alpha^*$.

the corporate governance concerns must be supported by economic regulators in industries where managerial opportunism generates operating costs. This suggests to extend the analysis to alternative forms of managerial opportunism, as the lack of effort or entrenchment strategies in asymmetrical information agency contexts.

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Proof of lemma (2). Under the assumptions made P is a concave function, such that:

$$P'(q) \geq 0, \text{ for } q \leq q^m \text{ and } P'(q) \leq 0, \text{ for } q \geq q^m, \tag{13}$$

In the symmetric case, we have $q_i^* = q^*/n$

and $P'(q^*) = -(q^*/n)\left[p'(3 - 2\alpha - n) + (1-\alpha)p''q^*/n\right]$ and . $For\ n = 1$, we have $P'(q^*) = -q^*(1-\alpha)(2p' + p''q) > 0$, according to relation (1). The sign of $P'(q^*)$ is the sign of -$[(3 - 2\alpha - n)p' + (1-\alpha)p''q^*/n]$ which becomes negative when $n \to \infty$. There exists a real number $n^* > 1$ such that, for $n = n^*$, $P'(q^*) = 0$. and $q^* = q^m$. Hence the result

Proof of theorem (3).

For $n = n^*$, the opportunistic oligopoly dominates the fair oligopoly. By continuity of the profit function, there exists a neighborhood $[n_1, n_2]$ of n^*,such that, for $n \in [n_1, n_2]$, we have $P^* \geq P^c$.

Let $\pi = p + p'q/n$,the marginal profit of any oligopolist. Since π is a decreasing function, we have:

$$\pi(q) \geq 0 \text{ for } q \leq q^c, \text{ and } \pi(q) \leq 0 \text{ for } q \geq q^c. \tag{14}$$

Clearly $\pi(q^m) = p^m(1 - 1/n) \geq 0$, then $q^m \leq q^c$. Let us compute $\pi(q^*)$. Thanks to relation (**??**), we have $\pi(q^*) = -(1-\alpha)(q^*/n)\,(2p' + p''q/n) \geq 0$, i.e. by (14), $q^* \leq q^c$. Thanks to lemma (2) and relation (13), for $n \geq n^*$, $q^m \leq q^* \leq q^c$, and then $P^m \geq P^* \geq P^c$. Hence the inequality $P^* \geq P^c$ holds for any $n \geq n_1$.

Proof of proposition (4).

Let $[\alpha_i p(q_{-i} + q_i)q_i + (1-\alpha_i)g_i q_i] + \sum_j \lambda_{ij}\left((p - g_j) + p'q_j\right)$, the Lagrangian of the program (8). FOC are :

$$\begin{cases} \alpha_i\,[p + p'q_i] + (1-\alpha_i)g_i + \lambda_{ii}\,(2p' + p"q_i) + \sum_{i\neq j}\lambda_{ij}\,(p' + p"q_j) = 0, \\ \alpha_i p'q_i + \lambda_{ij}\,(2p' + p"q_j) + \lambda_{ii}\,(p' + p"q_i) + \sum_{k\neq j\neq i}\lambda_{ik}\,(p' + p"q_k) = 0, j \neq i \\ (1-\alpha_i)q_i - \lambda_{ii} = 0. \end{cases} \tag{15}$$

Assuming that, for symmetry reasons that $\lambda_{ij} = \mu_i$,for $i \neq j$,yields

$$\begin{cases} p + (3 - 2\alpha_i)p'q_i + (1-\alpha_i)p''(q_i)^2 + \mu_i\sum_{i\neq j}(p' + p"q_j) = 0, \\ \alpha_i p'q_i + \mu_i\,(2p' + p"q_j) + (1-\alpha_i)q_i\,(p' + p"q_i) + \mu_i\sum_{k\ell\neq j\neq i}(p' + p"q_k) = 0, \end{cases} \tag{16}$$

which gives, in the symmetric case, relation (9) after eliminating μ_i.

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Proof of lemma (5). We have $P'(q^{**}) = -(q^{**}/n)\,[p'(3 - 2\alpha - n) + (1-\alpha)p''q^{**}/n + r]$, with

$$r = \frac{(n-1)n\,(p' + (1-\alpha)p"q^s/n)\,(p' + p"q^s/n)}{(n-1)p"q^s + p'n}, \tag{17}$$

For $n = 1$, we have $q^{**} = q^*$, and $P'(q^{**}) > 0$. the sign of $P'(q^{**})$ is the sign of $[p'(3 - 2\alpha - n) + (1-\alpha)p''q^{**}/n + r]$, which becomes also positive as $\lim_{n\to\infty} r = p'$. Then, as in the open loop case, there exists a real number $n^{**} > 1$ such that, for $n = n^{**}$, $P'(q^{**}) = 0$. and $q^* = q^m$. Hence the result.

Proof of proposition (7).

Let us consider function $h(q)$ defined as the left-hand side of relation (**??**), so that $h(q^*)=0$. Clearly, $q \lesseqgtr q^* \Leftrightarrow h(q) \gtreqless 0$. Straightforward computations yield $h(q^{**})=rq^{**}/n$, with r given by (17) ,which is negative. Hence $q^{**}\geq q^*$. Then, a soon as $q^m \leq q^*$,we have $P(q^m)\geq P(q^*)\geq P(q^{**})$.

Appendix : differentiated price setting duopoly

In the open loop price-setting case, the upstream unit i maximization program (8) becomes

$$\left\{\begin{array}{l} \max_{p_i,g_i}\left[\alpha_i p_i q_i+(1-\alpha_i)g_i q_i\right] \\ (p_i-g_i)\frac{\partial q_i}{\partial p_i}+q_i=0, \end{array}\right. \tag{18}$$

where q_i is given by (11). Introducing Lagrangian $L_i = \alpha p_i q_1 + (1-\alpha_i)g_i q_i + \lambda((p-g_1)\frac{\partial q_i}{\partial p_i}+q_i)$ leads to the following necessary conditions:

$$\begin{aligned} \alpha_i\left(p_i\frac{\partial q_i}{\partial p_i}+q_i\right)+(1-\alpha_i)g_i\frac{\partial q_i}{\partial p_i}+\lambda((p_i-g_i)\frac{\partial^2 q_i}{\partial p_i^2}+2\frac{\partial q_i}{\partial p_i}) &= 0, \\ (p_i-g_i)\frac{\partial q_i}{\partial p_i}+q_i &= 0, \\ (1-\alpha_i)q_i-\lambda\frac{\partial q_i}{\partial p_i} &= 0. \end{aligned}$$

After simplifying, this provides the equilibrium conditions (12).

Proof of theorem 8

Nash conditions (12) become in the linear demand case : :

$$\begin{aligned} \left(\pi\frac{\partial q_i}{\partial \pi}+q_i\right)+2(1-\alpha)q_i &= 0,\ \text{for } i=1,..,m. \\ \left(p_j\frac{\partial q_j}{\partial p_j}+q_j\right)+2(1-\alpha)q_j &= 0,\ \text{for } j=m+1,..,n \\ p_j &= \bar{p}_m, \text{for } j=m+1,..n. \end{aligned} \tag{19}$$

Solving equations (19) yields the equilibrium prices π_m and $\bar{p}_m$ respectively charged by the insiders and the outsiders, given by complicated formulas available upon request from the author. Hence the insider profit $P(m)=\pi_m q_m$. For $m=1$, we get the no merger case, with prices $\pi_1=\bar{p}_1=\dfrac{n\,(3-2\alpha)}{2n(2-\alpha)+\gamma(n-1)}$, and profit per firm $P()=\dfrac{n\,(3-2\alpha)\,(n+\gamma n-\gamma)}{(-4n+2\alpha n-\gamma n+\gamma)^2}$.

Merger is privately profitable for values of m such that $P(m) \geq P(1)$. It can be checked - at least by exploring numerically various reasonable sets of γ and n values - that function $P(.)$ is convex. The derivative $P'(1)$ is nul for $\alpha = \bar{\alpha}$,with

$$\bar{\alpha} = \left(\frac{\left(2\gamma^2(n-1)(n-2)-4\gamma n+14\gamma n^2+12n^2-2(n+\gamma n-\gamma)\sqrt{\left(\gamma^2(n-2)^2+4n^2(\gamma+1)\right)}\right)}{8n^2(\gamma+1)} \right).$$

. For $\alpha \geq \bar{\alpha}$, $P'(1) \geq 0$. Convexity of for P implies $P'(m) > 0$, . i.e. $P(m) > P(1)$, $\forall m \leq n$. For $\alpha < \bar{\alpha}$, $P'(1) < 0$; there exists m^* such that $P(m) < P(1)$, for $m \in [1, m^*]$. Since $P(n) = P^m =$ the monopoly profit , $P(n) > P(1)$ and then $m^* < n$.

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