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INTRA-FIRM BRANCH COMPETITION FOR A MONOPOLIST

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Abstract: This paper studies the effect of intra-firm branch competition in a monopoly setting. It demonstrates that intra-firm branch competition has significant impact on the firm's operation decisions, and consequently on market outcome. In particular, under certain conditions, a branch-competitive monopoly supplies hgiher quality at the same or lower price than a corresponding pure monopoly.

Keywords: intra-firm competition, monopoly.

Intra-firm Branch Competition for a Monopolist

Competition is the process by which one strives for better performance against one's rivals. The traditional production theory concludes that since a monopolist, by definition, has no existing rivals in the market, it does not compete[1]. This conclusion is based on the general neoclassical framework that treats the firm as the primary participant of market competition. While this framework has generated many important insights on *inter*-firm competition, it has ignored the internal structure of the firm, and thus has assumed away the possible effects of competition within a firm (*intra*-firm competition).

We are drawn to the importance of intra-firm competition by some factual observations. Firstly, after a major merger of some retailing firms, we were told by a credible source that they "still compete against each other". Secondly, we observe that prices for the same items in different branches of the same firm differ in ways that cannot be explained by cost differentials (for example, the distance between different branches and port or city centre may be similar, yet the branches charge distinctly different prices), which suggests that the branches may be engaging in price competition. Thirdly, being a staff member of a university that merged with another, one of the authors actually feels more competition after the merger. These observations seem to confirm the existence (or even the prevalence) of intra-firm competition. In addition, there is a good reason for such intra-firm competition -- a branch manager is naturally more interested in the performance of his own branch than that of the firm as a whole.

[1] Here we ignore the possibility of a contestable market where a monopolist may have to compete against potential rivals for a market.

In the past decade, there have been a few studies addressing the role of intra-firm competition. For instance, Lazear and Rosen (1981) modelled intra-firm competition as rank-order tournaments and compared the compensation scheme based on workers' rank order with that based on workers' output level. Their work has been generalised by Nalebuff and Stiglitz (1983). Since the motivation of these studies was to find the organisational design that provides the most work incentive, the authors focused on the role of intra-competition in improving the organisational efficiency of the firm, and mostly left unanalysed the effect of intra-firm competition on the firm's market choices (output, price, *etc.*).

This paper attempts to model the latter effect in a monopoly setting. It intends to show that a monopolist can have competition within itself and such competition has significant influence on market outcome.

In the following, we first present the general model of a pure monopoly where intra-firm competition is absent and of a monopoly with intra-firm competition (branch-competitive monopoly), and compare the market outcome of the two types of monopolists. We then illustrate the general model using specific functional forms. Finally, we present the conclusion and possible policy implications.

1. The general model

To facilitate the analysis of different decisions by the firm's central administration (headquarter) and by its branches, we take the simplest case of two decision variables, the price (P) and the quality (Q) of the product (or provision). The analysis can be generalised to cover other variables.

Consider the case of a pure monopoly (PM) first. Suppose that the monopoly's cost function depends on both the quantity (X) and the quality (Q) of the product, and that the consumer demand faced by the monopoly is also a function of X and Q. The monopoly chooses price and quality to maximise its profit, i.e.,

$$\max_{P,Q} \prod = PX(P,Q) - C(X,Q)$$

The first-order conditions are:

$$\prod_P = X + PX_P - C_X X_P = 0 \quad (1)$$

$$\prod_Q = PX_Q - C_Q = 0 \quad (2)$$

where $a_b = \dfrac{\partial a}{\partial b}$ (this notation will be used through out the paper).

Now consider the case of a branch-competitive monopoly which consists of N symmetrical branches (BC). Casual observation tells us that as a rule, the headquarter controls all its branches, yet each branch has some decision power as well. The absence of the headquarter's total control may be mainly attributed to the cost of monitoring and the lack of knowledge of local situations. Thus, at least in some cases, total control may be costly and/or undesirable if it discourages adaptation to local situations. For example, a uniform price or quality specification by the headquarter would rule out the most profitable (even from the whole firm's point of view) price-quality mixture in accordance to specific local conditions.

However, for simplicity, we assume in our model that the headquarter controls the price of the good (P) to maximize the profit of the firm as whole, while each branch can choose its own quality (Q^i) to maximize the profit of its own branch, or in other words, branches compete with one another by choosing quality. This implies that each branch's demand depends on both its own quality and the quality of other branches, i.e., $X^i = X^i(P, Q^i, Q)$, where we use the average quality (Q) to approximate the quality of other branches, assuming the number of branches is large[2].

This maximisation problem can be solved in 2 stages. Though in reality the headquarter chooses price before the branches decide on their quality levels, analytically the reverse orders should be used. This is because each (small) branch takes the price chosen by the headquarter as beyond its control, whereas the headquarter recognises its possible influence on the decisions of its branches and consequently its optimisation decision has to include some elements of the branches' optimisation outcome. Thus, at the (analytically) first stage, each branch chooses its own quality Q^i, taking P and other branches' quality Q as given, i.e.,

$$\max_{Q^i} \prod{}^i = PX^i(P, Q^i, Q) - C^i(X^i, Q^i)$$

The first-order condition is

$$\prod{}_{Q^i} = PX^i{}_{Q^i} - C^i{}_{Q^i} = 0 \qquad (3)$$

[2] The analysis below also applies to cases where N is small as long as each branch still takes the price and other branches' quality as beyond its control.

At the second stage, the headquarter chooses P, knowing that although it has no direct control over Q, its choice of P indirectly affects each branch's choice of Q^i, i.e.,

$$\max_P \prod = PX(P,Q(P)) - C(X,Q(P))$$

where Q(P) equals Q^i (as the branches are assumed to be symmetric) which is the solution to equation (3).

The first-order condition is

$$\prod\nolimits_P = X + PX_P + PX_Q \frac{dQ}{dP} - C_X X_P - C_Q \frac{dQ}{dP} = 0 \tag{4}$$

Next we investigate how the pure monopoly's market decisions differ from those of the branch-competitive monopoly. First look at the quality decision.

Rewrite equation (2) into

$$PX_Q\Big|_{P_{PM}} = C_Q\Big|_{P_{PM}} \tag{2'}$$

where $\Big|_{P_{PM}}$ means "evaluated at the pure monopoly's equilibrium price level".

Consistent with Q being each branch's decision variable, we take the whole firm's marginal cost with respect to quality as the sum of the N branches' marginal cost, i.e.,

$$C_Q = C^i{}_{Q^i} N \tag{5}$$

We then argue that

$$PX^i{}_{Q^i} > PX_Q / N \tag{6}$$

where $X^i{}_{Q^i}$ represents the response of branch i's demand to a change in this branch's quality, while the quality of other branches remains unchanged; and X_Q / N represents the response of branch i's demand to a change in the quality of all branches.

When only branch i increases its quality, its demand response can be said to consist of two effects -- first, it will have more demand from its old customers, second, it will attract new customers from other branches which now have lower quality than branch i. In contrast, if all branches increase their quality, the second effect will be absent. Similar reasoning applies to the case of a quality decrease. Hence, branch i's demand response to its own quality change must be greater than the demand response to an average quality change, or in other words, equation (6) holds.

From equations (2') and (5) and (6), we derive

$$PX^i{}_{Q^i}\Big|_{P_{PM}} > C^i{}_{Q^i}\Big|_{P_{PM}} \tag{7}$$

Rewrite the first-order condition for the monopoly with branch competition equation (3) into

$$PX^i{}_{Q^i}\Big|_{P_{BC}} = C^i{}_{Q^i}\Big|_{P_{BC}} \tag{3'}$$

Comparing equation (7) to equation (3'), we derive that at the pure monopoly's equilibrium price level, branch i's marginal revenue from a change in quality is greater than the marginal cost, thus branch i would increase its quality. If branch i faces a higher price than the pure monopoly's equilibrium price level, it has even more incentive to increase quality. This leads to

Proposition 1 Under similar cost and demand conditions, for the same or higher price, a branch-competitive monopoly supplies higher quality than a pure monopoly.

Next, we look at the price decision. The difference in the price decision for the two types of monopolists results from their different abilities to control the quality of their output. From Proposition 1, we know that a branch-competitive monopoly supplies a higher quality at any given price level. This higher quality has two effects on the branch-competitive monopoly's price decision.

First, the counter-quality effect. Knowing that the branches will compete in quality and thus producing excess quality from the whole firm's point of view, the headquarter would want to reduce the branches' quality level. As the headquarter can only indirectly affect each branch's quality by changing the price level, it will reduce/increase price level if the effect of price on quality is positive/negative; if the effect of price on quality is zero, then the headquarter does not have any control (direct or indirect) on each branch's quality, and it has no incentive to charge a price different from that of the pure monopoly as far as the counter-quality effect is concerned.

Second, the demand-adaptation effect. The higher quality implies that the branch-competitive monopoly has a higher demand than the pure monopoly, which means that the headquarter may want to charge a deferent price in view of the higher demand. The direction of the price change depends on whether the price elasticity of the higher demand is different from that of the pure monopoly's (lower) demand, and whether the marginal cost with respect to quantity, which is assumed here to be independent of quality[3], changes with the level of output. We illustrate this in Figure 1 assuming the marginal cost with respect to quantity is constant.

In the graph on the right, the pure monopoly's marginal revenue (with respect to quality) mr and the marginal cost curve mc determines its optimum quality Q. At this quality, it supplies quantity X at Price P (shown in the graph on the left). In contrast, the branch-competitive monopoly has a higher marginal revenue curve (with respective to quality) mr1 and consequently chooses a higher quality Q1. At the higher quality, the branch-competitive monopoly's demand curve shifts up. If it shifts to D1, which has the same elasticity as D at the same price level, then MR shifts accordingly to MR1, and the branch-competitive monopoly charges the same price as the pure monopoly (P1 = P). If the demand curve shifts to D2, which is more elastic, then MR shifts accordingly to MR2, and the branch-competitive monopoly charges a lower price P2. If the demand curve shifts to D3, which is less elastic, the branch-competitive monopoly charges a higher price P3.

Taking into account both of the counter-quality and the demand-adaptation effects, we now investigate, with reference to the monopolists' first-order conditions, how a branch-competitive monopoly's price is different from a pure monopoly's at equilibrium.

The pure monopoly's price decision satisfies its first-order condition equation (1), which is rewritten into

$$P(1+\frac{1}{\eta})\Big|_{Q_{PM}} = C_X\Big|_{Q_{PM}} \qquad (1')$$

where η is the price elasticity of demand.

[3] The case where marginal cost with respect to quantity increases with quality will be discussed later in this section.

At the pure monopoly's equilibrium price level, a branch-competitive monopoly chooses a quality that satisfies its first-order condition equation (3), i.e.,

$$PX^i{}_{Q^i}\Big|_{P_{PM}} = C^i{}_{Q^i}\Big|_{P_{PM}} \tag{3'}$$

Recall equation (6)

$$PX^i{}_{Q^i} > PX_Q / N \tag{6}$$

Equations (3') and (6) imply that for a branch-competitive monopoly,

$$PX_Q\Big|_{P_{PM}} < C_Q\Big|_{P_{PM}}$$

which in turn implies

$$\left(\frac{PX_Q - C_Q}{X_P}\right)\frac{dQ}{dP} \begin{matrix} > \\ = \\ < \end{matrix} 0 \qquad\qquad \left(\frac{dQ}{dP} \begin{matrix} > \\ = \\ < \end{matrix} 0\right) \tag{8}$$

where $\dfrac{dQ}{dP} = \dfrac{X^i{}_{Q^i} - C^i{}_{Q^i X^i} X^i{}_P + PX^i{}_{Q^i P}}{C^i{}_{Q^i X^i} X^i{}_{Q^i} + C^i{}_{Q^i X^i} X^i{}_Q + C^i{}_{Q^i Q^i} - PX^i{}_{Q^i Q^i} - PX^i{}_{Q^i Q}}$ (see Appendix 1) [4]

Equation (8) implies that at the pure monopoly's equilibrium price level, the marginal revenue from a quality change for the branch-competitive monopoly (from the headquarter's

[4] We initially thought that dQ / dP should be positive. Our reason was that an increase in price means an increase in unit profit, which would provide extra incentive for each branch to increase its own quality in order to attract customers away from other branches and increase its own sales. As a result, the average quality would increase. However, what we had ignored was that an increase in price also reduces the aggregate demand and thus the demand for each branch, which serves as a disincentive for branches to increase quality. Hence, while dQ / dP is likely to be positive, we cannot rule out the possibility of it being negative. This can be seen in the above expression of dQ / dP -- the denominator is positive, and the first two terms combined in the numerator is also positive, but the last term $PX^i{}_{Q^i P}$ is negative.

viewpoint) is less than the marginal cost, thus the headquarter would want to reduce quality by changing the price level. This captures the counter-quality effect.

Adding equations (1') and (8), we have

$$P(1+\frac{1}{\eta})\Big|_{Q_{PM}} + (\frac{PX_Q - C_Q}{X_P})\frac{dQ}{dP}\Big|_{P_{PM}} \overset{>}{\underset{<}{=}} C_X\Big|_{Q_{PM}} \qquad \left(\frac{dQ}{dP} \overset{>}{\underset{<}{=}} 0\right) \tag{9}$$

Equation (9) suggests that at the pure monopoly's equilibrium price and quality level, the marginal revenue (with respect to quantity) for the branch-competitive monopoly-with-branch-competition is higher than the marginal cost, thus the monopoly would increase quantity and reduce price. However, as mentioned before, at the pure monopoly's equilibrium price level, the branch-competitive monopoly supplies higher quality, and thus has a higher demand If the higher demand corresponds to a different price elasticity (η) and/or a different marginal cost (C_X), the branch-competitive monopoly will change its price accordingly. Hence, to determine whether the branch-competitive monopoly charges a lower price *at equilibrium*, we need to find out whether equation (9) still holds with the different η and/or C_X. We discuss this in the following, focusing on the case where $dQ/dP > 0$.

First, assuming marginal cost (C_X) is constant. If the price elasticity (η) for the branch-competitive monopoly is lower, then $P(1+\frac{1}{\eta})$ is smaller at any given price. Although $(\frac{PX_Q - C_Q}{X_P})\frac{dQ}{dP}$ is positive, it may not be large enough to compensate the lower value of $P(1+\frac{1}{\eta})$, thus we cannot determine whether the branch-competitive monopoly charges a lower price than the pure monopoly. However, if the price elasticity for the branch-competitive monopoly is no lower, then $P(1+\frac{1}{\eta})$ is no lower, and equation (9) still holds, which implies the branch-competitive monopoly charges a lower price for higher quality goods *at equilibrium.*

The case with a changing marginal cost is more complicated. If marginal cost increases with output, the branch-competitive monopoly has a higher marginal cost (C_X) because of its higher demand. This means that equation (9) may not hold even if the price elasticity (η) for the branch-competitive monopoly is higher. In contrast, if marginal cost decreases with output, then equation (9) may still hold even if the price elasticity (η) for the branch-competitive monopoly is lower.

Applying a similar approach, we can also analyse the cases where $dQ/dP=0$ and $dQ/dP<0$ respectively.

We present the overall results of the above analysis in Table 1.

From Table 1, we have

Proposition 2. Under similar cost and demand conditions,

(1) a branch-competitive monopoly charges a lower price than a pure monopoly *at equilibrium* if

(i) the effect of price on quality is positive, its price elasticity of demand is constant or higher and its marginal cost with respect to quantity (assumed to be independent of quality) is constant or decreasing; or

(ii) the effect of price on quality is zero, its price elasticity of demand is constant or higher and its marginal cost with respect to quantity is decreasing;

(iii) the effect of price on quality is zero, its price elasticity of demand is higher and its marginal cost with respect to quantity is constant.

(2) a branch-competitive monopoly charges the same price as a pure monopoly if the effect of price on quality is zero, its price elasticity of demand is constant and its marginal cost with respect to quantity is constant.

(3) a branch-competitive monopoly charges a higher price than a pure monopoly if

(i) the effect of price on quality is zero, its price elasticity of demand is constant or lower and its marginal cost with respect to quantity is increasing; or

(ii) the effect of price on quality is zero, its price elasticity of demand lower and its marginal cost with respect to quantity is constant or increasing; or

(iii) the effect of price on quality is negative, its price elasticity of demand is constant or lower and its marginal cost with respect to quantity is constant or increasing.

Proposition 2 tells how the equilibrium price for the branch-competitive monopoly differs from that for the pure monopoly. It also helps us to determine the difference in the equilibrium quality levels for the two types of monopolists. If the conditions (2) and (3) in Proposition 2 are satisfied, the branch-competitive monopoly charges a price no lower than a pure monopoly, which implies (from Proposition 1) that it will supply higher quality at equilibrium than the pure monopoly. Thus we have

Proposition 3. Under similar cost and demand conditions, if the conditions (2) and (3) in Proposition 2 are satisfied, a branch-competitive monopoly supplies higher quality at equilibrium than a pure monopoly.

The analysis in this section suggests that at a given quality level, a branch-competitive monopoly charges a price lower than /higher than /same as a corresponding pure monopoly if the effect of price on quality is positive /negative /zero; and at a given price level, a branch-competitive monopoly supplies higher quality than a pure monopoly. However, *at equilibrium*, if a branch-competitive monopoly charges a price higher than or the same as a pure monopoly, it will supply higher quality; if it charges a lower price, then it is ambiguous whether it will supply a higher quality than the pure monopoly's equilibrium quality level. Hence. the welfare implication of the two types of monopoly is not straightforward. If a branch-competitive monopoly charges the same price as and supplies higher quality than a pure monopoly (under the conditions in Proposition 2 (2)), a branch-competitive monopoly achieves higher efficiency. But in general, we can't be certain whether a branch-competitive monopoly is superior to a pure monopoly from the social point of view.

So far we have assumed that the marginal cost with respect to quantity is independent of quality, i.e., $C_{XQ} = 0$. we can further extend the analysis to include the case where the effects of quality on marginal cost of quantity is non-zero. It is possible that an increase in quality increases the marginal cost of quantity, but the increase in cost is likely to be proportionally less than the quality increase. i.e., $0 < C_{XQ} < 1$. then with reference to equation (9), we can still show, for the case where a branch-competitive monopoly supplies higher quality at the same (or lower) price, that the price per unit of quality is lower for the branch-competitive monopoly, or that price increases (if at all) by a lower proportion than quality.

In the following, we illustrate the general model in this section with specific functions of consumer utility and producer costs.

2. An illustration

We start with the derivation of the consumer demand function. Suppose the representative consumer has a Cobb-Douglas utility function

$$U = X^{\eta} Y, \qquad I = \frac{(Q/P)^{\alpha}}{1-\gamma(Q/P)^{\alpha}} \qquad \left(0 < \alpha, \gamma \frac{Q}{P} < 1\right)$$

where X is the good produced by the industry of our concern, and Y represents other goods; γ is a parameter that indicates the relative importance of the X industry in the whole economy (and thus it is reasonable to assume it to be a lot less than one). I is a quality index which increases with Q and decreases with P. The design of the index reflects the hypothesis that both higher quality and lower price increase utility. That a lower price contributes to consumer utility can be justified by the observation that consumers usually gain some extra psychological satisfaction from obtaining a bargain, which is over and above the satisfaction obtained by the increase in consumption due to the lower price. In addition, the more important the item X is, the higher the utility gained form higher quality and the higher the extra psychological satisfaction from a bargain, thus I increases with γ. (Readers who are not comfortable with this specification can dispense with the utility function and start directly from the conventional demand function itself (equation (10) below).

The representative consumer maximises utility subject to the budget constraint

$$PX + Y = E$$

where P is the relative price of X to Y; E is the total endowment.

Solving the consumer's maximisation problem, we obtain the consumer demand for X (see Appendix 2)

$$X = \gamma E P^{-(1+\alpha)} Q^{\alpha} \tag{10}$$

Given the constant elasticity demand function, we now look at how monopolies of different internal structures behave differently.

(1) Pure monopoly

The pure monopoly chooses price and quality to maximize its profit. Suppose the pure monopoly's cost function is $C = xX + qQ$ (which implies a constant marginal cost with respect to quantity and quality), its decision problem is

$$\max_{P,Q} \prod = PX - C = P\gamma E P^{-(1+\alpha)} Q^{\alpha} - (x\gamma E P^{-(1+\alpha)} Q^{\alpha} + qQ)$$

Solving this problem, we can obtain the optimal level of price, quantity and quality for the pure monopoly (see Appendix 2). The results are presented in Table 2.

(2) Branch-Competitive Monopoly

Suppose the monopoly has N symmetric branches. Each branch's cost will be 1/N of the total cost, i.e., $C^{i} = (xX + qQ)/N = xX^{i} + qQ^{i}/N$. And each branch's demand will be $X^{i} = \gamma\, E P^{-(1+\alpha)} Q^{i\,\alpha+\beta} Q^{-\beta}/N$. This implies that a branch's demand relates positively to its own quality and negatively to the quality of its competitors (approximated by the average quality assuming N is large). It also reflects our argument in the last section that a quality change by a single branch has a larger effect ($\alpha+\beta$) on this branch's demand than an overall quality change (α).

The monopoly's decision can be thought of as having two stages. At the first stage, each branches chooses quality to maximise its own profit, taking price and other branches' quality as given, i.e.,

$$\max_{Q^i} \prod{}^i = PX^i - C^i = (P\gamma\, EP^{-(1+\alpha)}Q^{i(\alpha+\beta)}Q^{-\beta} - x\gamma\, EP^{-(1+\alpha)}Q^{i(\alpha+\beta)}Q^{-\beta} - qQ^i)\,/\,N$$

At the second stage, the headquarter chooses price to maximize profit taken the average quality as given. Hence its decision problem is

$$\max_{P} \prod = PX - C = P\gamma EP^{-(1+\alpha)}Q^{\alpha} - (x\gamma EP^{-(1+\alpha)}Q^{\alpha} + qQ)$$

where Q equals the solution to the first stage problem Q^i since the branches are assumed to be symmetric.

Solving the two-stage problem as in the previous section, we can find the optimal price, quality, and quality for the monopoly with branch competition (see Appendix 2). The results are presented in Table 2.

To make our analysis complete, we also present in Table 2 the equilibrium outcome for an unconstrained social planner and that for a constrained social planner. An unconstrained social planner is assumed to choose quantity and quality to maximize net social gain defined as the total social value of production (the area under the demand curve) net of the total production cost, i.e.,

$$\max_{X,Q} W = \int_0^X P(S)dS - xX - qQ = \int_0^X (rE)^{\frac{1}{1+\alpha}} S^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} dS - xX - qQ$$

A constrained social planner maximises the same net social gain, but is subject to a zero profit constraint (see Appendix 2).

From Table 2 we conclude that the branch-competitive monopoly charges the same price, yet supplies more quantity and higher quality.[5] However, the branch-competitive monopoly charges a higher price and supplies lower quantity and quality than a constrained social planner, and the constrained social planner in turn charges a higher price and supplies lower quantity and quality than an unconstrained social planner.

Next, we go a step further to look at the net social gain associated with different types of producers. Two measures are applied here. One is a partial equilibrium measure which defines net social gain as the net total social value of the product, i.e., the total consumer valuation minus the total production cost,

$$W = \int_0^X P(S)dS - xX - qQ = \int_0^X (\gamma E)^{\frac{1}{1+\alpha}} S^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} dS - xX - qQ$$

The other is a general equilibrium measure. We assume a consumer's gain is simply his/her utility. Since the consumer in our model is representative, we can use the utility to approximate the social gain. It should be noted that in a general equilibrium framework, the consumer is also the owner of the firm, thus the profit (loss) made by the firm should be converted into positive (negative) utility. Here we use the marginal utility of income at the

[5] This does not represent the general result, but is consistent with Proposition 2 (2) as the demand elasticity is constant, the marginal cost with respect to quantity is constant and independent of the marginal cost with respect to quality, and it can be shown that the effect of price on quality is zero (see Appendix 2).

equilibrium level to convert profit (loss) into utility (Ng, 1983)[6]. Hence, our general equilibrium social gain function is

$$W = X^{\eta} Y + \lambda \pi$$

where λ is the equilibrium level marginal utility of income.

We realise that there is inconsistency in using the general equilibrium social gain measure because by our definition, the social planners maximize the social gain defined by the partial equilibrium measure. However, we think that our comparison is still relevant because in practice, policy choices are often made based on a partial equilibrium analysis, yet the impact of the policy can affect the economy as a whole[7].

Substituting the equilibrium quantity and quality into the two social gain functions respectively, and assuming specific parameter values (namely $E = 100$, $x = 0.1$, $q = 1$, $\alpha = 0.5$, $\beta = 0.1$, $\gamma = 0.01$), we obtain the numerical social gain for different producers (see Appendix 3), which are presented in Table 3.

Table 3 suggests that by both measures, the branch-competitive monopoly produces higher social gain than the pure monopoly, but lower social gain than the constrained social planner. The unconstrained social planner produces the highest social gain[8].

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[6] Ideally, the profit (loss) should be incorporated in the consumer's budget constraint, so that the consumer's choice problem becomes max $U = X^{\eta} Y$, subject to $PX + Y = E + \pi$. Unfortunately, the demand function derived from this consumer problem is no longer Cobb-Douglas, which makes the producer choice problem difficult to solve. Thus, we avoid this computational difficulty and only calculate an approximate value of the general equilibrium social welfare.

[7] Different policy choices are often made not by the government as a whole, but by different government departments. It stands to reason that one department may not care, or not as much as it should, how its policies affect sections under other departments' control. This is an interesting research topic in the public choice field which may be studied along similar lines as this paper.

3. Conclusion

In this paper, we have shown that intra-firm competition can have a significant effect on the firm's operation decisions, which in turn affects the market outcome. In general, at similar quality level, a branch-competitive monopoly charges a price lower than /higher than /same as a corresponding pure monopoly if the effect of price on quality is positive /negative /zero; and at similar price level, a branch-competitive monopoly supplies higher quality than a pure monopoly. Moreover, under certain conditions, a branch-competitive monopoly charges the same price as a pure monopoly but supplies higher quality. In the specific model with a Cobb-Douglas utility function and linear cost functions, we found that the branch-competitive monopoly produces more quantity, higher quality and higher social gain than the pure monopoly. We also found that a social planner (constrained or unconstrained) produces higher social gain than the 2 types of monopolies.

The result of this paper implies that by neglecting the firm's internal structure, the traditional analysis of the market structure may be biased. For example, the traditional analysis may over-estimate (or less likely, under-estimate) the anti-competitive effect of a merger if the firms continues to compete with each other after they have merged. This may have important policy implications because in reality, competition after a merger is often not reduced, or at least not by as much as commonly thought; in some cases, competition is even more fierce among firms after they have merged (probably because that competitors can observe each other more closely, and thus feel more competitive pressure).

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[8] The apparent divergence between the partial equilibrium and the general equilibrium social gain is due to the fact that the latter takes into account the utility associated with the consumption of good Y whereas the former does not.

This paper is our first attempt to relate the firm's internal structure to the market outcome. It has only investigated the role of intra-firm branch competition in a simple monopoly model. Further studies can extend the model to more complicated market structures.

Figure 1

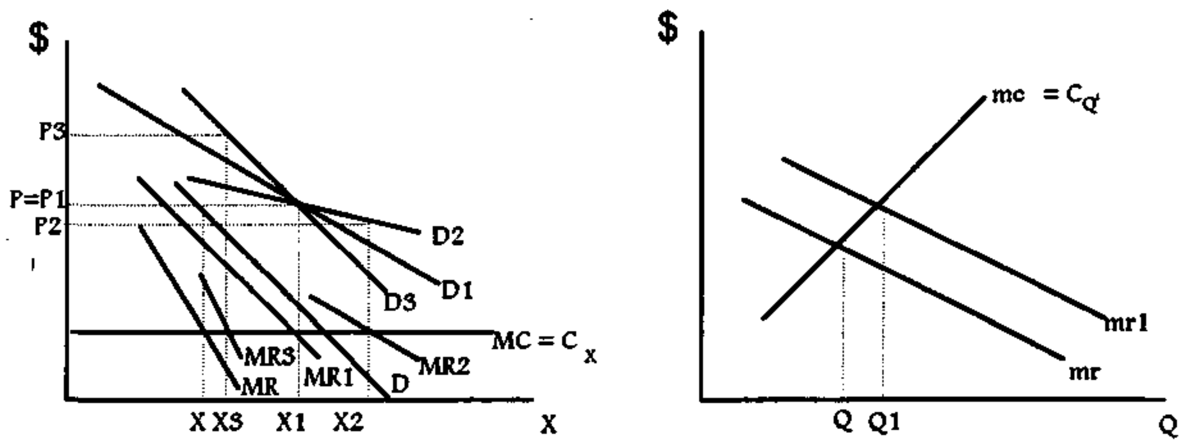
$
P3
P=P1
P2
D2
D1
D3
MC = C X
MRS
MR
MR1
D
MR2
X XS X1 X2
X
$
mc = Cq
mr1
mr
Q Q1
Q

Table 1. The price choice for the branch-competitive monopoly

(Assuming marginal cost of quantity is independent of quality)

		$dQ/dP>0$	$dQ/dP=0$	$dQ/dP<0$
Increasing MC	higher η	?	?	?
	Constant η	?	higher P	higher P
	lower η	?	higher P	higher P
Constant MC	higher η	lower P	lower P	?
	Constant η	lower P	same P	higher P
	lower η	?	higher P	higher P
Decreasing MC	higher η	lower P	lower P	?
	Constant η	lower P	lower P	?
	lower η	?	?	?

Table 2

Producers	Price	Quantity	Quality
Pure Monopoly	$\frac{x(1+\alpha)}{\alpha}$	$(1+\alpha)^{\frac{1+\alpha}{\alpha-1}}\alpha^{\frac{1}{1-\alpha}}\alpha^{\frac{\alpha}{1-\alpha}}q^{\frac{\alpha}{\alpha-1}}x^{\frac{1}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$	$(1+\alpha)^{\frac{1+\alpha}{\alpha-1}}\alpha^{\frac{1}{1-\alpha}}\alpha^{\frac{\alpha}{1-\alpha}}q^{\frac{1}{\alpha-1}}x^{\frac{\alpha}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$
Monopoly with Branch Competition	$\frac{x(1+\alpha)}{\alpha}$	$(1+\alpha)^{\frac{1+\alpha}{\alpha-1}}\alpha^{\frac{1}{1-\alpha}}(\alpha+\beta)^{\frac{\alpha}{1-\alpha}}q^{\frac{\alpha}{\alpha-1}}x^{\frac{1}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$	$(1+\alpha)^{\frac{1+\alpha}{\alpha-1}}\alpha^{\frac{1}{1-\alpha}}(\alpha+\beta)^{\frac{\alpha}{1-\alpha}}q^{\frac{1}{\alpha-1}}x^{\frac{\alpha}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$
Constrained Social Planner	$2x$	$2^{\frac{1+\alpha}{\alpha-1}}q^{\frac{\alpha}{\alpha-1}}x^{\frac{1}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$	$2^{\frac{1+\alpha}{\alpha-1}}q^{\frac{1}{\alpha-1}}x^{\frac{\alpha}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$
Unconstrained Social Planner	x	$q^{\frac{\alpha}{\alpha-1}}x^{\frac{1}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$	$q^{\frac{1}{\alpha-1}}x^{\frac{\alpha}{\alpha-1}}(\gamma E)^{\frac{1}{1-\alpha}}$

Table 3

Producers	Partial Equilibrium Social Gain	General Equilibrium Social Gain
Pure Monopoly	2.56	100.71
Monopoly-with-Branch-Competition	3.03	101.01
Constrained Social Planner	5.00	104.01
Unconstrained Social Planner	10.00	133.44

Appendix 1. The derivation of $\frac{dQ}{dP}$

Totally differentiating equation (3), we get

$$X^i_{Q^i}dP + PX^i_{Q^iQ^i}dQ^i + PX^i_{Q^iP}dP + PX^i_{Q^iQ}dQ = C^i_{Q^iQ^i}dX^i + C^i_{Q^iQ}dQ^i \tag{A1.1}$$

Then totally differentiating

$X^i = X^i(P, Q^i, Q)$,

we have

$$dX^i = X^i_P dP + X^i_{Q^i}dQ^i + X^i_Q dQ \tag{A1.2}$$

Substituting (A1.2) and $dQ = dQ^i$ into (A1.1) and re-arranging gives

$$\frac{dQ}{dP} = \frac{X^i_{Q^i} - C^i_{Q^iX^i}X^i_P + PX^i_{Q^iP}}{C^i_{Q^iX^i}X^i_{Q^i} + C^i_{Q^iX^i}X^i_Q + C^i_{Q^iQ^i} - PX^i_{Q^iQ^i} - PX^i_{Q^iQ}}$$

Appendix 2. The derivation of the equilibria for different producers

1. Consumer demand

The representative consumer's decision problem is

$$\max\ U = X^{\gamma I} Y,$$

where $I = \dfrac{(Q/P)^{\alpha}}{1-\gamma(Q/P)^{\alpha}}$ $\left(0<\alpha,\gamma\dfrac{Q}{P}<1\right)$

subject to $PX + Y = E$

The Lagrangian equation is $\underset{X,Y}{L} = X^{\gamma I} Y + \lambda(E - PX - Y)$

The first-order conditions are:

$$\begin{aligned} L_X' &= \gamma I X^{\gamma I-1} Y - \lambda P = 0 \\ L_Y &= X^{\gamma I} - \lambda = 0 \end{aligned} \qquad \text{(A2.1)}$$

Solving the first-order conditions gives

$$X = \gamma E P^{-(1+\alpha)} Q^{\alpha}$$

2. Pure monopoly

The pure monopoly 's decision problem is

$$\max_{P,Q} \prod = PX - C = P\gamma\ EP^{-(1+\alpha)}Q^{\alpha} - (x\gamma\ EP^{-(1+\alpha)}Q^{\alpha} + qQ)$$

The first-order conditions are

$$\prod\nolimits_P = -\alpha\gamma E P^{-(1+\alpha)} Q^{\alpha} + (1+\alpha)x\gamma E P^{-2-\alpha} Q^{\alpha} = 0$$

$$\prod\nolimits_Q = \alpha\gamma E P^{-\alpha} Q^{\alpha-1} - \alpha x\gamma E P^{-1-\alpha} Q^{\alpha-1} - q = 0$$

Solving the first-order conditions gives

$$P_{PM} = \frac{x(1+\alpha)}{\alpha}$$

$$X_{PM} = (1+\alpha)^{\frac{1+\alpha}{\alpha-1}} \alpha^{\frac{1}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}} q^{\frac{\alpha}{\alpha-1}} x^{\frac{1}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

$$Q_{PM} = (1+\alpha)^{\frac{1+\alpha}{\alpha-1}} \alpha^{\frac{1}{1-\alpha}} \alpha^{\frac{\alpha}{1-\alpha}} q^{\frac{1}{\alpha-1}} x^{\frac{\alpha}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

3. Branch-Competitive Monopoly

The firm's decision problem consists of two stages. At the first stage, branch i solves the following problem:

$$\max_{Q^i} \prod{}^i = PX^i - C^i = (P\gamma EP^{-(1+\alpha)}Q^{i(\alpha+\beta)}Q^{-\beta} - x\gamma EP^{-(1+\alpha)}Q^{i(\alpha+\beta)}Q^{-\beta} - qQ^i) / N$$

The first-order condition implies

$$Q^i = P^{\frac{1+\alpha}{\alpha-1}}(P-x)^{\frac{1}{1-\alpha}} q^{\frac{1}{\alpha-1}} (\alpha+\beta)^{\frac{1}{1-\alpha}} (\gamma E)^{\frac{1}{1-\alpha}} \tag{A2.2}$$

At the second stage, the headquarter's decision problem is

$$\max_{P} \prod = PX - C = P\gamma EP^{-(1+\alpha)}Q^{\alpha} - (x\gamma EP^{-(1+\alpha)}Q^{\alpha} + qQ\ )$$

As Q = Q^i at the equilibrium, we can substitute (A2.2) into the above objective function and solve for P, which gives

$$P_{BC} = \frac{x(1+\alpha)}{\alpha} \tag{A2.3}$$

Substituting (A2.3) into (A2.2) and take derivative with respect to P, we get $\frac{dQ}{dP} = 0$ (see footnote 5 in the text).

Substituting (A2.3) into (A2.2) and the demand function respectively, we have

$$Q_{BC} = (1+\alpha)^{\frac{1+\alpha}{\alpha-1}} \alpha^{\frac{1}{1-\alpha}} (\alpha+\beta)^{\frac{\alpha}{1-\alpha}} q^{\frac{1}{\alpha-1}} x^{\frac{\alpha}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

$$X_{BC} = (1+\alpha)^{\frac{1+\alpha}{\alpha-1}} \alpha^{\frac{1}{1-\alpha}} (\alpha+\beta)^{\frac{\alpha}{1-\alpha}} q^{\frac{\alpha}{\alpha-1}} x^{\frac{1}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

4. **Unconstrained social planner**

The unconstrained social planner's decision problem is

$$\max_{X,Q} W = \int_0^X P(S)dS - xX - qQ = \int_0^X (rE)^{\frac{1}{1+\alpha}} S^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} dS - xX - qQ$$

The first-order conditions are

$$W_X = X^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} (\gamma E)^{\frac{1}{1+\alpha}} - x = 0$$

$$W_Q = X^{\frac{\alpha}{1+\alpha}} Q^{\frac{-1}{1+\alpha}} (\gamma E)^{\frac{1}{1+\alpha}} - q = 0$$

Solving the first-order conditions gives

$$P_{SO} = x$$

$$X_{SO} = q^{\frac{\alpha}{\alpha-1}} x^{\frac{1}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

$$Q_{SO} = q^{\frac{1}{\alpha-1}} x^{\frac{\alpha}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

5. **Constrained social planner**

The constrained social planner's decision problem is

$$\max_{X,Q} W = \int_0^X P(S)dS - xX - qQ = \int_0^X (rE)^{\frac{1}{1+\alpha}} S^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} dS - xX - qQ$$

subject to $\pi = PX - xX - qQ = 0$

The Lagrangian equation is

$$\underset{X,Q}{L} = \int_0^X (\gamma E)^{\frac{1}{1+\alpha}} S^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} dS - xX - qQ + \lambda(PX - xX - qQ)$$

The first-order conditions are

$$L_X = (\gamma E)^{\frac{1}{1+\alpha}} X^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} - x - \lambda(\frac{\alpha}{1+\alpha} (\gamma E)^{\frac{1}{1+\alpha}} X^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} - x) = 0$$

$$L_Q = (\gamma E)^{\frac{1}{1+\alpha}} X^{\frac{\alpha}{1+\alpha}} Q^{\frac{-1}{1+\alpha}} - q - \lambda(\frac{\alpha}{1+\alpha} (\gamma E)^{\frac{1}{1+\alpha}} X^{\frac{\alpha}{1+\alpha}} Q^{\frac{-1}{1+\alpha}} - q) = 0$$

$$L_\lambda = (\gamma E)^{\frac{1}{1+\alpha}} X^{\frac{\alpha}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} - xX - qQ = 0$$

Solving the first-order condition gives

$$P_{CS} = 2x$$

$$X_{CS} = 2^{\frac{1+\alpha}{\alpha-1}} q^{\frac{\alpha}{\alpha-1}} x^{\frac{1}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

$$Q_{CS} = 2^{\frac{1+\alpha}{\alpha-1}} q^{\frac{1}{\alpha-1}} x^{\frac{\alpha}{\alpha-1}} (\gamma E)^{\frac{1}{1-\alpha}}$$

Appendix 3. The derivation of social gain associated with different producers.

1. The partial equilibrium social gain

The partial equilibrium social gain is defined as

$$\begin{aligned} W &= \int_0^X (\gamma E)^{\frac{1}{1+\alpha}} S^{\frac{-1}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} dS - xX - qQ \\ &= \frac{1+\alpha}{\alpha} X^{\frac{\alpha}{1+\alpha}} Q^{\frac{\alpha}{1+\alpha}} (\gamma E)^{\frac{1}{1+\alpha}} - xX - qQ \end{aligned} \tag{A3.1}$$

Substituting into (A3.1) the equilibrium levels of output and quality for different producers respectively and defining $E = 100,\ x = 0.1,\ q = 1,\ \alpha = 0.5,\ \beta = 0.1, \gamma = 0.01$, we obtain

$W_{PM} = 2.56$
$W_{BC} = 3.03$
$W_{CS} = 5.00$
$W_{SO} = 10.00$

2. The general equilibrium social gain

The general equilibrium social gain is defined as

$$W = X^{\gamma/\alpha} Y + \lambda \pi \tag{A3.2}$$

where $\lambda = X^{\gamma/\alpha}$, *and* $\pi = PX - xX - qQ$

Substituting into (A3.2) the equilibrium levels of output and quality for different producers respectively , and defining $E = 100,\ x = 0.1,\ q = 1,\ \alpha = 0.5,\ \beta = 0.1,\ \gamma = 0.01$, we obtain

$W_{PM} = 100.71$
$W_{BC} = 101.01$
$W_{CS} = 104.01$
$W_{SO} = 133.44$

Reference

Lazear, E. and Rosen, S. (1981), "Rank-Order Tournaments as Optimum Labor Contracts", *Journal of Political Economy*, 89, 841-64.

Nalebuff, B. and Stiglitz, J (1983), "Price and Incentives: Towards a General Theory of Compensation and Competition", *Bell Journal of Economics*, 14, 21-43.

Ng, Y-K (1983), *Welfare Economics: Introduction and Development of Basic Concepts*, 2nd edition, London: Macmillan.

---- (1986), *Mesoeconomics: A Micro Macroeconomic Analysis*, Hertfordshire: Wheatsheaf Books Ltd.

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